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JOBS, INDUSTRIALIZATION, and GLOBALIZATION

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Jobs, Industrialization, and Globalization

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Preface

After many decades of expansion, incomes and standards of living have never been better in many parts of the world. Yet global trade and the prospects of growth still seem uncertain, and protectionism seems to be on the rise. In developed countries, there is anxiety over the loss of the manufacturing jobs that once absorbed a large share of the labor force and created a middle class that formed the core of democracy. Most middle-income countries have not yet been able to make the transition to the high-income group despite decades of growth. Progress among low-income countries, particularly the sub-Saharan African countries, in achieving productivity growth and structural change—key features of economic development—has not been encouraging, and reverse structural transformation or deindustrialization has occurred in some countries.

Jobs, Industrialization, and Globalization examines the structural problems pertinent to each of these groups of countries and explores solutions. The book's structural analysis reveals key issues in low-income countries. First, given the wide variations in productivity across sectors, the improvement in overall productivity would be greater through an intersectoral allocation of resources than through an intrasectoral allocation, such as more investment in particular sectors. Thus, it would pay to move resources from low- to high-productivity sectors. Second, for this to occur, more jobs must be created in the higher-productivity sectors so that idle or laid-off workers can also move there. Third, a shift to sectors in which productivity is rising, such as finance or high-value services, may not be an optimal strategy. This is because as productivity rises, there will be more surplus workers as the search for more efficiency shrinks the labor force in these sectors. The best structural transformation would therefore be one in which activities are moved from areas of low productivity to areas of higher, but with constant productivity, as is the case with manufacturing. Fourth, job creation is thus the core strategy to boost growth and achieve structural transformation.

The book highlights a tremendous opportunity for low-income countries to shift resources from low- to higher-productivity sectors. The growth potential of such a structural transformation is greater in sub-Saharan Africa than elsewhere. Two features of African countries strengthens the above policy conclusions. First, the population dynamics in these countries—expanding youth populations with rising aspirations—puts increasing pressure on authorities to create jobs. Second, many countries in this group are resource-based and already face problems because of unemployment, so the job creation issue is at the forefront of their policy agenda.

In low-income countries, light manufacturing—with its low capital requirements, limited scale economies, readily available technology, and sales possibilities in domestic and international markets—retains potential as a springboard and the best hope to expand output, employment, productivity, and exports. To cope with the numerous roadblocks to the development of this sector, this book proposes a targeted, stepwise approach whereby the binding constraints in light manufacturing sectors are identified and reduced or eliminated.

The world economy has become more integrated. Production is no longer carried out in one country. It is fragmented. In the search for the lowest costs, the production of various components is zigzagged across factories located in different countries. This task-based production, or global value chain, is a direct result of globalization and has fundamental implications for the transition of middle-income countries to high-income status. Economic growth and structural transformation in this context require the expansion of domestic industries by moving into higher-value added tasks within the same industry or in other industries. The maximization of output, the objective of firms, is different from the objective of countries which is the maximization of value added. This upgrading process is more difficult for developing countries to achieve under the vertically specialized industrialization regime: the process is not a national policy at government discretion, but is guided by lead firms that are often located in developed countries. There is a potential conflict between national policies and lead firm policies.

The time it takes a country to pass through the middle-income stage has always been long. Countries currently in this middle-income trap appear to belong to one of two types. First are the old-timers, such as Argentina and Brazil, that have been lingering at middle-income status for a long time. Second are the newcomers, such as Malaysia and Thailand, countries in which growth in gross domestic product per capita, led by the vertically specialized industrialization strategy, has slowed down after a long period of catching up with the upper-middle-income countries.

Middle-income countries in which domestic production and the structure of exports are dominated by raw materials and commodities rather than manufactured goods (such as Argentina and Brazil) tend to miss out on the quickest path to industrialization. Given the relatively high wages in these countries (the old-timers), a sensible policy for them might therefore involve focusing on research and development and the technical capabilities of high-technology industries associated with natural resources. Another possible area of focus would be the creation of jobs in services with high value added or with the potential to raise value added, such as banking, finance, insurance, health care, and, especially, services with a potential for exports. In middle income countries with vertically specialized industrialization such as Malaysia and Thailand, governments should play a much more active role in education and training, but also in finding ways to integrate domestic producers with foreign-owned enterprises and the international market. Indirect exporters should be treated the same as direct exporters, and policies should be designed to promote the variety and quality of intermediate goods, which are usually more capital intensive and require more skills than final goods do. Governments should act as a catalyst to help the growth of enterprises at different stages in the life cycle and to link up enterprises with research and development in institutions of higher education.

After World War II, manufacturing jobs provided high incomes and good employment benefits in the United States, allowing workers to form a solid middle class with substantial purchasing power. The loss of manufacturing jobs in the United States has therefore been severe, and the impact of this loss seriously underestimated. This has been caused by two factors: foreign competition, and automation and other technological changes. The former has become more pronounced since China joined the World Trade Organization in December 2001 and as globalization has deepened over the years. In the United States, globalization has generated unintended adverse effects. First, the cost of adjustment is high and tends to be borne relatively more by disadvantaged groups. Second, increases in production efficiency have been associated with widening inequality mainly because the gains have accrued to the owners of capital and highly skilled entrepreneurs, while the least well-educated groups in society have suffered through the losses. Third, labor mobility has been weak, meaning that certain geographical areas have experienced high unemployment and rising social discontent. Some of the losses have occurred among low-paying, low-productivity jobs that the average American worker is no longer interested in pursuing. Jobs in cobbling and sewing are therefore unlikely to return to the United States. However, some jobs in high-end manufacturing and services could return, though the number would be small.

Even if the United States closes its borders, job losses there will continue to rise because of technological advances, especially automation and the use of robots. Moreover, the future of U.S. manufacturing is heavily influenced by new technologies. The reconstitution of a middle class as it was in the United States between the end of World War II and 2000 may never be realized, because the dividing line between the few skills at the top and the skills of the rest of the population is too wide. The hollowing out—the shrinking of the middle class—will therefore continue unless policies are designed and implemented to stop these trends. It is possible that a part of the middle class will have to be subsidized by society to maintain democracy. Otherwise, all financial resources, power, and skills will only accumulate among a small group of people. The role of the government would then become much more important, and, while such a society may be considered just by the vast majority, it may not be so from the viewpoint of those who have invested skills and innovation to be at the top. From a policy perspective, it is thus important to maintain a flexible education policy, to continue to provide learning in science and mathematics to children at an early age, and perhaps to establish and pilot a political and economic scheme to finance the reconstitution of the middle class. The narrowing of income inequality through a universal income scheme or an earned income credit seems inevitable. Together with the emergence of a sharing economy, this may result in a reconfigured society in which democracy may be maintained.

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To my late parents, for their love, support, and sacrifice

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Overview

This book is about creating productive jobs as a foundation of society in countries at various income levels.

Traditionally, economists have associated rising per capita income with economic development on the assumption that more rapid economic growth leads to more and better jobs. The book shows that this is only true if growth is led by industrialization accompanied by structural transformation. Even so, in high-income countries such as the United States, higher economic growth could lead to fewer, albeit better jobs, and a hollowing out of the labor force and the economy.

The world economy is roiled in many shocks not seen before: Europe's slow recovery from a deep recession is marred by terrorism, Brexit, and the Greek bailout. Japan's faint growth is more than offset by the slowdown in China, and, in the developing world, Argentina, Brazil, and India seem more hesitant than ever to chart out a path to growth. In the 2016 U.S. presidential election, leaders of both major political parties stressed the losses in jobs and blamed free trade as well as "unfair" trade agreements for the lack of job growth and opportunities in the United States.

Thus, after many decades of relentless expansion, world trade and the prospects for growth in both developed and developing countries seem uncertain. Yet, judging from traditional indicators, the world has never been better in terms of income and standards of living. Why does this contradiction exist? Chapter 6 shows that, in the developed part of the world, the advance of technology and automation, coupled with an increase in competition from emerging developing countries, has resulted in fewer jobs in manufacturing, the sector that traditionally absorbed a large part of the labor force and created a middle class that formed the core of democracy. Even if trade were at a standstill, the trends in U.S. manufacturing indicate that automation will displace many traditionally good jobs and replace them with robots. Some of the displaced workers will be able to take up new jobs created by new technology or services, but, on balance, the economy will continue to hollow out, that is, there will be fewer jobs exhibiting high productivity (and high wages), and, left by itself, income inequality will continue to widen. This has fundamental implications for the social, political, and economic system of the developed countries. If the political consensus is that a majority middle class is critical to the stability and sustainability of a democracy, how does one maintain this class and nurture it?

For the developing world, not all these questions are of immediate concern. For one thing, they can hardly afford it. Their priority is to achieve per capita income at the level of a developed country in the shortest time possible. Moreover, at least in the next two or three decades, opportunities still exist for them to provide their workforce with decent jobs, provided that the right industrialization strategy is pursued. This strategy is discussed in chapters 2-5 of this book. As will be shown in this book, the effects of industrialization are different for each country group and require different policy prescriptions.

The world economy has become more integrated. Production is no longer carried out in one country but is fragmented, with various components zigzagged across different factories located in different countries all searching for the cheapest sources. This task-based production, or global value chain, is a direct result of globalization, and in this book, will be used to illustrate the effects of globalization as it has proceeded in the last 30 years. The world has witnessed previous rounds of globalization, but the global value chain is new.

It would be simple to gloss over the many benefits of globalization, as most people did over the course of the decades during which the recent globalization took place. Indeed, there have been enormous benefits associated with this task-based production where everything is produced according to its comparative advantage: innovations are continually made in advanced countries where research and development (R&D) is strongest while the actual production is carried out using a variety of components made where it is cheapest to be produced, and again assembled in another place where labor is cheapest. If Adam Smith were alive today, he would have been pleased to see that specialization is carried out not just in one factory or country, but across the globe. As a result, the standard of living, in both developed and developing countries, has continued to improve substantially. Per capita income in Europe, Japan, and the United States has never been higher, while that of the developing countries is catching up.

There are certainly negative effects, some of which are only beginning to surface. First, the cost of adjustment is high. It would be easy to dismiss the fate of unemployed workers who are being displaced because of globalization as part of the frictional cost unless you are one of them. Second, the increase in production efficiency has been associated with widening inequality both within and across nations mainly because the gains and losses of globalization have not been distributed equally. Third, unlike within countries, where governments can at least make an effort to reduce the impact of globalization on income inequality through transfer of payments, there is no equivalent global entity that can redistribute wealth across the rich and poor groups. Hence, poor countries are left on their own to do what they can to survive. Worse, the ruling elites in these countries are often not freely elected by the people, and many prey upon their own people to enrich themselves. As a result, the extreme poor in the developing countries and the extreme poor in the developed countries are becoming less well-off relative to the top income groups in their own countries. Fourth, the increase in production efficiency transcends national boundaries so that national policy makers, even if they were seriously concerned about national goals, face many difficulties in steering their countries with a steady hand toward appropriate national goals. This book shows that globalization makes the transition to the high-income group difficult for middle-income countries.

For a long time, economists and policy makers in both developed and developing countries assume that these adjustment costs will work themselves out. After all, economic theory has always taught us that free trade raises welfare to all and this may be the case, perhaps in a few decades, when things have worked out among themselves. But like many things in economics, it is the short-term effects that matter the most, and it is entirely possible that the short run political consequences could derail the long run economic objectives. It turns out that beyond a finite time, agents cannot be retrained to do better suited, higher–value added jobs. Hence, the adjustment costs are being borne out by specific groups of people, while the benefits are bestowed upon the entire class of consumers, those adversely affected included. It is no wonder that there is widespread support in the United States at the moment to review all the trade deals signed.

Some of the main messages from the book:

For the least developed countries, industrialization remains the major route, if not the only one, to create jobs, to raise income, while acquiring the necessary investment in human capital to get to the next stage of modernization.

For the middle-income countries, the recent fragmentation of production and consumption brings new challenges along the industrialization path. This requires a total reassessment of the policy package traditionally used to achieve economic development.

For the advanced countries, especially the United States, modern industrialization involves shedding unskilled labor at an accelerating pace caused in part by rising competition from emerging and developing countries and in part by automation. Market led policies left an entire middle working class behind, fueling rising discontent that led to a backlash of the policies promoting markets. More importantly, the future of modern manufacturing evolves around new technology with many uncertainties which did not exist in the past. These countries require new policy reforms to protect workers, to keep a viable middle class that serves as a foundation of democracy and prosperity.

Chapter 1 presents the rationale for industrialization and the evidence on global progress in industrialization over the past half century. The achievement in income is astounding. Yet, the results in job creation are mixed. Except for a small number of emerging economies, the low- and middle-income countries are still facing large rates of unemployment and underemployment—their greatest waste of resources—because of the lack of structural transformation and industrialization. Industrialization is not the goal because some countries may succeed in industrializing, but still not utilize their human resources fully. This is the case of countries that possess an abundance of natural resources, but mortgage their future by selling these natural resources without adequate investment in alternative sources of growth.

This chapter also reviews the current wave of globalization in historical context. The previous wave of globalization followed the industrial revolution and led to industrialization in the North and deindustrialization in the South, together with a widening income gap between the North and the South. The current wave (1960 until now) is considered by many researchers as accomplishing the reverse, that is, deindustrializing the North and industrializing the South. Viewed in historical context, globalization is inevitable, and the key issue is not whether globalization can be stopped, but how to maximize the benefits of globalization. This leads to the aim of this book to examine job creation as the fundamental objective of economic development.

Chapter 2 presents the tools of analysis used in the book. It shows that productivity growth and structural change are the key features of economic development. In addition to the productivity decomposition technique used to assess the structural transformation of countries, the chapter discusses the newly proposed export variety and export quality indexes that are used throughout the book. It also discusses the economic complexity approach, which supplements the other tools. Chapter 2 presents an analytical model along the lines of the modern big push theory of the process of industrialization.

Chapter 3 assesses the progress in growth and structural transformation among low-income countries over the last two decades, particularly the sub-Saharan African countries. Through the productivity decomposition method, the chapter shows that some reverve structural transformation or deindustrialization took place in countries where relevant data are available. The gap between the sub-Saharan African countries and the rest of the world has been widening, and these countries risk falling further behind in the next decade, at a time when demographic pressures call for accelerating growth. The upside of this situation is there exists a tremendous opportunity for lifting growth through structural transformation, that is, by shifting resources to higher-productivity sectors. This growth potential is greater in the countries of sub-Saharan Africa than in other countries, including in Asia.

The structural analysis discussed in this chapter has revealed key policy implications for low-income countries. First, given the wide variations in productivity across sectors, the impact on productivity improvements through the intersectoral allocation of resources is more important than the intrasectoral allocation of resources (such as more investment in particular sectors). Thus, it pays to move resources from low- to high-productivity sectors. Second, for this to occur, there must be more jobs created in the higher-productivity sectors so that idle or laid-off workers can move there. Third, moving to sectors in which productivity is rising (such as finance or high-value services) is not an optimal strategy simply because there will be more surplus workers as more efficiency is sought, unless these sectors are expanding at a more rapid rate than the rate of productivity growth within the sector. Indeed, it can be shown analytically that the best structural transformation is one in which activities are moved from areas of low productivity to areas of higher, but constant, productivity such as manufacturing. Fourth, job creation therefore is the core of the strategy to raise growth and structural transformation in African countries. Two other features of African countries strengthen the above policy conclusions. First, the population dynamics in these countries—growing youth populations with rising aspirations—puts increasing pressure on authorities to create jobs. Second, many countries in this group are resource based and already have unemployment problems. So, the job creation issue is at the forefront of the policy agenda.

Following previous work by the same author and his colleagues, we argue that, for low-income countries, light manufacturing—with its low capital requirements, limited scale economies, readily available technology, and sales possibilities in domestic and international markets—retains potential as a springboard and the best hope to expand output, employment, productivity, and exports. As they grow, light manufacturing firms earn and save foreign exchange, provide higher wages to the vast pools of underemployed labor, and develop new technical and managerial skills. In addition to their low labor costs, low-income countries, particularly those in sub-Saharan Africa, also have the opportunity to leverage competitive (or potentially competitive) input industries (for example, agricultural products, leather, and wood) to develop competitive light manufacturing industries.

In contrast to the conventional wisdom, the book proposes a targeted, stepwise approach whereby the binding constraints in these sectors are identified and targeted for elimination or reduction. The chapter discusses how these constraints are eliminated in Asian countries and the policy lessons for countries in in sub-Saharan Africa.

Chapter 4 reviews the employment creation and industrialization experience of the low-income countries endowed with abundant natural resources. It shows that the traditional policy prescriptions are unrealistic and miss a number of issues that include what to do when resources are depleted, job creation for growth and prosperity, and heterogeneity in country conditions. The chapter proposes to address these problems through a strategy based on structural economics, with a special focus on economic growth and job creation. This approach combines learning by doing with targeted public investment to develop infrastructure and human capital. The development of simple, labor-intensive light manufacturing is the recommended path to create jobs and wealth. This recommendation is explained through a case study on a poor, resource-rich country in Africa.

Chapter 5 switches gears to address job creation and structural transformation in the middle-income group. As in the developed countries, these countries are affected by globalization, and, for them, it is increasingly difficult to leap over the middle-income trap, a term coined in the last decade. Throughout global economic history, the time a country takes to pass through the middle-income stage has always been long; the countries that quickly jumped past the trap have been the exception rather than the rule. Countries currently in the trap appear to belong to one of two types. First are the old-timers such as Argentina and Brazil that have been lingering at middle income for a long time (whether by relative or absolute measurement). Argentina in 1920 had higher per capita income than Australia or Italy. Second are the newcomers, such as Malaysia and Thailand, in which gross domestic product (GDP) per capita has slowed after a long period of catching up with the upper-middle-income countries.

The book argues that, in terms of economic history, the middle-income trap is not really a trap, but a normal transition from low-income to high-income status. So, in the 1,600 years before the industrial revolution, every country was in the low-income category. The Netherlands was the first country to reach lower-middle-income status. It then took the Netherlands 128 years to reach upper-middle-income status. In today's parlance, the Netherlands was caught in the middle-income trap. By contrast, it took the countries that reached high-income status in the last 65 years 32 years to transition from the low- to high-income category. But there have been few countries able to make the transition to high-income status in the last half century. Between 1950 and 2015, only four economies were able to transition from lower-middle-income to high-income status: Hong Kong, the Republic of Korea, Singapore, and Taiwan.

This chapter analyzes the pattern of structural transformation in both production and exports for the old-timers, the newcomers, and Korea and Taiwan. The analysis on exports is based on a new database of developing countries' exports to the United States over 1972–2012. The data on 1972–2006 are from the dataset of the National Bureau of Economic Research constructed by Feenstra (1996) and Feenstra, Romalis, and Schott (2002). The dataset is supplemented with trade data purchased from the U.S. Census Bureau for 2006–2012. The evidence seems to indicate that the middle-income countries that do not sufficiently focus their production on manufacturing tend to miss out on both the variety and quality of production (and exports) and therefore are left out of the quickest path to industrialization. The reason is simple: manufacturing goods, and certain (but not all) services sectors, require more human capital, more skills, and more organization, than products from other sectors.

Globalization and the intensification of vertically specialized industrialization and associated global value chains have fundamental implications for the transition of middle-income countries to high-income status (as well as for the domestic and trade policies of developed nations). First, growth and structural transformation in this context require growing the domestic industries through moving into higher-value added tasks, either within the same industry or to other industries. In this context, maximization of output (objective of the firm) is different from the objective of the country (maximization of value added). The upgrading process of moving up the value added chain by embarking on more integrated values and creating more products is harder for developing countries to achieve under the vertically specialized industrialization regime: it is no longer a national policy at the government discretion, but involves lead firms often located in developed countries. There is a potential conflict between national policies and lead firm policies arising from the principal-agent problem. So, unless government policies address this issue, the market will not lead to an optimal solution or will only lead to low equilibrium.

Second, because of globalization and global value chains, the world is becoming a large pool of cheap labor. Footloose industries can close shop in one country and move to the next if wages begin rising more rapidly than productivity in the first country. Higher productivity may also mean fewer jobs and every incentive for foreign-owned firms and the state sector to maintain the low equilibrium. In 1965–1975, before the formation of the World Trade Organization, Korea pioneered measures to integrate domestic firms into the value chain involving foreign firms, thereby facilitating the emergence of a local process of technology and knowledge transfer. This is no longer the case. Thailand has been assembling automobiles for many years now, but the parts are still delivered from abroad.

Third, the nature and extent of public policy support in areas such as institutional support, skills upgrading, and coordination between lead firms and firms in other regional and developing countries vary according to the value chains. It is thus becoming more difficult for governments to forge an effective, across-the-board approach to national industrial policy.

Chapter 6 reviews the experience of manufacturing job losses in the United States. Despite the reassurance of many economists, these losses have been substantial, and their impact vastly underestimated. After World War II, manufacturing jobs provided high incomes and employment benefits, allowing workers to form a solid middle class with high purchasing power. The manufacturing job losses have been caused by two factors: foreign competition and automation and other technological changes. The former has become more pronounced since China joined the World Trade Organization in December 2001 and as globalization has deepened over the years. Globalization allows emerging economies to become integrated in global production and consumption, but it also takes away the good jobs that form the core of the middle class in the United States. This results in a hollowing out of the U.S. economy and general dissatisfaction among those people who have lost their jobs and related activities. The election of Donald Trump in the 2016 U.S. presidential election reflects this sentiment. Some of the job losses were attributed to the low-pay, low-productivity work that the average American worker is no longer interested in pursuing; jobs such as cobbling and sewing will not likely come back to the United States. However, jobs in high-end manufacturing and services could return, though the number will be small.

Chapter 6 also shows that, even if the United States closes its borders, job losses in the United States will continue to rise because of technology advances, especially automation and the use of robots. Moreover, the future of U.S. manufacturing is heavily influenced by new technological developments, to the point where it is not known what the next generation jobs look like. The reconstitution of a middle class as it was defined in the United States between the end of World War II and 2000 may never be realized because the dividing line between the few skills at the top and those of the mass population is too wide. The hollowing up therefore will continue unless policies are designed and implemented to stop these trends. But the implications here are also deep. It is possible that an entire class of middle class has to be subsidized by the society to maintain democracy, otherwise all financial resources, power, skills only accumulate to a small class of people. The role of the government in that case will become much more important, and, while such a society may be considered just by the vast majority, it may not be so from the viewpoint of those who have invested in skills and innovation activities to be at the top. Therefore, from a policy perspective, it is important to maintain a flexible education policy, to continue to provide learning in science and mathematics to children at an early age, and perhaps to establish and pilot a political and economic scheme to finance the reconstitution of the middle class.

Chapter 7 presents policy recommendations. For low-income countries, it is argued that given their existing resource endowment, a strategy focusing on light manufacturing is the most appropriate to create jobs, income, and prosperity. The least developed countries in the world, many of them located in Africa, face a vicious circle of pervasive poverty and slow industrialization, and the binding constraints on the growth of firms vary by country, sector, and firm size. Economy-wide policies as traditionally recommended by economists have failed, and are likely to fail, to overcome the inertia of extreme poverty that impedes progress. What these countries need is a focused initiative to inject new elements of prosperity and growth even as large segments of the economies remain unaffected. Without such a breakthrough, poor countries are unlikely to eliminate the persistent low equilibrium of poverty and limited industrialization. The targeted development of light manufacturing – specifically, consumer goods manufactured with modest inputs of fixed capital and technology and the extensive application of unskilled or semi-skilled labor – is a promising entry point.

For the middle-income countries, a distinction is made between the newcomers and the old-timers. The most important development feature of the latter group is the failure to shift the export structure from the dominance of raw materials, agriculture goods to manufacturing goods and within the latter, to machinery and equipment and electronics. Correspondingly, this failure also results in the failure to shift the end use of exports from raw materials and consumer goods (typically associated with low-income economies) to capital good and intermediate goods. Given the relative high wages in these countries, a sensible policy is to focus on developing the R&D and technical capabilities of high-technology industries associated with natural resources. Another possible area is creating jobs in services with high value added or with potential to raise value added such as banking, finance, and insurance, health care, and especially those services with potential for exports.

For the newcomers, a key challenge is how to move up the value added chain and it is argued that, given the vertically integrated production structure of world trade, the government has to play a much more active role not only in education and training, but in finding ways for integrating the domestic producers with the foreign owned enterprises and with the international market. Indirect exporters should be treated the same way as direct exporters, and policies should be designed to promote the variety and quality of intermediate goods which are usually more capital intensive and require more skills than final goods. The government should act as a catalyst to help enterprises grow at different stages in the life cycle and to link up enterprises with R&D in higher education institutions.

For the advanced countries, policy makers should focus on more direct support, both financial and training, to workers who are being displaced by automation and robotization or by competition from abroad. An education system based on both elitist and mass training may remain a reasonable way, but the cost for higher training and college education needs to be greatly reduced. Reduction of income inequality either through a universal income scheme or earned income credit seems inevitable. Over time, this approach, together with the emergence of a sharing economy may result in a reconfigured society in which democracy could be maintained.

Chapter 1: The Setting

Introduction

Since the industrial revolution, the rapid rise in income of a nation has been associated with the growth of the industrial sector or industrialization. Gillis et al. (1996) note that the empirical evidence seems to have borne this out: on average, among large countries, per capita income rises from US$1,000 to US$5,000 if manufacturing value added rises from 13 percent to 22 percent of gross domestic product (GDP).[1] They also noted that somewhere between US$10,000 and US$20,000 per capita income, the share of manufacturing begins to decline.

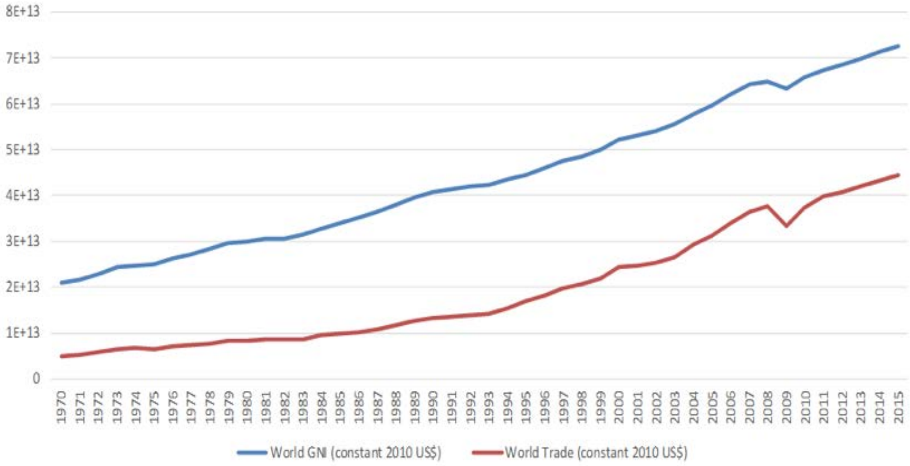
Over the last half century, the world has witnessed an extraordinary rise in income and spending, facilitated in the last few decades by rising trade volumes. Figure 1.1 shows how the world's gross national income (GNI) and trade (the sum of exports of goods and services and imports of goods and services) have grown over the last 45 years.[2] The average annual growth rate of world national income was 2.8 percent over this period, and the corresponding rate of trade was almost double, at 5.2 percent.[3]

1 Industry typically also includes nonmanufacturing activities, but these are minor. So, this book focuses on the manufacturing sector.

2 As of mid-2016, the World Bank's World Development Indicators do not include these data prior to 1970. In the discussion, data collected by Maddison (2007) are also used. See WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

3 Unless otherwise specified, growth rates in this book are calculated using ordinary least squares.

Figure 1.1. Gross National Income and Trade, the World, 1970–2015



Source: 2016 data, WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

Data on manufacturing covering the same period are more difficult to acquire, but, in 1997–2014, the same database shows that global manufacturing value added grew at a slightly lower rate relative to national income, at 2.3 percent a year (Table 1.1). In 2014, the latest year on which data are available, total global value added in manufacturing amounted to US$11.2 trillion, of which almost 59.5 percent was accounted for by high-income countries and about 40.2 percent by middle-income countries, while the share of low-income countries was only 0.3 percent.[4] These ratios were 63.4 percent, 36.4 percent, and 0.2 percent, respectively, in 1997. The growth of each group's value added in manufacturing is shown in Figure 1.2.

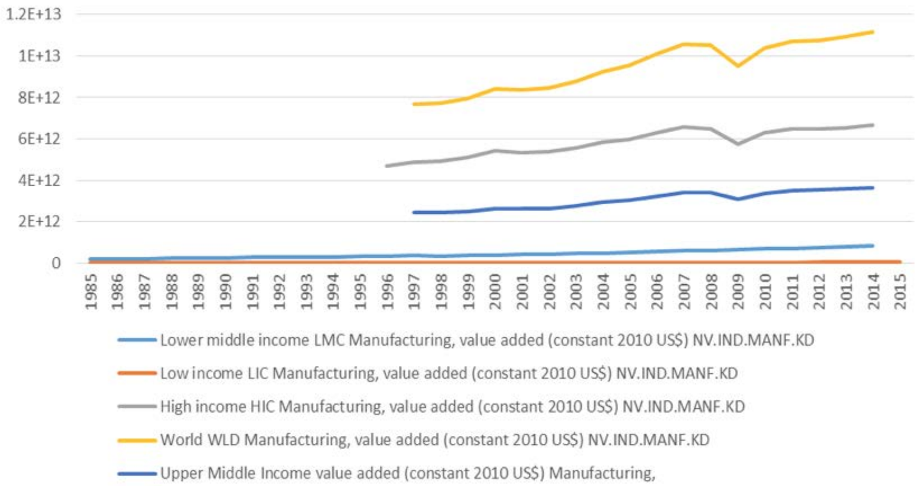
Table 1.1. Global Real GDP Growth, 1970–2015 (%)

Global GNI, annual growth	2.8
Global GNI, per capita annual growth	1.2
Global trade, annual growth	5.2
Global manufacturing value added, annual growth (1997–2014)	2.3

Source: 2016 data, WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

4 Expressed in 2010 prices. This number is consistent with the US$10.5 trillion of value added in manufacturing (in current prices) quoted in MGI (2012).

Figure 1.2. Trends in Manufacturing Value Added, by Country Income Group, 1985–2015



Source: 2016 data, WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

The average growth rate masks the huge difference among income groups. Thus, Figure 1.2 shows that, over the last 17 years, the middle-income group has grown the most rapidly in terms of manufacturing output. Indeed, during this period, two major exporters of manufacturing goods made the transition to the high-income group (Korea and Taiwan); so, excluding these two economies in 2014 would make the gain by middle-income countries even larger. Because manufacturing continues to be the largest category among tradable goods and services, this book focuses on manufacturing as a key link across production, trade, and income growth.

Industrialization & Job Creation

Why Industrialization?

The growth prospects of industry is not the only reason industrialization is synonymous with economic development throughout the world. Indeed, the term industrialized countries has often been used interchangeably to denote advanced economies. Why has industrialization been associated with improvement in economic well-being and why have all advanced countries today developed through industrialization? There are a number of reasons. First, as income rises, the proportion spent on food in the consumer basket declines (Engel's law), and more money can be spent on household goods. Second, industry enjoys higher productivity than agriculture, and structural transformation, the process that drives sustainable economic growth, entails moving economic activities from low- to high-productivity areas. (The data presented in Annex 1A help clarify the concept of structural transformation; see also Chapter 2, Annex 2A.) Third, because of their higher productivity, jobs in the industrial sector also entail higher pay and less hard manual labor. Fourth, externalities such as learning by doing are beneficially associated with industrial activities.

Recently, some authors have called for services as an engine of growth in developing countries (Ghani, Goswami, and Kharas 2011). While this seems plausible in theory, no developing country has been able to pursue services as a viable growth strategy in practice for a number of reasons. First, historically no country has developed on account of services. Second, the kind of services associated with high productivity in developing countries would require high levels of skills, not suited for the population segment with less than a high school education. Most services in low-income countries consist of activities in informal low-productivity sectors. Third, the measurement difficulties in services cause them to be used as a natural catch-all for equating GDP with the sum of agriculture and industry, thus making a high share of services in GDP artificial. Fourth, as may become clear from an examination of Annex 1A and Chapter 2, Annex 2A, the greatest effect of structural transformation on an economy takes place if there is productivity improvement in the sector that employs the most labor, provided the rest of the economy generates sufficient jobs to absorb the surplus labor. Among low-income countries that rely primarily on agriculture, the quickest transformation therefore involves improving productivity in agriculture, while creating jobs in manufacturing or services, where productivity is greater than in agriculture, to absorb the surplus farmers. The choice between manufacturing and services depends on the resource endowment of the country, but it is important to note that given the need for foreign exchange, and the need to have stable and large demand; and the fact that services in low-income countries are mostly nontradable, there is little scope to move into services.

The points made above can be seen clearly by looking at the breakdown of services into detailed components. Baumol, Blinder, and Wolff (2003) define laggard sectors as sectors with lower productivity. With the exception of one or two subsectors such as telecommunications, these laggard sectors include most services as currently known, such as finance and insurance, education, health care, hospitality and food, and government.

Job Creation

Traditionally, economic theory looks at jobs as a means to earn income and not as an end in itself. It views work and leisure as complements. An individual therefore only works to earn money and maximizes utility by minimizing work and maximizing leisure. However, in reality, a job is much more than a means to earn income. It can be associated with social status, self-respect, and dignity among individuals and families. From the perspective of the individual, a livelihood is better than living on handouts, be it from a government or a charity. Marshall (1920, 117) said that, "perhaps after he [the worker] has been out of work for some time, he might, as far as his immediate comfort is concerned, rather work for nothing than not work at all." World Development Report 2013 states that, "beyond their fundamental and immediate contribution to earnings, jobs also affect other dimensions of well-being, including mental and physical health" (World Bank 2012, 10).

Traditional economic theory distinguishes between two types of unemployment: unemployment that results from deficient aggregate demand and the "other" type of unemployment. The latter consists of frictional unemployment, seasonal unemployment, and structural unemployment. Frictional unemployment results from a situation in which unemployment and unfilled vacancies in the same occupation exist at the same time. This may arise because individuals have voluntarily quit their jobs in search of better opportunities, or they are between jobs, or they are recent school graduates looking for jobs, or are women returning to the job market after taking time off to care for their families. Seasonal unemployment occurs in sectors such as agriculture and tourism in which demand varies according to weather or climate. Structural unemployment results from a mismatch in skills between the unemployed and the available jobs because the unemployed lack the proper skills or because they are in the wrong location.

The well-known labor economist Albert Rees defines demand deficiency unemployment as unemployment that occurs "when there is not enough aggregate demand to provide work for the whole labor force no matter how it is trained or deployed" (Rees 1973, 113)[5]. Unemployment that results from deficient aggregate demand is the main topic of this book.

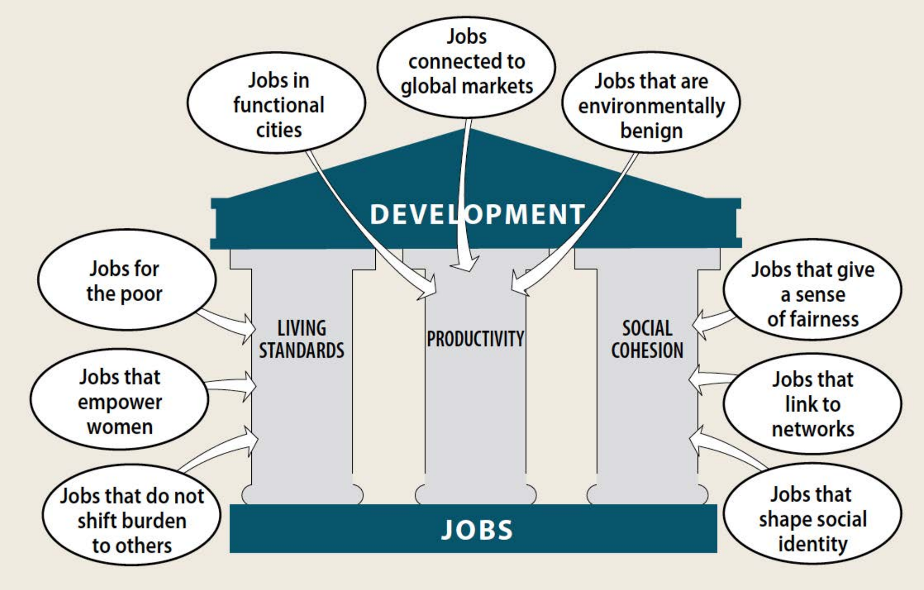
The world has fully recognized the importance of employment (Figure 1.3). Full and productive employment and decent work were added as a subtarget of the first Millennium Development Goal in 2007 (ILO 2012).[6] Even beyond the 2015 target, jobs

5 Rees (1973, 117) also states that an alternative definition is that "there is insufficient aggregate demand only if unemployment is greater than the amount consistent with stable price level."

6 See "Decent Work and the MDGs," International Labour Organization, Geneva (September, 2012), http://

will continue to be fundamental to establishing the fundamental economic, social, and environmental pillars of sustainable development. Thus, the World Bank (2012) devoted World Development Report 2013 to jobs.

Figure 1.3. Some Jobs Accomplish More for Development



Source: World Bank 2012.

The International Labour Organization is a strong proponent of making jobs a focal point. It has recognized that

"An adequate supply of jobs is the foundation of sustained and growing prosperity, inclusion and social cohesion. Where jobs are scarce or available livelihoods leave households in poverty, there is less growth, less security, and less human and economic development."[7]

In addition to addressing the need for productive employment, this book stresses the importance for countries to seek structural transformation to shift out of low-productivity agriculture and the informal sector to higher-productivity activities. This transformation will lower the dependence of a country on commodity exports, increase productivity, and lead to sustainable growth.

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www.ilo.org/integration/themes/dw_mainstreaming/WCMS_189357/lang--en/index.htm.

7 Sinanzeni Chuma-Mkandawire, director of the Country Office for Nigeria, Gambia, Ghana, Liberia, and Sierra Leone as reported in "Post MDGs: Jobs Creation Will Bring Development, Says ILO Boss," Daily Independent (Lagos, April 9, 2013), http://www.nigerianbestforum.com/index.php?topic=213343.0.

The original United Nations Millennium Declaration, under the heading of development and poverty eradication, stated that "we also resolve . . . to develop and implement strategies that give young people everywhere a real chance to find decent and productive work" (United Nations 2000). As a primary driver of economic growth and employment creation, the private sector plays a central role in reducing poverty. However, in many developing countries, the majority of the population faces obstacles in starting or expanding industrial activities. Few microenterprises have the capacity to become stable small and medium enterprises (SMEs) and to respond to the opportunities available in the export sector and the global economy (UNIDO 2009).

How To Create Jobs?

While virtually everyone one agrees about the importance of job creation, there is little guidance to policy makers on how to go about creating jobs. World Development Report 2013 recognizes that jobs challenges are not the same everywhere (World Bank 2012). Creating more jobs may be a universal goal, but the types of jobs that can contribute the most to development depend on the country context. Jobs that connect the economy to the world may matter the most in some situations; in others, the biggest payoff may be for jobs that reduce poverty or defuse conflict. Certainly, the level of development matters.

In a series of books and articles (Dinh 2013a, 2013b; Dinh et al. 2012, 2013), it is argued that, among low-income countries, light manufacturing—with its low capital requirements, limited scale economies, readily available technology, and sales possibilities in domestic and international markets—retains potential as a springboard and the best hope to expand output, employment, productivity, and exports. By leveraging the large low-wage, low-skilled labor force as well as access to abundant resources, light manufacturing offers huge potential for making sustainable growth a reality. In some cases, this may require governments to remove obstacles so that the light manufacturing firms may flourish. Over the past 20 years, light manufacturing has been an important stepping-stone toward economic transformation in economically successful developing countries (for example, China, Mauritius, Vietnam, and the Asian tigers). As they grow, light manufacturing firms earn and save foreign exchange, provide higher wages to the vast pools of underemployed labor, and develop new technical and managerial skills. In addition to their low labor costs, low-income countries, particularly those in sub-Saharan Africa, also have the opportunity to leverage competitive (or potentially competitive) input industries (for example, agricultural products, leather, and wood) to develop competitive light manufacturing industries.

The pursuit of sustained growth in light manufacturing requires steadfast government support. The appropriate kind of government support can help foster a turnaround to a development growth path. In many cases, subsidies or other government interventions can be counterproductive, creating economic distortions. More helpful is an effort to note the economic chokepoints and remove or ease the most serious constraints.

Middle-income countries face a different set of issues. A key feature of the latest phase of globalization has been the fragmentation in the production and consumption of the manufacturing value chain (below). As a result of improvements in global transport infrastructure, advancements in information and communication technologies, and significant progress in the elimination of tariff and nontariff barriers, manufacturers are now able to separate the different parts of the manufacturing value chain and carry out particular economic activities in different geographical locations around the world.

This book shows that globalization and the intensification of vertically specialized industrialization and associated global value chains have fundamental implications for the industrialization process in middle-income countries, as well as for the domestic and trade policies of developed nations. First, growth and structural transformation in this context means raising the value added in the domestic industries through moving into higher–value added tasks, either within the same industry or to other industries. The upgrading process of moving up the value added chain by embarking on more integrated values and creating more products is harder for developing countries to achieve under the vertically specialized industrialization regime. Moreover, the upgrading process of moving from low-productivity activities to higher-productivity activities is no longer a national policy at the government discretion, but involves"lead firms" often located in developed countries. There is a possible conflict between national policies and "lead firms"policies arising from the "principal-agent" problem.

Second, the nature and extent of relevant public policy in areas such as institutional support, skills upgrading, and coordination between lead firms and firms in other regional and developing countries vary by value chain so that it is becoming more difficult for governments to forge an effective across-the-board approach in national industrial policy.

Third, the prevalence of vertically specialized industrialization implies that both exports and imports are intertwined in government goal-setting in national industrial policy (Milberg, Jiang, and Gereffi 2014). The book explores the policy implications of this important finding. Traditional policies used to promote exports, such as exchange rate policies, can have unintended adverse effects on the growth of value added. Similarly, successful policies, such as import protection used by countries, such as Japan and Korea, in the early phases of industrialization to develop domestic industries, may no longer work in today's setting.

Fourth, in the industrialized countries, global value chains speed up the process of shedding low-productivity factory jobs, leading to a loss in middle-class income and consumption, with fundamental implications for the political economy of trade protection. The issue for the industrialized countries is how to design and implement policies to assist the vast majority of workers to acquire the requisite training and education to take up higher–value added activities and to create high-valued jobs sufficiently quickly to bridge the gap between demand and supply, while also creating jobs for those who have been unable to join these ranks.

Fifth, traditional trade statistics such as data on exports, imports, and so on, together with indicators based on them, cannot gauge the true trade or growth performance of a country. The process of tracking the progress of upgrading or raising value added through national income accounts is involved and costly. Hence, the book proposes a new method of approximating this progress through measures of the quality and variety of export goods.

Unemployment And Industrialization

Annex 1A, Table 1A.2 presents the latest International Labour Organization data on unemployment and underemployment in low-, middle-, and high-income countries. It shows that countries that are well integrated in the global trading system tend to have low unemployment and low underemployment rates. Table 1.2 shows the selected countries in each income category that have low unemployment and low underemployment rates, together with their Organisation for Economic Co-operation and Development (OECD) ratio of import content of exports in 2011 as an indicator of globalization. The higher the ratio, the more integrated to the world +the country is.

Table 1.2. Unemployment Rate and Globalization, Selected Countries, 2012–2020

Country	Income group	Unemployment Rate			Import Content
		2012	2015 (Proj.)	2020 (Proj.)	of Exports 2011
Low Income					
Cambodia	Low income	0.2	0.5	0.6	36.8
Average		**6.8**	**6.9**	**6.8**	
Middle Income					
India	Lower-middle income	3.6	3.5	3.2	24.0
Indonesia	Lower-middle income	6.1	5.8	5.3	12.0
Viet Nam	Lower-middle income	1.8	2.1	2.0	63.7
Malaysia	Upper-middle income	3.0	2.9	3.1	40.6
China	Upper-middle income	4.5	4.6	4.8	32.1
Mexico	Upper-middle income	4.8	4.3	4.0	31.7
Thailand	Upper-middle income	0.7	1.1	1.1	39.0
Average		**11.9**	**11.9**	**11.8**	
High Income					
Germany	High income	5.4	4.6	4.4	25.6
Japan	High income	4.2	3.3	3.6	14.7
Korea, Republic of	High income	3.2	3.7	3.5	41.6
Switzerland	High income	4.2	4.3	4.2	21.7
Taiwan, China	High income	4.2	3.8	4.1	43.5
Average		**9.1**	**8.6**	**8.3**	

Sources: Annex 1A, Table 1A.2; OECD.Stat (database), Organisation for Economic Co-operation and Development, Paris, https://data.oecd.org/trade/import-content-of-exports.htm#indicator-chart.

Industrialization & Globalization

The one common element in the development strategy of countries that have been successful in reaching high-income status in recent decades is a focus on manufacturing and exports. Nonetheless, the success is also associated with globalization, which has expanded the volume of trade and, especially, the exports of the developing world.

The Interaction Between Industrialization And Globalization

The trends in industrialization discussed above took place in the context of expanding globalization, raising the question whether this could continue, especially in the face of rising opposition to free trade because it was said to be a cause of unemployment in the developed countries. This debate is not a new phenomenon. Prior to the industrial revolution, which started around 1776, many developing countries today were already at the level of European countries in terms of industrialization per capita (Table 1.3). Baldwin and Martin (1999) point out that the first wave of globalization (covering roughly the period from 1870 to 1914) industrialized the North, deindustrialized the South, and produced enormous income divergence between groups of nations that were not initially far apart. The second wave of globalization (covering from about 1960 to the present) started with a large North-South income gap, and it deindustrialized the North, while industrializing the South (or parts of it).

Table 1.3. Per Capita Industrialization, 1750–1913.

(UK in 1900=100)	**1750**	**1800**	**1830**	**1860**	**1880**	**1900**	**1913**
Developed Countries	8	8	11	16	24	35	55
Europe	8	8	11	17	23	33	45
Europe (ex-UK)	7	8	9	14	21	36	57
Austria-Hungary	7	7	8	11	15	23	32
Belgium	9	10	14	28	43	56	88
France	9	9	12	20	28	39	59
Germany	8	8	9	15	25	52	85
Italy	8	8	8	10	12	17	26
Russia	6	6	7	8	10	15	20
Spain	7	7	8	11	14	19	22
Sweden	7	8	9	15	24	41	67
Switzerland	7	10	16	26	39	67	87
UK	10	16	25	64	87	100	115
Outside Europe	7	7	11	17	33	63	116
Canada		5	6	7	10	24	46
USA	4	9	14	21	38	69	126
Japan	7	7	8	7	9	12	20
Third World	7	6	6	4	3	2	2
China	8	6	6	4	4	3	3
India-Pakistan	7	6	6	3	2	1	2
Brazil				4	4	5	7
Mexico				5	4	5	7
World	7	6	7	7	9	14	21

Source: Bairoch 1982, cited in Baldwin and Martin 1999.

Both waves share some seemingly similarities but are fundamentally different. The chief similarities lie in the openness, as reflected in the aggregate trade to-GDP and capital-flows-to-GDP ratios. Many industrial countries were already quite open at the end of the 19th century[8]. Moreover, both waves were driven by radical reductions in technical and policy barriers to international transactions. Baldwin and Martin (1999)

8 Thus, the ratios of trade to GDP in France, Germany, and the United Kingdom were 33, 37, and 41 percent, respectively, by 1870 (43, 46, and 57 percent in 1996), while the ratios of the current account to GDP in the decade beginning in 1870 were 2.4, 1.7, and 4.6 percent (0.7, 2.7, and 2.6 percent in the decade beginning in 1989).

believe that one fundamental difference lies in the impact that these reductions had on trade in goods versus trade in ideas. While both waves saw reductions in both costs, the uniqueness of recent globalization is heavily shaped by the dramatic reduction in communications cost, what is sometimes referred to as 'the death of distance.' A second fundamental difference lies in the initial conditions. At the beginning of the first wave, the world was fairly homogeneous--homogeneously poor and agrarian, that is. At the beginning of the second wave, the world was sharply divided between rich industrial nations and poor primary producers. A third difference lies in the different speeds with which transportation and communication costs fell. Both dropped sharply in both waves, but the drop in communication costs far outpaced the drop in transport costs in the second wave, especially since 1980.

There are three changes brought about by the industrial revolution. First, the textile and metal industries allowed the British to raise productivity and replace other metals with steel. From 1830 to 1860, output per hour rose 270 percent in cotton spinning and 708 percent in cotton weaving (Crafts 1989). Second, steam engines shortened distance by cutting down on railroads, road and maritime transport time, greatly facilitating the manufacturing process by expanding market while saving on input costs. For example, Baldwin and Martin (1999) report that, in the late 1830s, a top-class sailing ship from Liverpool could take up to 48 days to reach New York and 36 days to return. By the 1840s, steamships brought the normal voyage to 14 days in either direction. The price of sea and land transportation continued to fall with advances in shipbuilding and railroads. By the 1860s, most major cities were connected by telegraph. Faster and more reliable communications spurred trade and investment. Third, and perhaps most importantly, industrialization contributed to the avoidance of violent conflicts often caused by the derivation of income from land, which is usually a zero-sum game. It still took two world wars to show the positive sum game of wealth derived from industry but wars among industrialized nations are far fewer today than in the days when land was still the sole source of wealth, or even today among poor agrarian nations.

Industrialization in the United Kingdom was soon followed by industrialization in Belgium in 1820–1870; France, Switzerland, Prussia, and the United States in the 1830s and 1840s; the Austro-Hungarian Empire, Canada, Italy, Russia, Sweden, and the rest of Europe by the end of the 1800s.

Table 1.3 from Bairoch (1982) quoted in Baldwin and Martin (1999) shows the evolution of per capita industrialization. All nations and regions started roughly at the same level. In 1750, all European nations were at 6–10 (the United Kingdom in 1900 = 100). All non-European nations were at 7 or 8, except the United States, which was at 4. China and India are the chief nations represented among developing countries (which Bairoch called the Third World) and followed a deindustrialization path, dropping from

7–8 to about 3. We also see that the United Kingdom and the United States performed well in industrialization. Bairoch (1982) notes that, in 1750, the Third World accounted for 73 percent of world manufacturing output, and it continued to account for over half even as late as 1830. By 1913, however, the Third World share had dropped to a mere 7.5 percent. Baldwin (2016, 79) states that "colonial-era deindustrialization helps explain why many Third World countries were distrustful of unfettered international trade until very recently."

The term deindustrialization requires some clarification. Unlike the developing countries where deindustrialization often means lower share of industry in total output, deindustrialization in the context of advanced economies denote the drop in employment in industry, but not necessarily in output because of the rapid rise of productivity. As we shall see in the last chapter of this book, the manufacturing share in GDP of advanced countries have stabilized even as employment continues to drop both in absolute and in relative terms. The globalization waves brought income disparity between the developed and the developing nations together with a top-end convergence.

Baldwin and Martin (1999) also point out that capital mobility was more extensive in the first wave than today. Foreign direct investment (FDI) was growing rapidly during the late 19th century, accounting for as much as one-third of overseas investment. FDI was considerable in the natural resources sector, but also in railways and utilities. Moreover, government borrowing was important during this period, and the flotation of new issues dominated the trade in secondhand debt. While FDI was important during the first wave of globalization, most FDI was used on primary products and railroads. Most of the FDI during the second wave went to services (63 percent) and manufacturing (31 percent). Indeed, 20 percent of the assets of the top 100 multinational corporations are in petroleum and mining. Another difference is that most of the FDI during the first wave was transferred from developed countries to developing countries, while most of the FDI during the second wave went to developed countries. Hummels and Stern (1994) show that rich nations account for 97 percent of direct investment outflows and 75 percent of the inflows. More importantly FDI in the second wave serves to slice up the value chain. Another striking difference is that now the global FDI pattern is quite similar to the world trade pattern. In particular, in the same manner that world trade is dominated by trade in similar goods among similar nations, FDI among rich nations now frequently involves two-way FDI in the same industry, or intraindustry FDI.

This difference between the two waves can be roughly associated with the cost of trading ideas. In the 19th century, the high cost of transmitting knowledge favored long-term capital investments. The telecommunications revolution of the late 20th century favored the rapid, almost frenetic movement of highly liquid assets.

Massive migration, along with massive capital inflows, was a hallmark of 1880–

1914. Emigration flows equal to 2 percent to 5 percent of the population were entirely normal. In the 1990s, the United States was the only major rich nation with high immigration rates. According to Cline (1997), the legal and illegal flows added around one million people a year, which implies a decadal migration rate of about 4 percent of the initial population.

The above discussion points to two conclusions. First, from a historical perspective, the recent wave of globalization is not exceptional in terms of the movement of capital or labor. While short-term resistance through rising protectionism will slow and even temporarily reverse the trend toward globalization, it is most likely that history will repeat itself, with more integration in the global trade in goods, services, and ideas. Second, even during the temporary respite of global trade caused by protectionism in developed countries, the developing countries can intensify the integration of the trade in goods, services, and ideas among themselves. In many ways, the process of integration is irreversible, and developing countries only stand to benefit from prolonging the globalization of trade in goods and services.

Globalization And Trade In Manufacturing

As the rate of globalization has accelerated, competition in domestic and international markets for manufactured goods has intensified. In addition to competition from other leading manufacturing countries such as the United States, France, Germany and Italy, U.K. manufacturers are now facing increasing competition from emerging economies which are steadily moving up the value chain into higher value activities and industries.

Manufacturers in developed countries have responded to the rise in globalization and increased international competition by outsourcing and offshoring to emerging countries lower value activities in the company's value chain such as production. This has enabled them to enhance their productivity and reduce costs, while gaining important access to rapidly growing emerging markets.

In contrast to the period between the end of World War II and the late 1970s, when globalization generated more stable income distribution in industrialized countries, globalization has been associated with rising unemployment among unskilled workers in the developed economies since the 1980s, when the FDI shift in manufacturing took place. In the United States, the share of GDP received by the bottom 20 percent of households fell by about a sixth from 1980 to 1992, while the GDP share going to the highest 5 percent of the population rose by about the same share. Real wages among workers with less than high school educational attainment fell by almost a quarter from 1973 to 1993. While unemployment is generally low in the United States, the rate among less highly skilled groups is similar to the corresponding rates in Europe (OECD

1997). In contrast to the U.S. experience, the level of real wages in Europe rose, but so did European unemployment rates, especially among the less highly (Cline 1997; OECD 1997). As Krugman (1997) notes, rising wage inequality in the United States is the flip side of the coin to Europe's rising unemployment.

Table 1.4 shows the share of industry employment in OECD countries. Most OECD countries saw their industry's share of employment dropped between 1950 and 1990, with the decline accelerates in the 1980s, at the same time when globalization picked up pace.

Table 1.4. Industry Employment Share, OECD Members, 1950–2010

Countries	1950	1980	2010
Australia	36	32	26
United States	36	21	28
Canada	33	33	25
Austria	35	41	37
Belgium	47	35	28
Denmark	33	31	28
Finland	28	35	31
France	35	35	29
Germany	43	45	38
Italy	29	38	32
Netherlands	40	31	26
Norway	33	29	25
Sweden	41	32	n/a
Switzerland	46	39	35
United Kingdom	47	38	29
Japan	23	35	n/a

Sources: Maddison 1989; WDI (World Development Indicators) (database), World Bank, Washington, DC (accessed on October 30, 2016), http://data.worldbank.org/products/wdi.

The past two decades have witnessed four important changes that may help account for the labor market impact. First, trade has expanded rapidly, especially the manufactured exports of emerging economies. Second, labor-saving technology (especially factory automation and information technology) has progressed at a mighty pace, even as overall productivity growth slowed. This has reduced demand for low-skill workers in offices and factories while simultaneously boosting demand for workers who can manipulate, manage, finance and develop these sorts of technology. Third, market-oriented economic policies triumphed worldwide, weakening the power of organized labor. Fourth, FDI has grown rapidly, and this has fostered outsourcing or the relocation of tasks to low-wage regions.

The large empirical work on trade and wage issues finds that trade does impact the labor market in the developed economies, although the magnitude of this impact varies (see Cline 1997 for surveys). Some studies find that trade accounts for little of the wage gap, while others find virtually all of the gap is attributable to trade. Baldwin and Martin (1999) note that the consensus range seems to be perhaps 10 percent–20 percent. In the United States, migration accounts for 30 percent–40 percent of the wage drop among the lowest skilled workers (Borjas, Freeman, and Katz 1997). Baldwin and Martin (1999, 21) conclude as follows:

"While these estimates cannot be simply [summed] up, it seems clear that maybe as much as half of the U.S. wage gap is due to trade and migration. The rest, according to most scholars, is due to technological change."

In the United States, widening income inequality contributed to pressures in support of anti-immigration legislation in the late 19th and early 20th centuries. It also fostered antitrade sentiments in Europe that was instrumental in the continent's post-1880s retreat from liberalism.

Given the intensification of vertically specialized industrialization and the consequent rapid expansion of the trade in intermediate goods, the progress of countries in upgrading domestic value added or in industrialization can no longer be measured by export growth. Yet, the traditional measurement of value added through national income accounts and input-output tables requires extensive, updated, and standardized data across nations, which are not as readily available as detailed trade data. Chapter 2 proposes to construct two indexes that rely on trade data, available worldwide at disaggregated levels, to measure progress in the upgrading process or in industrialization. These indexes are estimated here for a number of countries and country groupings, and the estimates are accompanied by policy discussion.

A key channel by which manufacturing contributes to economic development is through learning-by-doing, first through knowledge externalities from imitation activities and later through innovation activities. This is how the industrial revolution spread over time from the United Kingdom to countries in Western Europe, the United States, Russia, and Japan (Chandra, Lin, and Yang 2013). By providing an ever greater variety of inputs (some in the form of new capital goods), with an ever greater degree of technological sophistication, knowledge creation fuels the development and expansion of the manufacturing sector. Initially, technological knowledge can be acquired through mere imitation of foreign processes, but, while imitation entails decreasing returns, whereas innovation occurs under constant or increasing returns to scale (at least for a period), the expansion of the manufacturing sector over time requires a shift from imitation activities to true innovation (Agénor and Dinh 2013).

However, this transition may require access to highly skilled labor and other inputs, such as advanced communication and information technologies, and these can be critical in the shift from light manufacturing activities (which tend to be associated with an imitation regime) to higher value added manufacturing (which requires broader and more sophisticated inputs). In this context, after an economy has reached the stage where the assembly type of light manufacturing creates jobs, the appropriate development policy should not only emphasize innovation and the knowledge and learning externalities associated with imitation, it must also increasingly foster local absorption capacity and technological innovation for the development of manufacturing. These are the key issues that we address in a theoretical model (Agénor and Dinh 2013) and in a study on light manufacturing in Vietnam (Dinh 2013a).

The reason manufacturing can help speed up structural transformation perhaps lies in the fact that, unlike agriculture or commodities, manufacturing facilitates the process of upgrading through knowledge, a necessary condition for structural transformation, similar to the predictions of endogenous growth theory, where the knowledge from spillovers in one firm is transmitted to other firms in the economy (Romer 1986). If one can represent the process of economic development as a structural transformation through an increase in the variety of production and an improvement in economic quality[9], then manufacturing can serve as a stepping-stone for an economy to undertake higher value added economic activities.

Many middle-income countries, however, have been unable to make the switch to higher value added activities and have ended up in a middle-income growth trap, with a substantial reduction in growth and total factor productivity. The lesson from this experience for today's poor countries in sub-Saharan Africa and elsewhere is clear: governments should act early rather than late to take advantage of low wages and the gains from imitating foreign technology to promote knowledge spillovers and boost productivity. Because of the long gestation lag, this second stage should begin well before the benefits of low wages and the imitation of foreign technology have begun to yield diminishing returns or have been completely exhausted.

The experience of East Asian countries in transitioning from middle- to high-income status also provides important lessons for sub-Saharan Africa. These countries have successfully relied on a growth strategy based on low wages and technology imitation. However, once the pool of underemployed rural workers started to shrink and wages

9 Note the difference with Hummels and Klenow (2005) where the intensive margin (higher volumes of each good), the extensive margin (a wider set of goods), and higher-quality goods are examined for a single year, rather than our story of variety expansion and quality upgrading over time.

began to rise, competitiveness deteriorated, and the productivity gains associated with sectoral reallocation and technology catch-up began to disappear. Rising wages made labor-intensive manufacturing exports less competitive on world markets. At that point, some countries (most importantly, Korea) were able to switch from imitation as the main source of productivity growth to broad-based, home-grown innovation.

Industrialization And Economic Complexity

There is another reason why traditionally, manufacturing has been used as a path for industrialization. If one looks at economic development through the angle of an economy which is trying to develop through acquiring capabilities both of individuals and society to develop more diversity and more complex products, then the link between industrialization and development becomes even clearer. In a pathbreaking work, Hausmann, Hidalgo, and their colleagues use network theory to show that the per capita income of a nation can be explained by the degree of complexity of their products (Hausmann et al. 2014; Hausmann, Hwang, and Rodrik 2007; Hausmann and Klinger 2007; Hidalgo and Hausmann 2009). Furthermore, using proximity which determines how a country chooses to export a product close to another, they group products by commodities and show that products such as machinery or electronics have a much higher product complexity index than products such as rice or tropical agriculture.

Despite some issues such as failing to account for global value added chains—for instance, they consider the iPhones exported by China as China's exports, rather than considering the net exports, that is, the value of iPhone exports, minus imports of all the components needed to assemble the phone sets—and ignoring services, which are a major part of any economy, their approach does provide good insights into the makeup of a developed economy.

Global Value Chains & The Implications For Middle-Income & Industrialized Countries

Over the last several decades, manufacturing in middle- and high-income countries has experienced significant changes as rapid globalization has shifted a large proportion of manufacturing capacity from developed to emerging economies and substantial new markets and new competitors have emerged. The globalization of manufacturing was enabled by a combination of forces coming together simultaneously, including a significant change in geopolitical relations between the east and the west, the widespread growth of digital information, physical and financial infrastructure, computerized manufacturing technologies, and the proliferation of bilateral and multilateral trade agreements.

These factors, along with others, have permitted the disaggregation of supply chains into complex global networks that allow companies to interact in the design, sourcing of materials and components, and manufacturing of products from virtually anywhere, while satisfying customers almost anywhere.

The globalization of manufacturing has been a key driver of higher-value job creation and a rising standard of living for the growing middle class in emerging economies, including Brazil, China, India, Korea, and Mexico. Developed nations have benefited from lower cost products driven by the lower wages used for production in emerging markets. But this has also dramatically changed the relationship between emerging and developed nations, creating competition as well as codependency.

One of the most rapidly growing components of international trade over the last few decades has been intermediate goods and services resulting from vertical specialization, intraproduct specialization, and global production sharing in the production and consumption of goods and services (Grossman and Helpman 2005).

In manufacturing, such upgrading has also been associated with qualitative change, with firms moving from parts production or assembly, to design and more integrated production, to fully integrated production, to original brand design. Humphrey and Schmitz (2002) describe four types of upgrading in global value chains: product, process, functional, and chain. Product and process involve productivity gains, while the producer remains largely in the same place in the global value chain. Functional upgrading involves moving into more technologically sophisticated and higher–value added aspects of an existing chain. And chain upgrading implies moving into a new, related value chain that also involves more skills, capital, and value added.

The existence of global value chains raises a number of issues in traditional trade and development economics. First, exports and imports are intertwined in goal-setting in national industrial policies. While traditional policies to promote exports involve exchange rate policies, tariff protection, investment control, price policies, and public enterprise issues, now the problem to be addressed is how to raise the value added in domestic industries through the upgrading process, which may be thought of as the way to increase the quality and variety of export goods.

Second, in the industrialized countries, global value chains speed up the process of shedding low-productivity factory jobs, leading to a loss in middle-class income and consumption, with fundamental implications for the political economy of trade protection. The problem to be addressed is how to design and implement policies to assist the vast majority of workers to acquire the requisite training and education to take up higher–value added activities and to create these jobs sufficiently quickly to bridge the gap between demand and supply, while also creating jobs for those who are unable to join these ranks.

Third, among middle-income countries, structural transformation, that is, the process of moving from low-productivity activities to higher-productivity activities within a sector or across sectors, is no longer a policy at the disposal of national governments, but involves lead firms often located in developed countries. Conceivably, the process of moving up in value added by embarking on more well integrated values and creating more products is more difficult within global value chains than in the old world where goods were made by domestic companies. Hence, there is a possible conflict between national policies and policies involving lead firms. This conflict arises from the principal-agent problem. In addition, the nature and extent of the public sector contribution in areas such as institutional support, skills upgrading, coordination between lead firms and firms in other regional and developing countries vary by value chain so that it is becoming more difficult to generate effective across-the-board support.

Fourth, traditional trade statistics such as data on exports, imports, and so on, together with indicators based on them, cannot gauge the true trade performance of a country.

Gereffi (1999) notes that, with the growth of global value chains, intraindustry trade in intermediate goods becomes far more significant. In the 1960s and 1970s, global value chains were producer driven, whereby multinational corporations controlled entire chains, and FDI was usually associated with an import substitution strategy. In the 1980s, global value chains were consumer-driven, whereby wholesalers, such as Gap, Macy's, Nike, and Walmart, controlled entire chains, which were usually affiliated with an export-oriented development strategy, and international subcontracting networks replaced FDI to a significant degree. This meant that production was carried out in developing economies, but also that most suppliers were domestically owned firms engaged in assembly production and, later, in full-package production, that is, original equipment manufacturer production, which relied to a large degree on imported inputs. One of the major upgrading dynamics in buyer-driven chains involved developing countries attempting to capture more value by making more inputs locally rather than importing them and by moving up the value chain from production into design and branding, that is, original design manufacturing and original brand manufacturing (Gereffi 1999). This approach renders the establishment of domestic industries by a low-income economy more difficult today than it would have been in the 1960s and 1970s unless the various stages of the value chain already exist due to the country size as in the case of China.

Developing countries tried to restrict imports through import substitution industrialization, and then, under export-oriented industrialization, they focused on promoting exports. The main emphasis of vertically specialized industrialization is to use traded intermediates to capture more value in global value chains. Because imported intermediate goods are typically used in export products under of vertically specialized industrialization, moving up global value chains implies first allowing the required imports of intermediate goods to flow into the country. However, economic upgrading entails that countries also try to encourage the domestic production of these same goods, often first by foreign-owned companies, and then gradually by domestic firms. To encourage imports of intermediate goods, the exchange rate cannot be permitted to depreciate for long, or, if it is, the effects must be offset through low tariffs on intermediate goods.

Leaping Past The Middle-Income Trap

In this section, we discuss issues facing the middle-income countries and how some countries are more successful than others in jumping past the middle-income trap. The discussion is based on per capita income as an indicator of economic development. There are of course many problems associated with this indicator but it is the most objective and widely known as a measurement of development progress. Furthermore, there is no reason to think the policy conclusions would be different if another indicator is used. Thus it is assumed the objective of development is to raise per capita income, or to bring a country to a higher-income group. Later on we will turn to another indicator, employment creation, as the development goal of the society.

The World Bank's classification of income groups is the most well-known in the world. In 2016, low-income economies are defined by the Bank as those with a GNI per capita, calculated using the World Bank Atlas method, of US$1,025 or less in 2015; lower middle-income economies are those with a GNI per capita between US$1,026 and US$4,035; upper middle-income economies are those with a GNI per capita between US$4,036 and US$12,475; high-income economies are those with a GNI per capita of US$12,476 or more.

Annex 1A, Table 1A.1 presents the 217 countries classified using the World Bank definition. Of these 217 countries in 2015, 78 were classified as high-income, 56 as upper-middle-income, 52 as lower-middle-income, and 31 as low-income countries. The data to support this classification, which is based on the World Bank Atlas using a consistent methodology, are only available after 1986. In a comprehensive effort to study the middle-income trap, Felipe, Abdon, and Kumar (2012) have constructed consistent cross-country data using GDP per capita in 1990 purchasing power parity (PPP) dollars over an extended period drawing on the comprehensive historical data of Maddison (2007). Their database was updated in 2014 and allows an analysis of trends in the transition of countries of various categories (Felipe, Kumar, and Galope 2017). A number of interesting findings arise from their study as well as that of Maddison (2007), as follows:

- The rapid economic growth of developing countries is a new and recent phenomenon. During the 1,600 years before the industrial revolution, global per capita income stagnated below US$1,400 (in 1990 PPP dollars). The Netherlands was the first country to reach lower-middle-income status, in 1700.
- After the industrial revolution, which began in the United Kingdom in the late 1700s, Western countries grew more quickly from low- to middle- and high-income status.[10] Nonetheless, Western countries that had been low income prior to 1950 took a rather long time to reach upper-middle-income status. For example, it took the European countries that were in the lower-middle-income group before 1950 an average of 71 years to transition from that group to upper-middle-income status. The median is 67 years. In particular, the Netherlands spent 128 years in the lower-middle-income group before transitioning, even though it was the first country to reach the former group, while Hong Kong and Japan took 26 and 35 years, respectively.
- By contrast, countries that reached lower-middle-income status after 1950 took a shorter time to reach the next income level. It took the nine countries in this category an average of 34 years to reach the upper-middle-income group, with the median at 28 years. In particular, China took 17 years, while Korea and Taiwan took 19 years. Bulgaria, Costa Rica, and Turkey spent over 50 years in this category. However, this experience is influenced by the East Asian countries. Without the Asian countries, the mean and median number of years in this category would have been 48 and 52 years, respectively.
- The transition is more rapid from upper-middle-income status to the high-income group than from lower-middle-income status to the upper-middle-income group. The five countries that were in the upper-middle-income category by 1950 took an average of 19 years to reach high-income status, with a median of 20 years. Switzerland took only 14 years, while New Zealand took 23 years. The United States took 21 years.
- The 25 countries that reached upper-middle-income status after 1950 and then graduated to the high-income category took an average of 15 years (the median is 14) to accomplish this transition. Both Korea and Taiwan spent only 7 years in

10 Prior to the industrial revolution, manufacturing was done using hand tools in people's homes. Industrialization results in factories, mass production, and urbanization. The development of the steam engine played a central role in the industrial revolution, which also saw improved systems of transportation and communication. Felipe, Kumar, and Galope (2017) use the following thresholds for income classification: low-income: less than US$2,000 (1990 PPP U.S. dollars); lower-middle-income: US$2,000–US$7,250; upper-middle-income: US$7,250--US$11,750; high-income: US$11,750 and above.

this category before moving up, while Japan took 9. The longest inhabitant of the category among this group is Argentina, at 41 years.[11]

- In the 65 years from 1950 to 2015, there were only four economies, all East Asian, that reached the high-income group after transitioning both the lower- and upper-middle-income groups: Hong Kong, Korea, Singapore, and Taiwan. It took these economies an average of 32 years (the median is 31 years) to transition the lower-middle-income group and graduate to the high-income group.
- What is disturbing about the results of this analysis is that the countries of sub-Saharan Africa have been stuck in the low-income category since 1950 and, indeed, are likely to stay there unless they undertake major reforms. This is the subject of the next chapter.

The Changing Nature Of Manufacturing In Developed Countries

The manufacturing process has undergone significant changes in recent years. It used to be the case that barriers to entry were high and initial capital investments substantial, and that products had to go through many stages before reaching the consumer. Today, however, huge shifts in technology and public policy have eroded barriers that once impeded the flow of information, resources, and products. In a world where computing costs are plummeting, connectivity is becoming ubiquitous, and information flows freely, previously cost-prohibitive tasks and business models are becoming more available to more players. Meanwhile, rapid advances and convergences in technology, including additive manufacturing, robotics, and materials science, further expand what can be manufactured and how. All of these developments are combining with changing demand patterns to increase market fragmentation, supporting a proliferation of product makers further down the value chain with more direct consumer contact.

The same trends that have pushed manufacturing in the direction of delivering more value at lower cost and that have caused manufacturing to involve more than producing physical products will become more pronounced over the next few decades. To succeed, products will have to be smarter, more personalized, more responsive, more connected, and less expensive. Manufacturers will face increasingly complex and costly decisions about where and how to invest to add value.

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11 It is not clear that Argentina is still in the high-income group. The World Bank has reported delays in the reporting on national income accounts by Argentina. The Bank still classifies Argentina as an upper-middle-income country.

General Electric is a notable example of a company that has successfully navigated the shift from ownership to access. Along with Rolls-Royce and Pratt & Whitney, the General Electric division manufactures aircraft engines for a market of buyers led by Boeing and Airbus. These engines, which cost US$20 million–US$30 million each, have long, complex sales cycles and relatively low margins. Not surprisingly, more money is made servicing this equipment over the 30-year lifespan than on the initial sale. With this in mind, General Electric has introduced the Power by the Hour Program that shifts from sales and services to a utility model.

In General Electric's offering, after an initial setup cost, the customer pays for time used rather than equipment or service, thereby shifting from a large fixed cost to a variable cost aligned with usage. In such a scenario, the advantages to both company and customer are many. Sensors on the new engines generate real-time usage, diagnostic, and failure data. Together with a specialist team that will fly around the globe to address issues, this setup has reduced unscheduled downtime significantly. More accurate data also help the company improve products and scheduling, reducing overall costs for both parties. Of course, this model is not unique to the aircraft market.

With the change in the nature of products comes a shift in value creation. In the coming landscape, value will come from connectivity, data, collaboration, feedback loops, and learning, all of which can become the foundation of new, more powerful business models.

Large-scale production will always dominate some segments of the value chain, but three other manufacturing models are arising to take advantage of new opportunities: distributed smaller-scale local manufacturing, loosely coupled manufacturing ecosystems (like that in Shenzhen, China), and an increased focus on agile manufacturing methods at larger operations.

Just as the early twentieth century shift toward more efficient assembly-line techniques cost manufacturing jobs, so too have computer-technology-based productivity increases made it possible in the last decades of the century to produce more goods with fewer employees. Though manufacturing's share of total employment has declined, it still accounts for about 30 percent of total GDP today, as it has for the last three decades.

Widespread use of just-in-time production is another reason for manufacturing's reduced employment. With just-in-time production, firms carefully time their production schedules to the needs of their retail outlets or end users, avoiding costly inventory holding and increasing efficiency. Cost reduction has driven part of the recent loss of U.S. manufacturing jobs. Many United States–based multinational corporations have relocated much of their low-skilled production to foreign countries where wage rates for unskilled workers are relatively low—Mexico as well as Asian countries such as

China, Malaysia, and Thailand. Large numbers of U.S. jobs have been lost in the textile and apparel industries. In response to imports growth, some textile firms have invested heavily in labor-saving capital equipment, further reducing employment

A study by Shipp et al. (2012) of the Institute for Defense Analysis identifies emerging trends in a global economy of advanced manufacturing. Over the next 10 years, advances in manufacturing will likely become increasingly networked. In 20 years, manufacturing is expected to advance to new frontiers, resulting in an increasingly automated and data-intensive manufacturing sector that will likely replace traditional manufacturing as we know it today. The study concluded that an advanced workforce will be needed to develop and maintain these advances in manufacturing.

Today, the improvement of transportation and telecommunication services has allowed production chains to be split up geographically. This means that, to launch, separate locations need to have fewer personbytes in place than in the past. Design, procurement, marketing, distribution, and manufacturing need not be carried out in the same place, meaning that locations with few personbytes can more easily get their foot in the door and then add functions gradually. This has made much more of the manufacturing space accessible to more countries, with the concomitant reduction in manufacturing jobs in the advanced countries. The process is bound to continue at an accelerated pace, as more and more middle-income countries become positioned to occupy more of the product space, as China, Thailand, and Turkey have done. Meanwhile, inventing new products at an accelerated pace and controlling the international networks that help put together these products will allow the advanced countries to maintain their high level of income, albeit with a potential widening in inequality.

This book reviews progress in industrialization among low- and middle-income economies, together with issues facing the industrialized countries today, including the hollowing out of their economies as a result of continued industrialization. It concludes that despite all its fault, developing the manufacturing sector remains the most viable development strategy for gaining income and improve the standard of living of the vast majority of people. At the same time, policy makers have to recognize the changing nature of manufacturing, and be willing to adopt a flexible policy framework to accommodate the new environment.

Annex 1A. Data Tables

Table 1A.1. World Bank Country Classifications, by Income, 2005–2015

World Bank Analytical Classifications
(presented in World Development Indicators)
GNI per capita in US$ (Atlas methodology)

Bank's fiscal year:	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17
Data for calendar year:	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Low income (L)	<= 875	<= 905	<= 935	<= 975	<= 995	<= 1,005	<= 1,025	<= 1,035	<= 1,045	<= 1,045	<= 1,025
Lower middle income (LM)	876-3,465	906-3,595	936-3,705	976-3,855	996-3,945	1,006-3,975	1,026-4,035	1,036-4,085	1,046-4,125	1,046-4,125	1,026-4,035
Upper middle income (UM)	3,466-10,725	3,596-11,115	3,706-11,455	3,856-11,905	3,946-12,195	3,976-12,275	4,036-12,475	4,086-12,615	4,126-12,745	4,126-12,735	4,036-12,475
High income (H)	> 10,725	> 11,115	> 11,455	> 11,905	> 12,195	> 12,275	> 12,475	> 12,615	> 12,745	> 12,735	> 12,475
Afghanistan	L	L	L	L	L	L	L	L	L	L	L
Albania	LM	LM	LM	LM	UM	UM	LM	UM	UM	UM	UM
Algeria	LM	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM
American Samoa	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Andorra	H	H	H	H	H	H	H	H	H	H	H
Angola	LM	LM	LM	LM	LM	LM	UM	UM	UM	UM	UM
Antigua and Barbuda	H	H	H	H	UM	UM	UM	H	H	H	H
Argentina	UM	UM	UM	UM	UM	UM	UM	UM	UM	H	UM
Armenia	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Aruba	H	H	H	H	H	H	H	H	H	H	H
Australia	H	H	H	H	H	H	H	H	H	H	H
Austria	H	H	H	H	H	H	H	H	H	H	H
Azerbaijan	LM	LM	LM	LM	UM	UM	UM	UM	UM	UM	UM
Bahamas, The	H	H	H	H	H	H	H	H	H	H	H
Bahrain	H	H	H	H	H	H	H	H	H	H	H
Bangladesh	L	L	L	L	L	L	L	L	L	LM	LM
Barbados	UM	H	H	H	H	H	H	H	H	H	H
Belarus	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Belgium	H	H	H	H	H	H	H	H	H	H	H
Belize	UM	UM	UM	LM	LM	LM	LM	UM	UM	UM	UM
Benin	L	L	L	L	L	L	L	L	L	L	L
Bermuda	H	H	H	H	H	H	H	H	H	H	H
Bhutan	L	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Bolivia	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Bosnia and Herzegovina	LM	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM
Botswana	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Brazil	LM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
British Virgin Islands	..	..	..	..	..	..	..	..	..	..	H
Brunei Darussalam	H	H	H	H	H	H	H	H	H	H	H
Bulgaria	LM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Burkina Faso	L	L	L	L	L	L	L	L	L	L	L
Burundi	L	L	L	L	L	L	L	L	L	L	L
Cabo Verde	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Cambodia	L	L	L	L	L	L	L	L	L	L	LM
Cameroon	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Canada	H	H	H	H	H	H	H	H	H	H	H
Cayman Islands	H	H	H	H	H	H	H	H	H	H	H
Central African Republic	L	L	L	L	L	L	L	L	L	L	L

Chad	L	L	L	L	L	L	L	L	L	L	L
Channel Islands	H	H	H	H	H	H	H	H	H	H	H
Chile	UM	UM	UM	UM	UM	UM	UM	H	H	H	H
China	LM	LM	LM	LM	LM	UM	UM	UM	UM	UM	UM
Colombia	LM	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM
Comoros	L	L	L	L	L	L	L	L	L	L	L
Congo, Dem. Rep.	L	L	L	L	L	L	L	L	L	L	L
Congo, Rep.	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Costa Rica	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Côte d'Ivoire	L	L	L	LM	LM	LM	LM	LM	LM	LM	LM
Croatia	UM	UM	UM	H	H	H	H	H	H	H	H
Cuba	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Curaçao	..	..	..	..	..	H	H	H	H	H	H
Cyprus	H	H	H	H	H	H	H	H	H	H	H
Czech Republic	UM	H	H	H	H	H	H	H	H	H	H
Denmark	H	H	H	H	H	H	H	H	H	H	H
Djibouti	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Dominica	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Dominican Republic	LM	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM
Ecuador	LM	LM	LM	LM	LM	UM	UM	UM	UM	UM	UM
Egypt, Arab Rep.	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
El Salvador	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Equatorial Guinea	UM	UM	H	H	H	H	H	H	H	H	UM
Eritrea	L	L	L	L	L	L	L	L	L	L	L
Estonia	UM	H	H	H	H	H	H	H	H	H	H
Ethiopia	L	L	L	L	L	L	L	L	L	L	L
Faeroe Islands	H	H	H	H	H	H	H	H	H	H	H
Fiji	LM	LM	UM	UM	UM	LM	LM	UM	UM	UM	UM
Finland	H	H	H	H	H	H	H	H	H	H	H
France	H	H	H	H	H	H	H	H	H	H	H
French Polynesia	H	H	H	H	H	H	H	H	H	H	H
Gabon	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Gambia, The	L	L	L	L	L	L	L	L	L	L	L
Georgia	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	UM
Germany	H	H	H	H	H	H	H	H	H	H	H
Ghana	L	L	L	L	L	LM	LM	LM	LM	LM	LM
Gibraltar	..	..	..	..	H	H	..	..	..	..	H
Greece	H	H	H	H	H	H	H	H	H	H	H
Greenland	H	H	H	H	H	H	H	H	H	H	H
Grenada	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Guam	H	H	H	H	H	H	H	H	H	H	H
Guatemala	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Guinea	L	L	L	L	L	L	L	L	L	L	L
Guinea-Bissau	L	L	L	L	L	L	L	L	L	L	L
Guyana	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	UM
Haiti	L	L	L	L	L	L	L	L	L	L	L
Honduras	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Hong Kong SAR, China	H	H	H	H	H	H	H	H	H	H	H
Hungary	UM	UM	H	H	H	H	H	UM	UM	H	H
Iceland	H	H	H	H	H	H	H	H	H	H	H
India	L	L	LM	LM	LM	LM	LM	LM	LM	LM	LM
Indonesia	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Iran, Islamic Rep.	LM	LM	LM	LM	UM	UM	UM	UM	UM	UM	UM
Iraq	LM	LM	LM	LM	LM	LM	LM	UM	UM	UM	UM
Ireland	H	H	H	H	H	H	H	H	H	H	H
Isle of Man	H	H	H	H	H	H	H	H	H	H	H
Italy	H	H	H	H	H	H	H	H	H	H	H
Jamaica	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM	UM

Japan	H	H	H	H	H	H	H	H	H	H	H
Jordan	LM	LM	LM	LM	LM	UM	UM	UM	UM	UM	UM
Kazakhstan	LM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Kenya	L	L	L	L	L	L	L	L	L	LM	LM
Kiribati	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Korea, Dem. Rep.	L	L	L	L	L	L	L	L	L	L	L
Korea, Rep.	H	H	H	H	H	H	H	H	H	H	H
Kosovo	..	..	..	LM	LM	LM	LM	LM	LM	LM	LM
Kuwait	H	H	H	H	H	H	H	H	H	H	H
Kyrgyz Republic	L	L	L	L	L	L	L	L	LM	LM	LM
Lao PDR	L	L	L	L	L	LM	LM	LM	LM	LM	LM
Latvia	UM	UM	UM	UM	H	UM	UM	H	H	H	H
Lebanon	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Lesotho	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Liberia	L	L	L	L	L	L	L	L	L	L	L
Libya	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Liechtenstein	H	H	H	H	H	H	H	H	H	H	H
Lithuania	UM	UM	UM	UM	UM	UM	UM	H	H	H	H
Luxembourg	H	H	H	H	H	H	H	H	H	H	H
Macao SAR, China	H	H	H	H	H	H	H	H	H	H	H
Macedonia, FYR	LM	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM
Madagascar	L	L	L	L	L	L	L	L	L	L	L
Malawi	L	L	L	L	L	L	L	L	L	L	L
Malaysia	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Maldives	LM	LM	LM	LM	LM	UM	UM	UM	UM	UM	UM
Mali	L	L	L	L	L	L	L	L	L	L	L
Malta	H	H	H	H	H	H	H	H	H	H	H
Marshall Islands	LM	LM	LM	LM	LM	LM	LM	UM	UM	UM	UM
Mauritania	L	L	L	L	L	LM	L	LM	LM	LM	LM
Mauritius	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Mexico	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Micronesia, Fed. Sts.	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Moldova	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Monaco	H	H	H	H	H	H	H	H	H	H	H
Mongolia	L	L	LM	LM	LM	LM	LM	LM	LM	UM	LM
Montenegro	..	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Morocco	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Mozambique	L	L	L	L	L	L	L	L	L	L	L
Myanmar	L	L	L	L	L	L	L	L	L	LM	LM
Namibia	LM	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM
Nauru	..	..	..	..	..	..	..	..	..	..	H
Nepal	L	L	L	L	L	L	L	L	L	L	L
Netherlands	H	H	H	H	H	H	H	H	H	H	H
New Caledonia	H	H	H	H	H	H	H	H	H	H	H
New Zealand	H	H	H	H	H	H	H	H	H	H	H
Nicaragua	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Niger	L	L	L	L	L	L	L	L	L	L	L
Nigeria	L	L	L	LM	LM	LM	LM	LM	LM	LM	LM
Northern Mariana Islands	UM	UM	H	H	H	H	H	H	H	H	H
Norway	H	H	H	H	H	H	H	H	H	H	H
Oman	UM	UM	H	H	H	H	H	H	H	H	H
Pakistan	L	L	L	LM	LM	LM	LM	LM	LM	LM	LM
Palau	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Panama	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Papua New Guinea	L	L	L	LM	LM	LM	LM	LM	LM	LM	LM
Paraguay	LM	LM	LM	LM	LM	LM	LM	LM	LM	UM	UM
Peru	LM	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM

Philippines	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Poland	UM	UM	UM	UM	H	H	H	H	H	H	H
Portugal	H	H	H	H	H	H	H	H	H	H	H
Puerto Rico	H	H	H	H	H	H	H	H	H	H	H
Qatar	H	H	H	H	H	H	H	H	H	H	H
Romania	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Russian Federation	UM	UM	UM	UM	UM	UM	UM	H	H	H	UM
Rwanda	L	L	L	L	L	L	L	L	L	L	L
Samoa	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
San Marino	H	H	H	H	H	H	H	H	H	H	H
São Tomé and Principe	L	L	L	LM	LM	LM	LM	LM	LM	LM	LM
Saudi Arabia	H	H	H	H	H	H	H	H	H	H	H
Senegal	L	L	L	L	LM	LM	LM	LM	LM	LM	L
Serbia	..	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Seychelles	UM	UM	UM	UM	UM	UM	UM	UM	UM	H	H
Sierra Leone	L	L	L	L	L	L	L	L	L	L	L
Singapore	H	H	H	H	H	H	H	H	H	H	H
Sint Maarten (Dutch part)	..	..	..	..	..	H	H	H	H	H	H
Slovak Republic	UM	UM	H	H	H	H	H	H	H	H	H
Slovenia	H	H	H	H	H	H	H	H	H	H	H
Solomon Islands	L	L	L	LM	L	LM	LM	LM	LM	LM	LM
Somalia	L	L	L	L	L	L	L	L	L	L	L
South Africa	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
South Sudan	..	..	..	..	..	..	LM	L	LM	L	L
Spain	H	H	H	H	H	H	H	H	H	H	H
Sri Lanka	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
St. Kitts and Nevis	UM	UM	UM	UM	UM	UM	H	H	H	H	H
St. Lucia	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
St. Martin (French part)	..	..	..	..	..	H	H	H	H	H	H
St. Vincent and the Grenadines	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Sudan	L	L	LM	LM	LM	LM	LM	LM	LM	LM	LM
Suriname	LM	LM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Swaziland	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Sweden	H	H	H	H	H	H	H	H	H	H	H
Switzerland	H	H	H	H	H	H	H	H	H	H	H
Syrian Arab Republic	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Taiwan, China	H	H	H	H	H	H	H	H	H	H	H
Tajikistan	L	L	L	L	L	L	L	L	L	LM	LM
Tanzania	L	L	L	L	L	L	L	L	L	L	L
Thailand	LM	LM	LM	LM	LM	UM	UM	UM	UM	UM	UM
Timor-Leste	L	L	LM	LM	LM	LM	LM	LM	LM	LM	LM
Togo	L	L	L	L	L	L	L	L	L	L	L
Tonga	LM	LM	LM	LM	LM	LM	LM	UM	UM	UM	LM
Trinidad and Tobago	UM	H	H	H	H	H	H	H	H	H	H
Tunisia	LM	LM	LM	LM	LM	UM	UM	UM	UM	UM	LM
Turkey	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
Turkmenistan	LM	LM	LM	LM	LM	LM	UM	UM	UM	UM	UM
Turks and Caicos Islands	..	..	..	..	H	H	H	H	H	H	H
Tuvalu	..	..	..	..	LM	LM	UM	UM	UM	UM	UM
Uganda	L	L	L	L	L	L	L	L	L	L	L
Ukraine	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
United Arab Emirates	H	H	H	H	H	H	H	H	H	H	H
United Kingdom	H	H	H	H	H	H	H	H	H	H	H
United States	H	H	H	H	H	H	H	H	H	H	H
Uruguay	UM	UM	UM	UM	UM	UM	UM	H	H	H	H
Uzbekistan	L	L	L	L	LM	LM	LM	LM	LM	LM	LM

Vanuatu	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Venezuela, RB	UM	UM	UM	UM	UM	UM	UM	UM	UM	H	UM
Vietnam	L	L	L	L	LM	LM	LM	LM	LM	LM	LM
Virgin Islands (U.S.)	H	H	H	H	H	H	H	H	H	H	H
West Bank and Gaza	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM
Yemen, Rep.	L	L	L	L	LM	LM	LM	LM	LM	LM	LM
Zambia	L	L	L	L	L	LM	LM	LM	LM	LM	LM
Zimbabwe	L	L	L	L	L	L	L	L	L	L	L

* At this time, there were Yemen, PDR (L) and Yemen, Arab Rep. (LM); combined they would have been LM.

Czechoslovakia (former)						
Mayotte	UM	UM	UM	UM	UM	UM
Netherlands Antilles (former)	H	H	H	H	H	
Serbia and Montenegro (former)	LM					
USSR (former)						
Yugoslavia (former)						

Source: WDI (World Development Indicators) (database), World Bank, Washington, DC (accessed on October 30, 2016), http://data.worldbank.org/products/wdi.

Table 1A.2. Unemployment and Underemployment Rates, by Country, 2012–2020

Country	**Income group**	**Unemployment Rate**			**Underemployment Rate**	
		2012	**2015 (proj.)**	**2020 (proj.)**		
Afghanistan	Low income	8.3	9.6	9.9	year(2011)	18.3
Benin	Low income	1.0	1.1	1.1		
Burkina Faso	Low income	3.3	2.9	2.8		
Burundi	Low income	1.6	1.5	1.7		
Cambodia	Low income	0.2	0.5	0.6		
Central African Republic	Low income	7.6	7.6	7.9		
Chad	Low income	5.6	5.6	5.6		
Comoros	Low income	19.2	19.6	19.4		
Congo, Democratic Republic of the	Low income	3.7	3.8	3.8		
Eritrea	Low income	7.9	8.4	8.4		
Ethiopia	Low income	5.8	5.5	5.7	year(2012)	41.8
Gambia	Low income	29.8	30.1	29.3		
Guinea	Low income	1.7	1.8	1.7		
Guinea-Bissau	Low income	7.6	7.6	7.4		
Haiti	Low income	7.0	6.9	6.7		
Korea, Democratic People's Republic of	Low income	6.8	6.7	6.6		
Liberia	Low income	3.7	4.2	4.0		
Madagascar	Low income	1.3	2.2	2.5	year(2010)	41.9
Malawi	Low income	6.4	6.7	6.8		
Mali	Low income	6.9	8.5	8.8		
Mozambique	Low income	22.6	22.3	21.3		
Nepal	Low income	2.6	3.1	3.0		
Niger	Low income	2.3	2.8	2.8		
Rwanda	Low income	3.4	2.4	2.1		

Sierra Leone	Low income	3.3	3.4	3.3		
Somalia	Low income	7.5	7.5	7.5		
Tanzania, United Republic of	Low income	3.2	3.2	3.3	year(2014)	13.5
Togo	Low income	7.7	7.7	7.6		
Uganda	Low income	4.3	3.6	3.4		
Zimbabwe	Low income	11.1	9.3	7.6	year(2014)	15.5
Armenia	Lower-middle income	17.3	16.3	16.4		
Bangladesh	Lower-middle income	4.5	4.4	4.4		
Bhutan	Lower-middle income	2.1	2.6	2.4	year(2010)	2.8
Bolivia, Plurinational State of	Lower-middle income	2.3	3.6	4.1		
Cameroon	Lower-middle income	4.1	4.6	4.8		
Cape Verde	Lower-middle income	10.5	10.8	10.7		
Congo	Lower-middle income	7.3	7.2	7.2		
Côte d'Ivoire	Lower-middle income	9.4	9.5	9.4		
Djibouti	Lower-middle income	59.2	53.9	52.2		
Egypt	Lower-middle income	12.7	12.1	10.4	year(2013)	7.3
El Salvador	Lower-middle income	6.1	6.4	6.8	year(2013)	21.5
Georgia	Lower-middle income	15.0	12.3	12.0	year(2015)	2.4
Ghana	Lower-middle income	4.1	6.3	6.6		
Guatemala	Lower-middle income	2.9	2.7	2.6	year(2015)	10.7
Guyana	Lower-middle income	11.2	11.2	11.2		
Honduras	Lower-middle income	4.1	3.9	3.8		
India	Lower-middle income	3.6	3.5	3.2		
Indonesia	Lower-middle income	6.1	5.8	5.3	year(2015)	8.5
Kenya	Lower-middle income	9.2	9.2	9.1		
Kyrgyzstan	Lower-middle income	8.4	8.2	7.9		
Lao People's Democratic Republic	Lower-middle income	1.4	1.6	1.7		
Lesotho	Lower-middle income	25.2	27.5	28.2	year(2013)	1.1
Mauritania	Lower-middle income	30.8	31.1	31.3		
Moldova, Republic of	Lower-middle income	5.6	5.0	4.6	year(2015)	6.2
Morocco	Lower-middle income	15.6	16.3	17.0	year(2015)	10.8
Myanmar	Lower-middle income	4.4	4.7	4.7		
Nicaragua	Lower-middle income	6.8	6.0	6.8		
Nigeria	Lower-middle income	7.6	5.8	6.9		
Pakistan	Lower-middle income	5.7	5.4	5.0		
Papua New Guinea	Lower-middle income	3.6	3.1	3.4		
Philippines	Lower-middle income	7.0	6.7	5.4	year(2015)	9.7
Samoa	Lower-middle income	8.7	5.8	4.5		
Sao Tome and Principe	Lower-middle income	13.6	14.0	13.9		
Senegal	Lower-middle income	10.3	9.3	8.7	year(2011)	9.6
Solomon Islands	Lower-middle income	34.2	34.8	34.9		
Sri Lanka	Lower-middle income	4.0	4.7	5.5	year(2011)	2.7
Sudan	Lower-middle income	12.9	13.6	13.9		
Swaziland	Lower-middle income	27.4	25.6	25.2		
Syrian Arab Republic	Lower-middle income	14.7	12.3	10.8		
Tajikistan	Lower-middle income	11.0	10.9	10.9		
Timor-Leste	Lower-middle income	3.7	5.0	5.7		
Ukraine	Lower-middle income	7.5	9.9	8.6	year(2015)	0.5
Uzbekistan	Lower-middle income	10.3	10.1	10.0		
Vanuatu	Lower-middle income	4.3	4.3	4.5		

Viet Nam	Lower-middle income	1.8	2.1	2.0	year(2015)	1.8
West Bank and Gaza Strip	Lower-middle income	23.0	25.9	23.7		
Yemen	Lower-middle income	17.7	15.9	15.6		
Zambia	Lower-middle income	7.8	10.7	11.6		
Albania	Upper-middle income	13.4	17.3	16.3	year(2015)	15.2
Algeria	Upper-middle income	11.0	10.5	8.9	year(2014)	0
Angola	Upper-middle income	7.6	7.6	7.4		
Azerbaijan	Upper-middle income	5.2	4.7	5.7	year(2012)	18.5
Belarus	Upper-middle income	5.9	6.1	6.2		
Belize	Upper-middle income	14.4	11.8	12.4	year(2015)	11.6
Bosnia and Herzegovina	Upper-middle income	28.1	30.3	27.3		
Botswana	Upper-middle income	17.7	18.6	19.4		
Brazil	Upper-middle income	6.1	7.2	7.9	year(2013)	1.8
Bulgaria	Upper-middle income	12.3	9.8	9.6	year(2009)	1.2
China	Upper-middle income	4.5	4.6	4.8		
Colombia	Upper-middle income	10.6	10.0	8.8	year(2014)	10.2
Costa Rica	Upper-middle income	7.8	8.6	7.8	year(2013)	14.5
Cuba	Upper-middle income	3.5	3.0	3.5		
Dominican Republic	Upper-middle income	14.7	14.4	15.2	year(2015)	16.6
Ecuador	Upper-middle income	4.1	4.3	5.3	year(2015)	11.9
Fiji	Upper-middle income	9.0	7.7	7.1		
Gabon	Upper-middle income	20.4	20.5	20.0		
Guadeloupe	Upper-middle income	22.9	26.2	26.1		
Iran, Islamic Republic of	Upper-middle income	12.7	10.5	10.3	year(2015)	9.8
Iraq	Upper-middle income	15.2	16.9	17.9		
Jamaica	Upper-middle income	13.7	13.7	11.9	year(2010)	0.8
Jordan	Upper-middle income	12.2	12.8	13.6		
Kazakhstan	Upper-middle income	5.3	5.6	6.5	year(2012)	2.1
Lebanon	Upper-middle income	6.2	7.1	7.6		
Libya	Upper-middle income	20.6	20.6	20.6		
Macedonia, the former Yugoslav Republic of	Upper-middle income	31.0	26.9	30.5	year(2012)	2.2
Malaysia	Upper-middle income	3.0	2.9	3.1	year(2011)	4.1
Maldives	Upper-middle income	11.2	11.8	12.4		
Mauritius	Upper-middle income	8.7	7.9	7.5		
Mexico	Upper-middle income	4.8	4.3	4.0	year(2015)	8.4
Mongolia	Upper-middle income	8.2	7.1	6.2		
Montenegro	Upper-middle income	19.6	18.2	17.7		
Namibia	Upper-middle income	27.4	25.5	23.6		
Panama	Upper-middle income	4.0	5.2	6.2	year(2010)	2
Paraguay	Upper-middle income	4.9	4.9	5.6	year(2015)	20
Peru	Upper-middle income	3.6	3.5	4.2	year(2015)	10.4
Romania	Upper-middle income	6.8	6.9	6.3	year(2015)	3.3
Saint Lucia	Upper-middle income	19.1	20.1	18.9	year(2015)	13
Saint Vincent and the Grenadines	Upper-middle income	18.4	20.0	19.6		
Serbia	Upper-middle income	23.9	19.0	18.4	year(2015)	9.4
South Africa	Upper-middle income	24.7	25.1	24.4	year(2015)	4.5
Suriname	Upper-middle income	6.3	7.8	8.6		
Thailand	Upper-middle income	0.7	1.1	1.1	year(2011)	1
Tonga	Upper-middle income	4.8	5.2	4.9		
Tunisia	Upper-middle income	17.6	14.8	14.5		

Turkey	Upper-middle income	8.1	10.3	11.6	year(2015)	1.6
Turkmenistan	Upper-middle income	10.3	10.0	9.9		
Argentina	High income	7.3	6.7	6.7	year(2014)	9.6
Australia	High income	5.2	6.3	5.9	year(2015)	8.9
Austria	High income	4.9	5.7	5.6	year(2015)	4.6
Bahamas	High income	14.0	14.4	11.2		
Bahrain	High income	1.2	1.2	1.4		
Barbados	High income	11.6	12.3	11.5	year(2014)	3
Belgium	High income	7.5	8.7	8.3	year(2015)	4.8
Brunei Darussalam	High income	1.5	1.9	2.1		
Canada	High income	7.3	6.9	6.8	year(1999)	1.7
Channel Islands	High income	4.6	4.5	4.4		
Chile	High income	6.4	6.4	7.7	year(2015)	9.1
Croatia	High income	15.9	16.1	16.4	year(2015)	4
Cyprus	High income	11.8	15.6	10.5	year(2015)	14
Czech Republic	High income	7.0	5.2	5.2	year(2009)	0.6
Denmark	High income	7.5	6.3	5.6	year(2015)	2.6
Equatorial Guinea	High income	7.6	9.4	11.2		
Estonia	High income	10.0	5.9	8.2	year(2015)	1.4
Finland	High income	7.7	9.6	10.1	year(2015)	6
France	High income	9.4	10.6	9.1	year(2015)	9.7
French Guiana	High income	22.3	23.8	24.1		
French Polynesia	High income	21.8	16.1	14.1		
Germany	High income	5.4	4.6	4.4	year(2015)	4.3
Greece	High income	24.1	24.9	19.2	year(2015)	8.5
Guam	High income	12.2	10.3	10.0		
Hong Kong, China	High income	3.3	3.3	4.0	year(2015)	1.4
Hungary	High income	11.0	7.0	6.8	year(2015)	1.9
Iceland	High income	6.0	4.4	4.1	year(2015)	5
Ireland	High income	14.7	9.5	7.1	year(2015)	7.1
Italy	High income	10.7	12.1	10.5	year(2012)	4.7
Japan	High income	4.2	3.3	3.6	year(2015)	4.5
Korea, Republic of	High income	3.2	3.7	3.5		
Kuwait	High income	3.6	3.5	3.8		
Latvia	High income	15.0	9.8	9.5	year(2015)	4.6
Lithuania	High income	13.4	9.5	9.2	year(2015)	2
Luxembourg	High income	5.1	5.9	5.1	year(2015)	2.9
Macau, China	High income	2.0	1.8	2.3	year(2014)	0.4
Malta	High income	6.3	5.4	5.7	year(2015)	3.7
Martinique	High income	21.0	23.2	23.3		
Netherlands	High income	5.3	6.1	4.7	year(2015)	6.6
New Caledonia	High income	15.0	15.8	16.0		
New Zealand	High income	6.9	5.9	5.6	year(2015)	2.9
Norway	High income	3.1	4.1	3.9	year(2015)	3.1
Oman	High income	6.4	6.3	6.5		
Poland	High income	10.1	7.4	7.5	year(2015)	2.7
Portugal	High income	15.5	12.1	10.1	year(2015)	9.2
Puerto Rico	High income	14.5	13.6	12.4		
Qatar	High income	0.5	0.2	0.4		
Réunion	High income	28.5	30.2	30.0	year(2012)	11.9

Russian Federation	High income	5.5	5.8	5.9	year(2012)	0.7
Saudi Arabia	High income	5.6	5.8	5.6		
Singapore	High income	2.8	3.3	3.8	year(2015)	2.9
Slovakia	High income	14.0	11.3	10.5	year(2015)	2.5
Slovenia	High income	8.8	9.3	7.3	year(2015)	6.9
Spain	High income	24.8	22.4	18.9	year(2015)	10
Sweden	High income	8.0	7.4	6.5	year(2015)	4.3
Switzerland	High income	4.2	4.3	4.2	year(2015)	5.8
Taiwan, China	High income	4.2	3.8	4.1		
Trinidad and Tobago	High income	5.0	3.8	5.3		
United Arab Emirates	High income	4.1	3.7	3.5		
United Kingdom	High income	7.9	5.5	5.7	year(2015)	6.8
United States	High income	8.2	5.3	5.1	year(2014)	4.9
United States Virgin Islands	High income	8.9	9.1	9.1		
Uruguay	High income	6.5	7.3	9.2	year(2015)	7
Venezuela, Bolivarian Republic of	High income	8.1	8.0	9.7		

Source: ILOSTAT Database, International Labour Organization, Geneva (accessed November 1, 2016), http://www.ilo.org/ilostat/.

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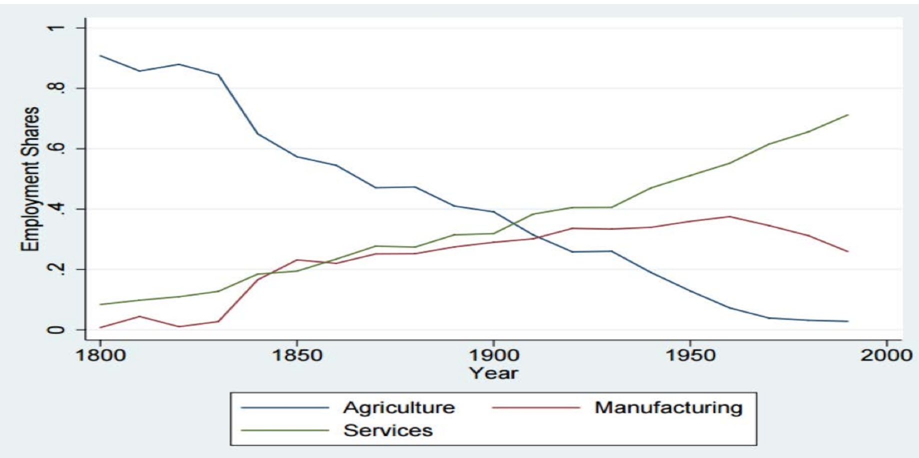
Chapter 2: Tools For Analysis

This chapter presents the tools used in this book to analyze industrialization and job creation. The analysis of productivity and structural transformation is conducted using the decomposition method shown in the next section. The following section discusses structural transformation using two new indicators: export variety and export quality. The new database used for the analysis of exports is presented. The results are compared with the new approach on economic complexity, which is explained in the last section.

Economic Growth, Industrialization, & Structural Change

An important feature of economic growth throughout the world is the change in the employment shares of agriculture, industry, and services as an economy develops. This has been pointed out by Kuznets (1959). Figure 2.1 illustrates the U.S. case.

Figure 2.1. Employment, by Sector, United States, 1800–2000



Source: Acemoglu 2009.

The share of labor force in agriculture dropped from over 90 percent in 1800 to below 4 percent today while more than 75 percent of the labor force is in the services sector.

Different theories have been advanced over the years to explain this phenomenon. These include Engel's law and its extension, which state that, as income rises, people spend less on food and more on industrial goods and beyond a certain point, on more services; Baumol's theory that different sectoral growth rates arise because of different rates of technological progress; and the new structural economics, which states that an economy develops according to its dynamic comparative advantage.[12]

The essence of economic growth is the divergence across countries in income and in income growth. Various scholars have stressed the importance of industrialization because economic development may "necessitate an analysis of why some countries industrialized early, while others were delayed or never started the process of industrialization" (Acemoglu 2009, 720).

A neoclassical production function linking output to factors of production is presented, as follows:

$$\mathbf{Y = f(A,K,L, N),}$$

where Y is output (value added in constant prices), A is the efficiency with which inputs are used in the production process, K is the capital stock, L is the labor force, and N is amount of land and other natural resources of the country.

Taking differential and rearranging this equation yields:

$\dot{y}=a+\alpha Gk+\beta Gl+\Upsilon Gn$ where $\dot{y}$ denotes output growth Gk, Gl, Gn denotes growth rates of capital, labor, and land and other resources respectively, and α, β, and Υ denotes the share of capital, labor, and land respectively. Hence,

$$\mathbf{a= \dot{y}-\alpha Gk -\beta Gl-\Upsilon Gn.}$$

The economy-wide productivity, a, is sometimes called the our ignorance term because it summarizes everything we do not know, including technology progress, machinery per worker, institutional arrangement, structural transformation, and so on. The seminal work of Denison (1982), Jorgenson (2005), Solow (1970), and others show that this term amounts to almost half of total growth of output. Hence, structural change in output depends on growth of productivity.

Output growth is a focus not for its own sake, but for its ability to create good quantity and quality in employment. To this end, it is important to understand if the change in output per worker is derived from greater productivity within the sector or from a shift in sectoral employment; the former is not directly affected by policies, but the latter is. Similarly, it is important to understand if the higher-productivity sectors in an economy

12 See Acemoglu (2009) for a succinct treatment of the aspects associated with Engel's Law; Baumol, Blackman, and Wolff (1989) on Baumol's theory; and Lin (2012) on the new structural economics.

can absorb new entrants in the labor force, as is the case of light manufacturing in low-income countries (Chapter 3), or are they characterized by limited employment absorption, as is the case of mining, utilities, and other capital-intensive sectors. This is a key issue not only in developing countries, but also in advanced countries.

Term a is the total factor productivity: what is left in output growth after proper accounts are made of the effects from labor force and capital as well as other natural resource endowment. Since the calculation of total factor productivity involves estimates of capital and other factors of production, which are notoriously difficult in developing countries, we will use a simpler indicator throughout this book, labor productivity, which is the ratio of value added in constant prices to the labor force.

In addition to data availability, there is another reason for the focus on labor productivity. Baumol, Blackman, and Wolff (1989) point out that, unlike total factor productivity, which measures the efficiency with which inputs are used in production, labor productivity can be taken as a measure of prospective consumption or standard of living. In their view, "What is special about the labor productivity concept is that it indicates how hard humanity must work to achieve the current economic yield" (Baumol, Blackman, and Wolff 1989, 227). They conclude that "labor productivity is the proper measure of the capacity of an economic unit (a firm, an industry, or an entire economy) to reward its labor force and that total factor productivity, or some other measures, cannot serve that purpose as well, being designed for another role" (Baumol, Blackman, and Wolff 1989, 228).

Throughout the book, emphasis is placed on the notion of achieving sustainable economic growth through productivity improvement and structural transformation. Productivity is defined as value added per unit of input used in the production process, while structural transformation is the process whereby economic resources are shifted from low- to high-productivity activities. A country can gain economic growth without taking this route, for instance, by exploiting natural resources. Chapter 4 shows that this method is not sustainable.

In the context of low-income countries, economic growth is not sustainable without structural transformation, a key feature in the history of economic development throughout the world. With the possible exception of a few city-states, all developed countries today started out as agrarian economies, moving to manufacturing and then to services. Growth can also be obtained through raising productivity within the sectors, such as capital deepening, by adopting new technology, or by improving the quality of services.

The starting point for our analysis of structural transformation is the decomposition of labor productivity along the lines of McMillan, Rodrik, and Verduzco-Gallo (2014):

$$(1) \qquad \Delta Y_t = \sum_{i=1,n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=1,n} y_{i,t} \Delta \theta_{i,t}$$

where ΔY_t denotes the change in the economy-wide labor productivity in period t, $\theta_{i,t-k}$ is the employment share of sector i in period t-k, and $\Delta y_{i,t}$ is the change in labor productivity of sector i in period t.

The first right-hand term in the decomposition equation is the weighted sum of productivity growth within individual sectors, where the weights are the employment share of each sector at the beginning of the period. This is the within component of productivity growth, which occurs if capital deepening or new technology (high variety yield, better inputs, and so on) is adopted in sectors and assuming no change in the sectoral distribution of employment. The second term captures the productivity effect of labor reallocation across sectors. It is sectoral productivity (at the end of the period), multiplied by the change in employment shares across sectors. This second term is the structural change term. If changes in employment shares are positively correlated with productivity, this term will be positive, and structural change will increase economy-wide productivity growth.

The decomposition technique above clarifies how partial analyses of productivity performance within individual sectors (such as agriculture) can be misleading when there are large differences in labor productivities (yi,t) across economic activities. In particular, a high rate of productivity growth within an industry can have quite ambiguous implications for overall economic performance if the industry's share of employment shrinks rather than expands. If the displaced labor ends up in activities with lower productivity, economy-wide growth will suffer and may even turn negative.

To examine the structural transformation pattern in further detail, we decompose the second term in equation 1 into two effects:

$$(2) \qquad \Delta Y_t = \sum_{i=1,n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=1,n} y_{i,t-k} \Delta \theta_{i,t} + \sum_{i=1,n} \Delta y_{i,t} * \Delta \theta_{i,t}$$

In equation (2), the structural term --the second term in equation (1)—is broken down into two components, the static reallocation effect and the dynamic reallocation effect (Timmer, de Vries, and de Vries 2014).

The first term of equation (2) is the same as the first term of equation 1. It measures the within effect, or the change in sector productivity arising from capital, technology, and so on, and assuming there is no change in sectoral employment. For example, in the agriculture sector, an improvement in yields because of a new type of seed or an enhancement in irrigation infrastructure would lead to positive change in this within effect, even if there is no change in the labor share in the sector. Conversely, a drought or war could cause a drop in agricultural output, leading to a negative within effect.

The second term in equation (2) refers to the between effect, or static structural change, and reflects the change in productivity brought about by the sectoral gain or loss in employment, assuming there is no change in productivity over the period. As such, it measures the pure effect of labor movement on overall productivity change. For the economy as a whole, this term is negative if there are more labor losses than labor gains across sectors. In general, for an economy that grows, this term is positive because there tends to be more jobs created so the gains would more than offset the losses.

The third term is the most interesting effect of all, and refers to the dynamic structural change. It is a product of the change in sector employment and the change in productivity and therefore indicates the "right" direction of productivity change. This term is thus positive if the economy progresses along the structural transformation path, that is, resources are being moved from low-productivity to high-productivity sectors. It is negative if the reverse happens, that is, if resources are being moved from high- to low-productivity sectors.

There are two caveats in this type of analysis from an ex ante viewpoint. First, it is assumed that jobs are already being created in the higher-productivity sectors so labor can move there. Of course, no structural transformation will occur if there are no jobs in the higher-productivity sectors. This is the reason this book focuses on creating jobs so that structural transformation can take place. Second, sectors with higher productivity may be capital intensive so that there may not be any possibility for additional job creation because of demand constraints. This is the case with many utility sectors and natural resource–based sectors.

Annex 2A explains in detail this concept by assuming a simple economy with three sectors: agriculture, manufacturing, and services. Under the base scenario, there is no change in sectoral productivity and no change in the sectoral share in employment during 20 years, yet, the labor force grows by 60 percent (that is, 2.4 percent a year) because of population growth, and the new entrants can be absorbed into the economy. Under this scenario, GDP grows by 60 percent solely on the basis of the availability of more labor (Table 2.1).

Table 2.1. Base Scenario: Sectoral Distribution of GDP and Employment, 2010 – 2030

		BASE									
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**		**Agri-culture**	**Manu-facturing**	**Services**	**GDP**
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00					
	Const. VA	2030	480.00	160.00	384.00	1 024.00					
	EMP	2010	150.00	20.00	80.00	250.00	% share	60.0%	8.0%	32.0%	100%
	EMP	2030	240.00	32.00	128.00	400.00		60.0%	8.0%	32.0%	100%
	PROD	2010	2.00	5.00	3.00	2.56					
	PROD	2030	2.00	5.00	3.00	2.56		% Change in GDP	60.0%		
2010-2030											
Change in productivity			0.00	0.00	0.00	0.00					
Change in sectoral employment			0.000	0.000	0.000	0.000					
Change in overall productivity			0.0								
Within Term			0.0000	0.0000	0.0000	0.0000					
Static Between Term			0.0000	0.0000	0.0000	0.0000					
Dynamic Between Term			0.0000	0.0000	0.0000	0.0000					
						0.0					
Growth in productivity 2010-2030			0.0%								
Within Term			0.0%								
Static Between Term			0.0%								
Dynamic Between Term			0.0%								

Source: Annex 2A.

In scenario 1a, there is again no sectoral productivity growth, but the economy manages to create a limited number of jobs in manufacturing, where labor productivity is higher. The shift of employment to manufacturing then lifts GDP growth from 60 percent to 74 percent even though there is no productivity growth in any of the sectors. The difference in GDP between scenario 1a and the base scenario is the pure effect of labor deployment and represents the extreme case of structural adjustment derived entirely from labor movement from low- to higher-productivity activities. Even though there is no productivity change within each of the sectors, economy-wide productivity rises by 9 percent, wholly because of the static between effect (the second term in equation 2) (Table 2.2).

Table 2.2. Scenario 1a: No Productivity Change, but a Shift to More Suitable Sectors

Scenario 1a no productivity change only labor shift to better sectors											
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**		**Agri-culture**	**Manu-facturing**	**Services**	**GDP**
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00					
UTOPIA	Const. VA	2030	400.00	300.00	420.00	1 120.00					
UTOPIA	EMP	2010	150.00	20.00	80.00	250.00	% share	60.0%	8.0%	32.0%	100%
UTOPIA	EMP	2030	200.00	60.00	140.00	400.00		50.0%	15.0%	35.0%	100%
	PROD	2010	2.00	5.00	3.00	2.56					
		2030	2.00	5.00	3.00	2.80		% Change in GDP	75%		
2010-2030											
Change in productivity			0.00	0.00	0.00	0.24					
Change in sectoral employment			-0.100	0.070	0.030	0.000					
Change in overall productivity			0.2								
Within Term			0.0000	0.0000	0.0000	0.0000					
Static Between Term			-0.2000	0.3500	0.0900	0.24					
Dynamic Between Term			0.0000	0.0000	0.0000	0.0000					
						0.24					
Growth in productivity 2010-2030			9%								
Within Term			0%								
Static Between Term			9%								
Dynamic Between Term			0%								

Source: Annex 2A.

The various scenarios are explored and discussed in Annex 2A. Scenario 1b illustrates reverse structural transformation (Table 2.3). This is the case of most African countries today (see Chapter 3). This scenario illustrates the case of reverse structural adjustment where there are no jobs in manufacturing or services so that new entrants into the labor force must be absorbed in agriculture or other low productivity sectors.

Table 2.3. Scenario 1b, Reverse Transformation: No Productivity Change, but a Shift to Less Suitable Sectors

			Scenario 1b reverse transformation --no productivity change only labor shift to worse sectors								
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**		**Agri-culture**	**Manu-facturing**	**Services**	**GDP**
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00					
	Const. VA	2030	500.00	125.00	375.00	1 000.00					
	EMP	2010	150.00	20.00	80.00	250.00	% share	60.0%	8.0%	32.0%	100%
	EMP	2030	250.00	25.00	125.00	400.00		62.5%	6.3%	31.3%	100%
	PROD	2010	2.00	5.00	3.00	2.56					
	PROD	2030	2.00	5.00	3.00	2.50		% Change in GDP	56.3%		
2010-2030											
Change in productivity			0.00	0.00	0.00	-0.06					
Change in sectoral employment			0.025	-0.018	-0.008	0.000					
Change in overall productivity			-0.06								
Within Term			0.0000	0.0000	0.0000	0.0000					
Static Between Term			0.0500	-0.0875	-0.0225	-0.0600					
Dynamic Between Term			0.0000	0.0000	0.0000	0.0000					
						-0.06					
Growth in productivity 2010-2030			-2%								
Within Term			0%								
Static Between Term			-2%								
Dynamic Between Term			0%								

Source: Annex 2A.

In many African countries, the surplus labor shifts to low- productivity services or in the informal sector. In this case, GDP falls below the GDP in the base case, and the difference in GDP between this scenario and the base case reflects the rise of the labor force in the least productive sector.

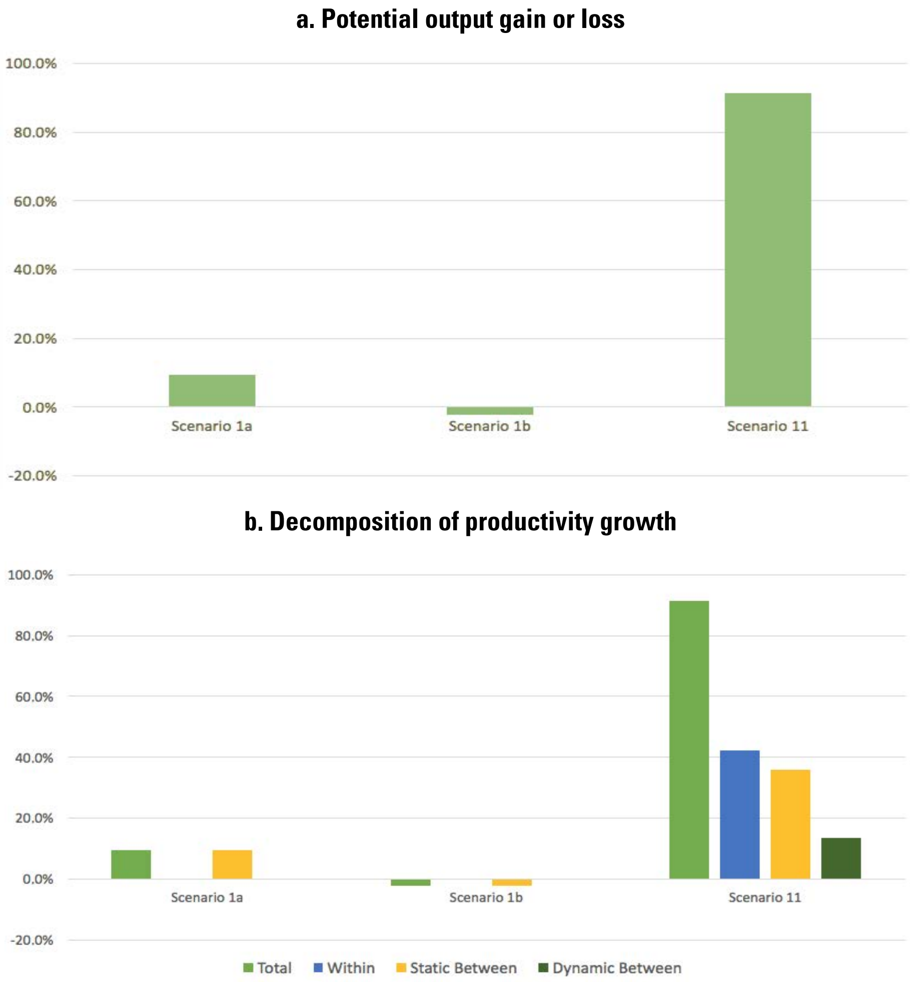
This appears irrational: why would labor move in the wrong direction, with possible negative consequences on wage remuneration? However, this is a common situation if the high-productivity sectors do not generate sufficient jobs to absorb new workers, and the low-productivity jobs—such as the ones in the informal sector are the ones that are easy to get—can absorb new workers. Indeed, there is every reason to believe that some services sectors such as banking tend to exhibit rising productivity because of technological change and because the absorption rate of new entrants to the labor force in these two sectors is slow.

Indeed, Chapter 6 argues that this is the root cause of the slowdown in the U.S. economy in the last few decades. The slowdown in U.S. productivity is rooted in both technological change and imports, especially from China since the 1990s. Both factors have reduced the rate of job creation in manufacturing while the services sectors did not generate enough well-paid jobs. Of course, robotization can generate jobs in a new sector, but not all laid-off workers can find a job or are not qualified for the new job. If these workers take jobs in low-productivity services, such as restaurants or hotels, the entire economy will suffer a reverse structural transformation. Coupled with a new cultural factor of not considering jobs as an absolute necessity (the way baby boomers, generation X, or the millennials view jobs), this results in fewer workers actively seeking work.

Scenario 11 is the best one in that there is both productivity growth and a redeployment of labor to the higher-productivity sectors (see Annex 2A, Table 2A.7). As a result, productivity (and GDP) is more than 90 percent higher than in the base case. The productivity growth in this scenario can be decomposed into three effects according to equation 2 above. The within effect accounts for 42 percent of the total productivity growth; the static between effect for 36 percent; and the dynamic between effect for 13 percent. Structural transformation—the sum of the static and dynamic effects—therefore amounts to 49 percent of the total, exceeding the productivity growth arising from the sectors (the within effect). Thus, the effect of structural transformation can exceed the improvement in productivity or efficiency associated with the production process.

Figure 2.2 shows the effects of the three scenarios in graphical terms. Panel a shows the effect of each scenario on the base scenario, while panel b shows the decomposition, mainly of scenario 3 (see Annex 2A, Table 2A.4).

Figure 2.2. Structural Transformation and the Decomposition of Productivity Growth



Source: Annex 2A.

Viable, sustained economic growth has to rely on both sources of productivity growth. For example, within productivity growth through mechanization in agriculture leads to higher output per farmer, but over time, to fewer farmers producing the same level or higher output than before. The extra farmers released from the agricultural sector would need to be absorbed in other sectors of the economy. In case they go to the sectors with higher productivity than agriculture, the whole economy gains, and structural transformation takes place. But if there are no jobs available, and these newly released workers have to stay unemployed, or if they go the informal sector, where productivity is even lower than in agriculture, then productivity growth from mechanization can result in limited impact on the economy as a whole.

In developing countries, where the number of the unemployed or underemployed is large, shifting labor to sectors with higher productivity may not be helpful if domestic demand imposes restrictions on the expansion of output or if the sector is capital intensive. On the first point, suppose that the banking sector undergoes a technology revolution, and worker productivity in the sector therefore rises. This does not mean this sector can absorb all the surplus workers from agriculture. Indeed, rising productivity may mean the sector needs fewer workers to achieve the same output. Sectors with constant productivity can absorb the surplus workers in the quickest way. This is one reason why manufacturing is always used as a stepping-stone for industrialization: it is a tradable sector, and external demand can easily expand output and absorb the extra workers. Some services sectors do, but, if they do, the workers usually require more training and education than a factory normally does. The other types of services, those exhibiting low productivity, are often nontradable, and their output depends on a domestic demand that may be limiting.

At their current development stage, low-income countries need simple, labor-intensive jobs such as the large-scale assembly jobs that FDI brought to Bangladesh, Cambodia, and Vietnam in the 1990s. The emphasis is on having as many jobs as possible to utilize the country's resources fully and to generate externalities through learning by doing, rather than by deepening value addition. Thus, low-income countries need to expand their industries horizontally, as opposed to moving up the value added scale (vertical expansion). This horizontal expansion is consistent with the task-based nature of modern manufacturing and the acute need for job creation, a need that has been made more urgent by demographic forces. Vertical expansion—moving up the value added chain through skills enhancement and so on—can only be achieved at a later stage among middle-income countries.

Moreover, horizontal expansion is the only way to achieve the fastest structural transformation among low-income countries, for example, the countries of sub-Saharan Africa. To absorb labor from low-productivity sectors such as agriculture, a typical African country needs to have job openings in industry or services. For nontradable services, the absorption rate is slow, making industry the only hope. For jobs in industry (or tradable services) that are created through horizontal expansion, the presence of marginal workers will be less likely to lower average productivity, a point made by Roy (1951) and recently confirmed by Young (2014) and this facilitates the absorption rate of surplus labor. Timmer et al. (2012) also argue that the less productivity rises in industry and services, the more rapidly structural transformation can occur. The quickest path to structural transformation emerges if productivity in industry and services is constant (such as in assembly work). Only in the later stages of economic development (where Vietnam is now) does the shift to higher–value added need to take place. In the same vein, the need to address the skills gap through increases in post-primary and vocational/technical education is a long term issue that will be critical at the next stage of industrial development. At the current stage, short term training geared toward enterprise needs may be of a higher priority.

Convergence & Divergence Through The Lens Of Structural Transformation

This book also shows that structural transformation can offer an explanation of why economic growth tends to be lower in developed countries than in developing countries (the absolute convergence) and also why developing countries tend to become stuck in an early stage of industrialization characterized by a small share of manufacturing and a larger share of lower-productivity sectors such as agriculture and services. There are a number of reasons. First, the level of productivity by sector varies a great deal across sectors, and this is much more apparent in developing countries (see above). Thus, the scope of growth through structural transformation is larger. Second, developing countries that do not manage to implement this structural transformation will increasingly face growth problems because the between productivity growth may be rapidly exhausted. Third, developed countries have less scope for structural transformation than developing countries, and their rapidly advanced manufacturing sector creates an uncertain outlook for job creation. To explain this last reason, one needs to understand the cost disease, a concept developed by the economist William Baumol.

The conventional wisdom holds that the share of services in GDP among developed countries increases, while the share of manufacturing declines after reaching a peak. Baumol, Blackman, and Wolff (1989) show that the share of services and manufacturing remain constant over time if one takes into account the differences in the relative price movements across sectors. In any economy, costs and prices will tend to rise more rapidly in those sectors in which productivity is lower than the economy-wide average (the laggards) than in the sectors with above average productivity (progressive sectors). Consequently, more and more resources in the economy will be devoted to these sectors, and fewer resources will be devoted to the progressive sectors. This may indeed represent a solution to the hollowing out of the U.S. economy (see Chapter 6).

To illustrate the point, Table 2.4 shows an economy with industry A (manufacturing) and B (services), and both sectors are assumed to maintain their shares constant.

Because of rapid productivity growth in A, the output price of A dropped by 25 percent a year, while that of B rises by 6 percent a year. The table shows that, by year 10, industry A's share in GDP in current prices is only 15 percent, while that of services has risen to 85 percent. It is also natural that labor force growth would be highest in services and not manufacturing.

Table 2.4. An Illustration of Baumol's Cost Disease

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Output of industry A (constant prices)	160	160	160	160	160	160	160	160	160	160
A's Output price	100	75	56.3	42.2	31.6	23.7	17.8	13.3	10.0	7.5
A's output in current prices	160	120.0	90.0	67.5	50.6	38.0	28.5	21.4	16.0	12.0
Output of industry B (constant prices)	40	40	40	40	40	40	40	40	40	40
B'S output price	100	106	112.4	119.1	126.2	133.8	141.9	150.4	159.4	168.9
B'S output in current prices	40	42.4	44.9	47.6	50.5	53.5	56.7	60.1	63.8	67.6
Total economy constant prices	200	200	200	200	200	200	200	200	200	200
Total economy in current prices	200	162.4	134.9	115.1	101.1	91.5	85.2	81.5	79.8	79.6
Share of A in current prices	80%	74%	67%	59%	50%	41%	33%	26%	20%	15%
Share of B in current prices	20%	26%	33%	41%	50%	59%	67%	74%	80%	85%

Source: Author's calculations.

Input-Output Analysis: An input-output table is a set of structural relations linking output of a sector or subsector for a country, a state, or a region to the inputs and final demand of that sector or subsector. The backward linkage of an industry refer to the inputs required in the economy to produce an extra unit of that industry. In other words, when an industry ith produces an extra unit, it requires (or demands) inputs from the rest of the economy and these requirements are called backward linkages. Note that these inputs come from upstream industries. On the other hand, when output of industry ith increases, that increases the supply of sector ith to the industries that use input ith in their production. Forward linkages refer to the impact of an increase in an industry's output on those industries that use it as input. Note that those are the industries that industry ith sells to (downstream industries). Frequently in economics, the interlinkages among industries are examined using backward linkages more so than forward linkages because it is easier to identify the source of the change in a demand model than from a supply model.[13] If the forward linkage of a sector ith is larger than another sector, jth,

13 The Leontief inverse can be used to find backward linkages, but not forward linkages because it relates gross output to final demand, that is, what happened to output if there were an additional unit at the end of the process. The Ghosh inverse, on the other hand, relates gross output to primary input, that is, to the unit of value entering the interindustry at the beginning of the process.

then sector ith can be identified as one with the larger impact on the economy and, hence, should be the focus.

Following Miller and Blair (2009), we define backward linkage of sector j as follows:

BLtj = ∑lij (summing over i),

where lij is the ij element of the requirement matrix (Leontief inverse). In other words, this is the column sums of the total requirement matrix. The forward linkage, however, is not defined on the requirement matrix because that would imply the impact on sector j of an increase in one unit of final demand of every sector. The forward linkage is defined as follows:

FL ti = ∑gij (summing over j),

where gij is element ij of the Ghosh inverse.

Combining these two concepts into a multiplier product matrix, which provides a graphical presentation of these interindustry linkages over time, Guo and Planting (2000) examine the structural change of the U.S. economy over a quarter century, from 1972 to 1996. They find that the United States has experienced significant transformation over that period. In general, the interdependence among domestic industries has been reduced because of the growth in imports, while the links among services have been increasing.

An understanding of input-output analysis is useful in Chapter 5, which examines the difference between value added and gross exports.

Structural Transformation By Upgrading Production & Exports

This section presents a method to compute two indexes that may be used to measure structural transformation without output and employment data, which are often not available or comparable across countries.[14] By contrast, trade data are readily available on a frequent basis and in fine detail and are consistent internationally. A discussion of the new export database used throughout this book is also discussed.

The two indicators proposed here are the export variety index and the export quality index. Horizontal diversification (variety expansion) and quality upgrading are two important facets that relate to the transformation of a country's economic structure. The ability to transition from simple, low-quality products to sophisticated, high-quality products is viewed as a necessary condition for export success and, eventually, economic development (Khandelwal 2010). The analysis is confined to the manufacturing sector.

14 For more details, see Dinh and Su (2017).

Quality upgrading tends to be greater in manufactures than in agriculture and natural resources (Henn, Papageorgiou, and Spatafora 2013). Meanwhile, manufacturing exports account for a large proportion of total exports even in Latin America.

Why are export variety and export quality of interest and how are they related to productivity growth and structural transformation? Recall that structural transformation is the process of moving resources from low- to high-productivity sectors to increase overall productivity growth. The decomposition technique discussed in the early part of this chapter deals with domestic production data that are aggregated and therefore do not contain much information on education, technology, capital intensity, and so on which would be needed for comparison across countries. In contrast, the detailed data used in the calculation of export variety and export quality are consistent across all countries and have been shown to relate to total factor productivity, education, and capital intensity.

Indeed, the relationship between productivity growth and increases in product variety is key to the endogenous growth models. Feenstra et al. (1999) examines if changes in export variety for Taiwan relative to Korea are correlated with the growth in total factor productivity in each sector. They find that, in most sectors studies, changes on relative export variety have a positive and significant effect on total factor productivity. They also find that the variety of upstream export industries also affect productivity and growth. Moreover, the sectors which rely on and produce differentiated manufactures tend to be the ones where empirical evidence tends to confirm the endogenous growth models. They find that the evidence on industries which rely on natural resources is mixed.

Similarly, using prices as a proxy for quality, studies have shown that more highly capital- and skill-intensive countries export higher-quality products (Hallak 2006; Schott 2004). Khandelwal (2010) shows that, even if prices do not indicate quality, as is the case if the horizontal product differential is taken into account, it is still true that developed countries export higher-quality products. However, in markets with a wide scope for quality differentiation (a long quality ladder), prices are good proxies for quality. In markets in which quality differentiation is narrow, prices are not good proxies for quality, and expensive products coexist with cheaper rivals because of horizontal product differentiation. Khandelwal also reports a positive and statistically significant relationship between a long quality ladder, capital intensity, and total factor productivity. The quality ladder also exhibits a positive and significant correlation with spending on research and development (R&D). Furthermore, the employment vulnerability of the United States in import competition is greatest in the face of low-wage countries rather than richer countries. For example, if low wage penetration increases by 10 percentage points, employment declines by 6 percent in an average ladder industry, but only 1.4 percent in a long ladder industry.

Annex 2C shows the methodology and detailed calculation of these two indexes. Chapter 3, Figure 3.7 shows the performance on these two indexes in 1974–2010 among countries in Africa, including those in the African franc zone (the Economic and Monetary Community of Central Africa and the West African Economic and Monetary Union). Overall, there was hardly any noticeable change in the movement of the two indexes over this period. Of the two, the export variety index is particularly important because it relates to the horizontal expansion of production and exports, which is more appropriate for low-income countries. Raising value added through higher quality (via innovation activities) is more appropriate for countries in the middle-income stage.

To measure the upgrading process accurately, trends in domestic value added can be estimated through detailed input-output tables, which are not frequently available and are not comparable across countries. In this book, this upgrading process is measured using two indexes: export variety and export quality. Data on exports are available on a frequent basis, are standardized across countries, and are provided in detail. At the same time, as discussed above, exports and imports are no longer correct indicators of the upgrading process as the vertically specialized integration has necessitated imports of intermediate goods.

Horizontal diversification (variety expansion) and quality upgrading are two important facets that relate to the transformation of a country's economic structure. The ability to transition from simple and low-quality to sophisticated and high-quality products is viewed as a necessary condition for export success and eventually economic development (Khandelwal 2010). The analysis is confined in the manufacturing sector. On the one hand, quality upgrading tends to be greater in manufactures than in agriculture and natural resources (Henn, Papageorgiou, and Spatafora 2013). On the other, manufacturing exports account for a large proportion of the total exports even in Latin America.

Database for Trade Analysis: This book utilizes the National Bureau of Economic Research trade dataset updated with trade data obtained from the U.S. Census Bureau for the years 2006–2012 to calculate the export variety index and the export quality index. The trade dataset provides U.S. import and export values disaggregated according to the Harmonized System, the Standard International Trade Classification (SITC), and the U.S. Standard Industrial Classification categories.[15] In addition, U.S. Harmonized System

15 See Instruments and Tools (database), Harmonized Commodity Description and Coding System, World Customs Organization, Brussels, http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools.aspx; SIC (Standard Industrial Classification) (database), Occupational Safety and Health Administration, United States Department of Labor, Washington, DC, https://www.osha.gov/pls/imis/sicsearch.html; SITC (Standard International Trade Classification) (database), Statistics Division, United Nations, New York, https://unstats.

tariff data have been added. The dataset on 1972–2006 was constructed by Feenstra (1996) and Feenstra, Romalis, and Schott (2002). For this book, the import dataset has been extended to 2012. In particular, U.S imports are classified under the 7-digit Tariff Schedule of the U.S. Annotated classification for 1972–1988, while, after 1989, the 10-digit Harmonized System classification is used.

There are many advantages of using this database to analyze export patterns in developing countries. First, it is based on a consistent methodology over a long period and covers many countries. Second, the product classification is consistent across all exporting countries. Third, the database allows an examination of all exporters under the same conditions of the importing country (the United States), that is, insulating export data from the macroeconomic conditions of individual countries.

The Economic Complexity Approach

In many ways, a new approach to economic development reinforces the industrialization approach to development and structural changes discussed in this book. This new approach is pioneered by Ricardo Hausmann at Harvard and César Hidalgo at MIT, who provide a compelling case that manufacturing does indeed matter (see Hausmann et al. 2014). Using export trade data for only manufactured goods from 128 countries over the past 60 years, they show that a significant portion (over 70 percent) of the income variations in countries can be explained using the definition of economic complexity. In their research, economic complexity is directly related to manufacturing knowledge and capabilities and they demonstrate that once a country begins to manufacture goods, thus building knowledge and capabilities, its path to prosperity becomes much easier. Furthermore, they show that the more complex the goods a country produces and the more advanced the manufacturing process a country uses, the greater prosperity the country will accumulate.

Hausmann and Hidalgo not only show that income, prosperity, sophistication, and economic complexity rise in tandem, but also that the linkages among manufacturing, economic complexity, and prosperity is highly predictive and that economic complexity is much better at explaining the variation in incomes across nations compared with other leading indicators (Hausmann et al. 2014). Economic complexity and, therefore, manufacturing is closely related to a country's prosperity: the more advanced are manufacturing capabilities and product sets, the greater the prosperity. Economic complexity reflects the amount of knowledge that is embedded in the productive structure of an economy. Countries in which economic complexity is greater than what

un.org/unsd/cr/registry/regcst.asp?Cl=14.

we would expect given the level of income tend to grow more quickly than those that are too rich relative to their current economic complexity. In this sense, economic complexity is not only a symptom or an expression of prosperity; it is a driver. Countries tend to move toward an income level that is compatible with their overall level of embedded expertise. On average, their income tends to reflect their embedded knowledge. But when it does not, it gets corrected through accelerated or diminished growth.

The economic complexity index represents the productive knowledge embedded in a society as a whole and is related to the diversity of knowledge exhibited by a society.[16] This productive knowledge is not based on skills acquired from school alone although for a complex economy to function, members of that society must be able to perform basic tasks such as read, write and solve simple mathematics problems. The amount of knowledge embedded in a society, however, does not depend mainly on how much knowledge each individual holds. It depends, instead, on the diversity of knowledge across individuals and on their ability to combine this knowledge, and make use of it, through complex webs of interaction. Because it is hard to transfer, tacit knowledge is what constrains the process of growth and development. Ultimately, differences in prosperity are related to the amount of tacit knowledge that societies hold. Ultimately, the complexity of an economy is related to the multiplicity of useful knowledge embedded in it. For a complex society to exist, and to sustain itself, people who know about design, marketing, finance, technology, human resource management, operations and trade law must be able to interact and combine their knowledge to make products. These same products cannot be made in societies that are missing parts of this capability set. Because individuals are limited in what they know, the only way societies can expand their knowledge base is by facilitating the interaction of individuals in increasingly complex webs of organizations and markets. Increased economic complexity is necessary for a society to be able to hold and use a larger amount of productive knowledge.

The amount of embedded knowledge that a country has is expressed in its productive diversity, or the number of distinct products that it makes. On the other hand, the ubiquity of a product, therefore, reveals information about the volume of knowledge that is required for its production. Hence, the amount of knowledge that a country has is expressed in the diversity and ubiquity of the products that it makes.

Hausmann and Hidalgo stress that the complexity of an economy reflects the amount of productive knowledge which is costly to acquire and transfer, and which is organized into modules called capabilities. Capabilities are difficult to accumulate because of the

16 See Atlas of Economic Complexity (database), Center for International Development, Harvard University, Cambridge, MA, http://atlas.cid.harvard.edu/.

chicken and egg problem: countries cannot create products that require capabilities they do not have, but they cannot acquire these capabilities if there is no demand for them. This is particularly true when the missing capabilities required by a potential new industry are many. In this case, supplying any single missing capability will not be enough to launch the new industry, given the absence of the other required capabilities. As argued in Chapter 5, this is also a serious problem for recent middle-income countries under fragmented production patterns, because the vertically integrated production makes it too easy to specialize and too hard to develop the complementary capabilities. This is similar to the argument for a big push by Rosenstein-Rodan (1943), although the big push is an argument for investment, not necessarily capabilities (Annex 2B).

In the same way that skill and expertise are modularized in individual capabilities, larger amounts of expertise are modularized in organizations and networks of organizations as organizational or collective capabilities. Manufacturing capabilities can be combined to produce different products and create various networks, some more sophisticated or complex than others. Hausmann and Hidalgo create a means to measure the sophistication of an economy based on how many products a country exports successfully and how many other countries also export those products. They argue that sophisticated economies export a large variety of exclusive products that few other countries can make. To do this, these economies have accumulated productive knowledge and developed manufacturing capabilities that others do not have.

Hausmann and Hidalgo also show that it is easier for countries to manufacture new products that are similar to ones they already make, for example, it is easier to graduate from assembling toys to assembling televisions than to jump from textiles to aerospace. They call the feasibility of these jumps adjacent possibilities. In their maps of the industrial landscape of a nation, similar products using similar knowledge and capabilities are more closely related than others and cluster tightly together, while unrelated products stand apart. Using their maps, one can see that an economy that already exports a few products in the tightest clusters can diversify quickly, hopping from one closely related product to the next. Manufacturing knowledge and capabilities can breed new knowledge and capabilities and thus new, more advanced products if the proper jumps are made.

The collection of all proximities is a network connecting pairs of products that are significantly likely to be co-exported by many countries. Hausmann and Hidalgo refer to this network as the product space and use it to study the productive structure of countries. The structure of the product space is important because it affects the ability of countries to move into new products. Products that are tightly connected share most of the requisite capabilities. Thus, countries that already have what it takes to make one product will find it relatively easy to move to the next ones. A highly connected product space, therefore, makes the problem of growing the complexity of an economy easier. Conversely, a sparsely connected product space makes it harder. The product space shows that many goods group naturally into highly connected communities. This suggests that products in these communities use a similar set of capabilities. We can identify communities because the products that belong to them are more closely connected to each other than to products outside of the community.

The product space gives us a glimpse of the embedded knowledge of countries by highlighting the productive capabilities they possess and the opportunities these imply. Hausmann and Hidalgo propose to evaluate a country's overall position in the product space by calculating how far it is to alternative products and how complex these products are. They call this measure opportunity value and it can be thought of as the value of the option to move into more and more complex products. Connectedness is a measure of how centrally located a community is in the product space. It is the average proximity of a community's products to all other products, where proximity is the measure of distance between two products used to construct the product space. New products may require capabilities that do not exist precisely because the other products that use them are not present. Moreover, since capabilities are chunks of tacit knowledge, accumulating them is difficult even when there is demand for them, because the country does not have any exemplars to copy.

A country's position in the product space determines its opportunities to expand productive knowledge and increase economic complexity. But the product space is highly heterogeneous, placing countries in radically different settings. Ultimately, development is the expression of the total amount of productive knowledge that is embedded in a society. But the process by which this knowledge is accumulated has a structure that we are only now starting to understand.

Hausmann and Hidalgo view economic development as a social learning process that is rife with pitfalls and dangers. Countries accumulate productive knowledge by developing the capacity to make a larger variety of products of increasing complexity. This process involves trial and error. It is a risky journey in search of the possible. Entrepreneurs, investors and policy-makers play a fundamental role in this economic exploration. Manufacturing, however, provides a ladder in which the rungs are more conveniently placed, making progress potentially easier.

This book argues that the concepts of diversity and ubiquity as proposed by Hausmann and Hidalgo are reasonable indicators of economic progress, but that they fail to capture an important aspect of the knowledge economy, namely, the variety and quality of products. Variety is a more refined concept than diversity in that it breaks down the products within a subsector, as opposed to the number of products across subsectors. As discussed above, the discussion on structural transformation is supplemented by these two new indicators.

Annex 2A. Structural Transformation: Labor Absorbing Versus Labor Replacing Production Technique

The term structural transformation is often used loosely to show the change in the structure of an economy. This book uses a stricter definition: structural transformation denotes the change in the total productivity of an economy (the sum of productivity changes in all sectors) arising from the shifting of resources (labor) relative to the sectoral distribution at the beginning of the selected period. Whether and how much this shift contributes to GDP growth depends not only on the original structure of the economy, but also on whether there is a change in productivity within and across individual sectors and if this change is caused by labor absorbing or labor replacing production techniques. For easy exposition, two extreme cases are distinguished, corresponding to whether the new production technique is completely labor absorbing or labor replacing. In reality, most real world cases fall somewhere in between.

- **Labor Absorbing Technique**

Assume a developing economy, Utopia, with three sectors: agriculture, manufacturing, and services. The assumed sectoral distribution of GDP in constant prices and of employment are given in Table 2A.1, which represents the base scenario. GDP is measured in millions of local currency at constant prices, and employment is measured in thousands of persons. Labor productivity, the quotient of the two, is measured as thousands of local currency (at constant prices) per person. The base year is 2010 and the target year is 2030. In the base scenario, there is no productivity growth and no change in sectoral employment distribution over 2010–2030. Hence, the economy grows entirely based on the growth in the labor force. The far right of Table 2A.1 shows the sectoral distribution of employment; this is a crucial determinant of structural transformation. Over this period, the economy grew by 60 percent, or about 2.4 percent a year, the growth rate of the population and of the labor force, which is the same in all scenarios.

Table 2A.1. Base Scenario: Sectoral Distribution of GDP and Employment

		BASE									
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**		**Agri-culture**	**Manu-facturing**	**Services**	**GDP**
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00					
	Const. VA	2030	480.00	160.00	384.00	1 024.00					
	EMP	2010	150.00	20.00	80.00	250.00	% share	60.0%	8.0%	32.0%	100%
	EMP	2030	240.00	32.00	128.00	400.00		60.0%	8.0%	32.0%	100%
	PROD	2010	2.00	5.00	3.00	2.56					
	PROD	2030	2.00	5.00	3.00	2.56		% Change in GDP	60.0%		
2010-2030											
Change in productivity			0.00	0.00	0.00	0.00					
Change in sectoral employment			0.000	0.000	0.000	0.000					
Change in overall productivity			0.0								
Within Term			0.0000	0.0000	0.0000	0.0000					
Static Between Term			0.0000	0.0000	0.0000	0.0000					
Dynamic Between Term			0.0000	0.0000	0.0000	0.0000					
						0.0					
Growth in productivity 2010-2030			0.0%								
Within Term			0.0%								
Static Between Term			0.0%								
Dynamic Between Term			0.0%								

Source: Author's calculations.

In this base case, there is no change in productivity at the individual sector level nor at the economy-wide level. Hence all the right hand side components of equations 1 and 2 are zero. This annex assumes that demand is not a factor so that the rise in labor can be absorbed by increased output.

Scenario 1a (Table 2A.2) also assumes no productivity change, but there is a labor shift from the lowest productivity sector (agriculture) to higher-productivity sectors. The crucial assumption is that jobs are created in the higher-productivity sectors to absorb the labor movement. The reduction in the agricultural labor force does not occur in absolute terms, but in the sectoral share (from 60 percent to 50 percent), and, compared with the base case, an additional 40 jobs are being absorbed by manufacturing (28) and services (12). This causes GDP growth to rise from 60 percent to 75 percent. This is the structural transformation effect in its purest sense. Even though there is no productivity change within each of the sectors, economy-wide productivity increases by 9 percent entirely because of the static between effect (the second term in equation 2).

Table 2A.2. Scenario 1a: No Productivity Change, but a Shift to Higher Productivity Sectors

Scenario 1a no productivity change only labor shift to better sectors											
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**		**Agri-culture**	**Manu-facturing**	**Services**	**GDP**
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00					
UTOPIA	Const. VA	2030	400.00	300.00	420.00	1 120.00					
UTOPIA	EMP	2010	150.00	20.00	80.00	250.00	% share	60.0%	8.0%	32.0%	100%
UTOPIA	EMP	2030	200.00	60.00	140.00	400.00		50.0%	15.0%	35.0%	100%
	PROD	2010	2.00	5.00	3.00	2.56					
		2030	2.00	5.00	3.00	2.80		% Change in GDP	75%		
2010-2030											
Change in productivity			0.00	0.00	0.00	0.24					
Change in sectoral employment			-0.100	0.070	0.030	0.000					
Change in overall productivity			0.2								
Within Term			0.0000	0.0000	0.0000	0.0000					
Static Between Term			-0.2000	0.3500	0.0900	0.24					
Dynamic Between Term			0.0000	0.0000	0.0000	0.0000					
						0.24					
Growth in productivity 2010-2030			9%								
Within Term			0%								
Static Between Term			9%								
Dynamic Between Term			0%								

Source: Author's calculations.

Scenario 1b (Table 2A.3) illustrates the case of reverse structural transformation, the case of many low-income countries today. As in scenario 1a, assume there is no change in sectoral productivity and only an intersectoral labor shift. However, instead of shifting economic resources from low- to high-productivity sectors, shift them from high- to low-productivity sectors. As a result, overall productivity is reduced by 2 percent of GDP, although there is no change in individual sectoral productivity.

This appears irrational. Why would labor move in the wrong direction, with possible negative consequences on wage remuneration? Yet, this is a common situation if high-productivity sectors do not generate sufficient jobs to absorb new workers and if the low-productivity jobs are the informal ones that can absorb new workers. In particular, there are subsectors within manufacturing and services that tend to exhibit rising productivity because of technological change, and the absorption rate of new entrants into those sectors is likely very low.

Chapter 6 argues that this is the root cause of the slowdown in the U.S. economy in the last few decades. The slowdown in U.S. productivity is rooted in both technological change and imports, especially from China since the 1990s. Both factors have reduced the rate of job creation in manufacturing. Coupled with a new cultural factor among the millennials, this results in fewer workers actively seeking jobs.

Table 2A.3. Scenario 1b, Reverse Transformation: No Productivity Change, but a Shift to Lower Productivity Sectors

		Scenario 1b reverse transformation --no productivity change only labor shift to worse sectors									
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**		**Agri-culture**	**Manu-facturing**	**Services**	**GDP**
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00					
	Const. VA	2030	500.00	125.00	375.00	1 000.00					
	EMP	2010	150.00	20.00	80.00	250.00	% share	60.0%	8.0%	32.0%	100%
	EMP	2030	250.00	25.00	125.00	400.00		62.5%	6.3%	31.3%	100%
	PROD	2010	2.00	5.00	3.00	2.56					
	PROD	2030	2.00	5.00	3.00	2.50		% Change in GDP	56.3%		

2010-2030				
Change in productivity	0.00	0.00	0.00	-0.06
Change in sectoral employment	0.025	-0.018	-0.008	0.000
Change in overall productivity	-0.06			
Within Term	0.0000	0.0000	0.0000	0.0000
Static Between Term	0.0500	-0.0875	-0.0225	-0.0600
Dynamic Between Term	0.0000	0.0000	0.0000	0.0000
				-0.06
Growth in productivity 2010-2030	-2%			
Within Term	0%			
Static Between Term	-2%			
Dynamic Between Term	0%			

Source: Author's calculations.

But what kinds of production techniques would allow for this kind of labor absorption? Assuming that output can be raised without any problems from the demand side (which would be the case if an economy is small and open so that the global demand for its exports is infinite), an improvement in productivity because of technological advancement could raise output, which could lead to greater labor absorption.

In scenario 2 (not shown for lack of space), we keep the same sectoral distribution of the labor force, but assume that productivity in manufacturing and services rises from 5 percent to 7 percent and from 3 percent to 4 percent, respectively, while agricultural productivity remains the same. GDP in that case grows by 90 percent compared with the base case, and the overall economy shows an increase in productivity of 19 percent arising from the within effect.

Scenario 3 (Table 2A.4) illustrates what happens if all three sectors show productivity improvement within the sector, but labor force distribution remains the same.

Table 2A.4. Scenario 3: Productivity Increases in All Sectors, but Static Labor Distribution

Scenario 3 same as scenario 2 but with productivity increases in all sectors											
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**		**Agri-culture**	**Manu-facturing**	**Services**	**GDP**
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00					
UTOPIA	Const. VA	2030	720.00	224.00	512.00	1 456.00					
UTOPIA	EMP	2010	150.00	20.00	80.00	250.00	% share	60.0%	8.0%	32.0%	100.0%
UTOPIA	EMP	2030	240.00	32.00	128.00	400.00		60.0%	8.0%	32.0%	100.0%
	PROD	2010	2.00	5.00	3.00	2.56					
		2030	3.00	7.00	4.00	3.64		% Change in GDP	127.5%		
2010-2030											
Change in productivity			1.00	2.00	1.00	1.08					
Change in sectoral employment			0.000	0.000	0.000	0.000					
Change in overall productivity			1.1								
Within Term			0.6000	0.1600	0.3200	1.0800					
Static Between Term			0.0000	0.0000	0.0000	0.0000					
Dynamic Between Term			0.0000	0.0000	0.0000	0.0000					
						1.1					
Growth in productivity 2010-2030			0.42								
Within Term			0.42								
Static Between Term			0.00								
Dynamic Between Term			0.00								

Source: Author's calculations.

In this case, GDP increases by 127.5 percent, more than twice the base case of 60 percent. Since there was no movement of labor distribution, there is no structural transformation and both the static and dynamic between effects are zero.

In scenario 4 (Table 2A.5), there is both a productivity increase and labor shifting from agriculture to manufacturing. GDP rises by 146.9 percent. In this case, the increase in productivity of 42 percent is supplemented by the structural transformation effect: both the static and dynamic effects are positive, contributing to the increase in overall productivity.

Table A2.5. Scenario 4: Productivity Increases in All Sectors and Labor Movement

		Scenario 4 same as scenario 3 but with labor shifting									
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**		**Agri-culture**	**Manu-facturing**	**Services**	**GDP**
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00					
UTOPIA	Const. VA	2030	600.00	420.00	560.00	1 580.00					
UTOPIA	EMP	2010	150.00	20.00	80.00	250.00	% share	60.0%	8.0%	32.0%	100.0%
UTOPIA	EMP	2030	200.00	60.00	140.00	400.00		50.0%	15.0%	35.0%	100.0%
	PROD	2010	2.00	5.00	3.00	2.56					
		2030	3.00	7.00	4.00	3.95		% Change in GDP	146.9%		
2010-2030											
Change in productivity			1.00	2.00	1.00	1.39					
Change in sectoral employment			-0.100	0.070	0.030	0.000					
Change in overall productivity			1.4								
Within Term			0.6000	0.1600	0.3200	1.0800					
Static Between Term			-0.2000	0.3500	0.0900	0.2400					
Dynamic Between Term			-0.1000	0.1400	0.0300	0.0700					
						1.4					
Growth in productivity 2010-2030			54.3%								
Within Term			42.2%								
Static Between Term			9.4%								
Dynamic Between Term			2.7%								

Source: Author's calculations.

Table 2A.6 illustrates another case of reverse structural transformation. In this case, even though individual sectors show productivity increases as in scenario 4, there are fewer opportunities in manufacturing and services. Consequently, labor stays in agriculture, causing a loss of 2.3 percent in the static between effect and 0.7 percent in the dynamic between effect.

Table 2A.6. Scenario 5: Productivity Increases in All Sectors and Weak Labor Movement

		Scenario 5 same as scenario 4 but with labor not shifting well									
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**		**Agri-culture**	**Manu-facturing**	**Services**	**GDP**
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00					
UTOPIA	Const. VA	2030	750.00	175.00	500.00	1 425.00					
UTOPIA	EMP	2010	150.00	20.00	80.00	250.00	% share	60.0%	8.0%	32.0%	100%
UTOPIA	EMP	2030	250.00	25.00	125.00	400.00		62.5%	6.3%	31.3%	100%
	PROD	2010	2.00	5.00	3.00	2.56					
		2030	3.00	7.00	4.00	3.56		% Change in GDP	1.23		
2010-2030											
Change in productivity			1.00	2.00	1.00	1.00					
Change in sectoral employment			0.025	-0.018	-0.008	0.000					
Change in overall productivity			1.0								
Within Term			0.6000	0.1600	0.3200	1.0800					
Static Between Term			0.0500	-0.0875	-0.0225	-0.0600					
Dynamic Between Term			0.0250	-0.0350	-0.0075	-0.0175					
						1.0					
Growth in productivity 2010-2030			39.2%								
Within Term			42.2%								
Static Between Term			-2.3%								
Dynamic Between Term			-0.7%								

Source: Author's calculations.

Table 2A.7 shows the scenario exhibiting the largest structural transformation. All the labor surplus in agriculture is absorbed by the sector with the highest productivity: manufacturing. GDP grows by 206 percent, compared with 60 percent in the base case. More importantly, the total transformation effect and the static and dynamic between effects account for more than half the total increase in productivity. The country is clearly well on its way to develop.

Table 2A.7. Scenario 11, Greatest Transformation: Movement of Surplus Labor

		Scenario 11 HIGHEST TRANSFORMATION same as scenario 10 but with surplus labor shifting to manufacturing									
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**		**Agri-culture**	**Manu-facturing**	**Services**	**GDP**
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00					
UTOPIA	Const. VA	2030	450.00	1 190.00	320.00	1 960.00					
UTOPIA	EMP	2010	150.00	20.00	80.00	250.00	% share	60.0%	8.0%	32.0%	100%
UTOPIA	EMP	2030	150.00	170.00	80.00	400.00		37.5%	42.5%	20.0%	100%
	PROD	2010	2.00	5.00	3.00	2.56					
		2030	3.00	7.00	4.00	4.90		% Change in GDP	2.06		
2010-2030											
Change in productivity			1.00	2.00	1.00	2.34					
Change in sectoral employment			-0.225	0.345	-0.120	0.000					
Change in overall productivity			2.3								
Within Term			0.6000	0.1600	0.3200	1.0800					
Static Between Term			-0.4500	1.7250	-0.3600	0.9150					
Dynamic Between Term			-0.2250	0.6900	-0.1200	0.3450					
						2.3					
Growth in productivity 2010-2030			91.4%								
Within Term			42.2%								
Static Between Term			35.7%								
Dynamic Between Term			13.5%								

Source: Author’s calculations.

From the simulation exercise, a number of conclusions emerge. First it is important that productivity takes place in the sector where the largest proportion of labor is employed. Among most low-income countries, in which agriculture still represents the primary sector of employment among most of the labor force, a small improvement in agriculture productivity (for example, through more irrigation, new seed varieties) could go a long way in helping achieve the structural transformation. In the simulation exercise, a 40 percent increase in agriculture productivity, holding productivity in all other sectors constant, from 2 to 2.8 raises output from 60 percent to 90 percent. But the output effect is smaller (from 60 percent to 70 percent) if manufacturing productivity increases by the same proportion (holding all the other productivities constant) or if services productivity were to increase (84 percent).

- **Labor Replacing Technique**

If, on the other hand, technology simply replaces labor or if demand cannot expand beyond the output level in the base case, then a strategy to maximize employment should aim at shifting resources to the areas or sectors where productivity is higher but steady (not rising).

Table 2A.8 presents the simulation illustrating this case. The base case is the same as in Table 2A.1. In scenario 1, productivity improvement and labor saving occur in the manufacturing sector, where productivity is already highest during the base year. If no additional job is created in the sector, the surplus labor will move to other sectors, agriculture in this case. The result is still an improvement over the base case as shown in the GDP of the end year (1038 compared with 1024). Similarly, in scenario 2, productivity improvement and labor saving take place in the services sector, resulting in a larger share of labor being displaced than in scenario 1 (28 versus 7), and this labor is absorbed in the agriculture sector, resulting in slightly higher GDP. In scenario 3, the labor saving occurs in agriculture, where productivity improvement results in a massive number of people becoming unemployed. If these can be absorbed in the services sector, as shown in scenario 3, GDP can increase to the highest level among the three scenarios (US$1,181.5).

Table 2A.8. Productivity Growth Is Labor Replacing

			Productivity growth is labor replacing											
		BASE							**Scenario 1: Labor saving technology in manufacturing**					
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**	**Country**	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**	
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00	UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00	
	Const. VA	2030	480.00	160.00	384.00	1 024.00		Const. VA	2030	494.00	160.00	384.00	1 038.00	
	EMP	2010	150.00	20.00	80.00	250.00		EMP	2010	150.00	20.00	80.00	250.00	% share
	EMP	2030	240.00	32.00	128.00	400.00		EMP	2030	247.00	25.00	128.00	400.00	
	PROD	2010	2.00	5.00	3.00	2.56		PROD	2010	2.00	5.00	3.00	2.56	
	PROD	2030	2.00	5.00	3.00	2.56		PROD	2030	2.00	6.40	3.00	2.60	
2010-2030							**2010-2030**							
Change in productivity			0.00	0.00	0.00	0.00	Change in productivity			0.00	1.40	0.00	0.04	
Change in sectoral employment			0.000	0.000	0.000	0.000	Change in sectoral employment			0.018	-0.018	0.000	0.000	
Change in overall productivity			0.0				Change in overall productivity			0.0				
Within Term			0.0000	0.0000	0.0000	0.0000	Within Term			0.0000	0.1120	0.0000	0.1120	
Static Between Term			0.0000	0.0000	0.0000	0.0000	Static Between Term			0.0350	-0.0875	0.0000	-0.0525	
Dynamic Between Term			0.0000	0.0000	0.0000	0.0000	Dynamic Between Term			0.0000	-0.0245	0.0000	-0.0245	
						0.0							0.035	
Growth in productivity 2010-2030			0.0%				Growth in productivity 2010-2030			1.4%				
Within Term			0.0%				Within Term			4.4%				
Static Between Term			0.0%				Static Between Term			-2.1%				
Dynamic Between Term			0.0%				Dynamic Between Term			-1.0%				
		Scenario 2: Labor saving technology in services							**Scenario 3: Labor saving technology in agriculture**					
Country	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**	**Country**	**Variable**	**Year**	**Agri-culture**	**Manu-facturing**	**Services**	**GDP**	
UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00	UTOPIA	Const. VA	2010	300.00	100.00	240.00	640.00	
	Const. VA	2030	536.00	160.00	384.00	1 080.00		Const. VA	2030	480.00	160.00	541.50	1 181.50	
	EMP	2010	150.00	20.00	80.00	250.00		EMP	2010	150.00	20.00	80.00	250.00	% share
	EMP	2030	268.00	32.00	100.00	400.00		EMP	2030	187.50	32.00	180.50	400.00	
	PROD	2010	2.00	5.00	3.00	2.56		PROD	2010	2.00	5.00	3.00	2.56	
	PROD	2030	2.00	5.00	3.84	2.70		PROD	2030	2.56	5.00	3.00	2.95	
2010-2030							**2010-2030**							
Change in productivity			0.00	0.00	0.84	0.14	Change in productivity			0.56	0.00	0.00	0.39	
Change in sectoral employment			0.070	0.000	-0.070	12.000	Change in sectoral employment			-0.131	0.000	0.131	0.000	
Change in overall productivity			0.1				Change in overall productivity			0.4				
Within Term			0.0000	0.0000	0.2688	0.2688	Within Term			0.3360	0.0000	0.0000	0.3360	
Static Between Term			0.1400	0.0000	-0.2100	-0.0700	Static Between Term			-0.2625	0.0000	0.3938	0.1313	
Dynamic Between Term			0.0000	0.0000	-0.0588	-0.0588	Dynamic Between Term			-0.0735	0.0000	0.0000	-0.0735	
						0.140							0.394	
Growth in productivity 2010-2030			5.5%				Growth in productivity 2010-2030			15.4%				
Within Term			10.5%				Within Term			13.1%				
Static Between Term			-2.7%				Static Between Term			5.1%				
Dynamic Between Term			-2.3%				Dynamic Between Term			-2.9%				

Source: Author's calculations.

In the above simulation, it is assumed that the labor-saving technology is implemented in a sector in which no additional demand or output is needed, and the surplus labor freed up is then employed elsewhere. If no additional jobs are available, the same output is achieved in the second period and in the base case: the economy simply produces the same output with unemployment. This is often the case in developed economies (see Chapter 6). If there are additional jobs in the sectors in which no productivity improvements have occurred, the above simulation shows that, for the same percentage change in sectoral productivity, the transformation is greatest in the sector that employs the most labor. Among low-income countries that are primarily agrarian, the quickest path to transformation is therefore to create jobs in manufacturing or services, where productivity is greater than in agriculture. The choice between manufacturing and services depends on the resource endowment of the country. However, it is important to note the following: (1) given the need for foreign exchange and large, stable demand and the fact that services in low-income countries are mostly nontradable, there is little scope for shifting into services; (2) tradable services require skills and training not readily available in developing countries; and (3) the externalities involved in manufacturing and the linkages of manufacturing throughout an economy make the manufacturing sector an attractive choice for industrialization.

Annex 2B. On The Big Push Model[17]

This annex builds a dynamic model of industrialization following Murphy, Sleifer, and Vishny (1989) in which sectors differ in the fixed cost to industrialize; hence, those sectors with lower fixed costs tend to industrialize first. The model is extended to include input chains and to show that the speed of industrialization can be accelerated through appropriate government policy interventions in the appropriate sectors. Appropriate sectors are defined as those with the deepest forward and backward linkages in the economy and those with the most intense domestic production of intermediate goods.

Among middle- and high-income countries, the process of upgrading industries through innovation, learning, and building up knowledge is a powerful way to move up the value added chain and achieve rapid structural transformation, but the process poses serious challenges to the traditional policy framework and institutions. The annex discusses issues facing these countries and possible solutions from a range of successful cases to inform the recommendations.

17 This annex was prepared jointly with Dan V. Cao of Georgetown University and is part of a more comprehensive paper by Cao and Dinh (2014).

- **The Model**

Consider an economy with a continuum of measure 1 of sectors, either traditional or modern. Sectors are indexed by q $\in$ [0; 1]. There is also a continuum of measure *L* of identical workers. Workers can choose to work either in the traditional sectors or industrial sectors. The utility function of each worker is as follows:

$$\exp\left(\int_0^1 \ln x(q)\, dq\right)$$

If they work in the traditional sectors, but

$$\exp\left(\int_0^1 \ln x(q)\, dq\right) - v,$$

If they work in the industrial sectors, where v > 0 is the disutility of working in a factory. x (q) denotes the amount of goods from sector q that the worker consumes.

Let the income of a worker be y. This solves as follows:

$$\max \int_0^1 \ln x(q)\, dq$$

subject to

$$\int_0^1 x(q)\, p(q)\, dq = y,$$

where p(q) is the price set in sector 1. Because of log utility, the solution yields equal expenditure across goods, that is, x (q) p (q) = y for all q $\in$[0; 1].

The income of each worker y consists of wages and profits from firm ownership, as follows:[18]

$$y = w + \int_0^1 \pi(q)\, dq,$$

where π(q) is the profit made by a firm in sector q. Let Y denote the aggregate income of all workers in the economy.

18 Here, the assumption is that each worker owns a portfolio of firms in all sectors in the economy. Alternatively, one might assume that workers in traditional sectors own firms in the traditional sectors, and workers in the modern sectors own firms in modern sectors. This alternative assumption does not change the results in this book.

Firms in the traditional sector using a constant returns to scale technology produce l units of goods using l workers, whereas firms in the industrial sector using an increasing returns to scale technology produces αl units of goods, where α > 1, using l workers. We assume that there is no cost of adopting the traditional constant returns to scale technology, but firms have to pay a fixed cost F to adopt the modern increasing returns to scale technology. Under this assumption, prices are set in each sector at least at 1; otherwise there will be infinite entry by traditional firms. Firms with modern technology can charge prices slightly above the marginal costs of traditional firms and capture the whole market in a sector. So, a firm with modern technology in sector q, sets price p (q) = 1. The aggregate demand for good q is $\frac{Y}{p(q)} = Y$, which yields revenue

$$Y.1 - \frac{Y}{\alpha}(1+v) = Y\left(1 - \frac{1+v}{\alpha}\right).$$

The assumption is that modern technology is sufficiently productive to make it profitable given the wage premium: α > 1 + v. After subtracting the fixed cost, F (1 + v), from the profit function, one obtains the formula for the profit of firms using modern technology:

$$\Pi = Y\left(1 - \frac{1+v}{\alpha}\right) - F(1+v). \tag{1}$$

Firms in traditional sectors make zero profit.

Let m denote the fraction of firms with the modern technology, then the income of workers is

$$y = w + m\Pi,$$

where w = 1 or 1 + v, depending on whether the worker is working in the traditional sectors or the modern sectors. Let n denote the share of workers working for the modern firms. Then, the aggregate income is the sum of the incomes of workers in the traditional and the modern sectors:

$$Y = (1-n)L(1+\Pi) + nL(1+v+\Pi). \tag{2}$$

In equilibrium, we need the labor market to clear. In the modern sector, the supply of labor is nL and the demand for labor (coming from the production of firms with modern technology and from fixed cost) is m(Y/ α) + mF . Thus, equating supply and demand yields:

$$m\frac{Y}{\alpha} + mF = nL. \tag{3}$$

Similarly, the supply and demand for labor in traditional sectors yields:

$$(1-m)Y = (1-n)L. \tag{4}$$

Definition 1 A competitive equilibrium is a collection of (Y,Π, m, n) such that Y is determined by the aggregate income equation, 2 and Π is determined by the profit equation, 1, and the labor markets in the traditional and modern sectors clear, that is, equations 3 and 4.

In equilibrium, there are three cases. First, Π (defined in 1) < 0, then no firm uses the modern technology, that is, m = 0. Second, > 0, all firms use the modern technology, that is, m = 1. Lastly, there are firms in both sectors, in this case, Π = 0 and m ∈ (0; 1). Let us analyze each of these three cases separately.

Case 1: Π < 0. Since no firm uses the modern technology, we have m = 0 and n = 0. The market clearing condition in the traditional sector, equation 4, implies

Y = L.

Plugging this into the formula for profit of a firm that considers using the modern technology, equation 1, we obtain

$$\Pi = L\left(1 - \frac{1+v}{\alpha}\right) - F(1+v).$$

For this equilibrium to exist, we need Π < 0, that is, fixed cost is sufficiently high as in

$$F > \left(\frac{1}{1+v} - \frac{1}{\alpha}\right) L = \underline{F}. \tag{5}$$

Case 2: Π > 0. In this case all firm adopt the modern technology, thus m = 1 and n = 1. In this case, the labor market clearing condition, equation 3, implies

$$\frac{Y}{\alpha} + F = L$$

Or

$$Y = \alpha (L - F).$$

Plugging this into the equation for profit, equation 1, we have

$$\begin{aligned} \Pi &= Y\left(1 - \frac{1+v}{\alpha}\right) - F(1+v) \\ &= \alpha (L-F)\left(1 - \frac{1+v}{\alpha}\right) - F(1+v) \\ &= (\alpha - (1+v)) L - F(1+v). \end{aligned}$$

So, for this equilibrium to exist, we need Π > 0, that is, fixed cost is not too high:

$$F < \alpha\left(\frac{1}{1+v} - \frac{1}{\alpha}\right) L = \overline{F}. \tag{6}$$

As noticed in Murphy, Shleifer, and Vishny (1989), if both conditions 5 and 6 are satisfied,

$$\underline{F} < F < \overline{F}, \tag{7}$$

multiple equilibriums result: either the economy fully industrializes or there is no modern sector.

Case 3: $\Pi = 0$ and $m \in (0; 1)$.[19] The equation for profit, 1, implies

$$Y\left(1 - \frac{1+v}{\alpha}\right) = F\left(1+v\right) \tag{8}$$

Or

$$F = Y\left(\frac{1}{1+v} - \frac{1}{\alpha}\right).$$

Plugging this into the labor market clearing condition in the modern sectors, equation 3, gives

$$m\frac{Y}{\alpha} + mY\left(\frac{1}{1+v} - \frac{1}{\alpha}\right) = nL$$

Or

$$mY\frac{1}{1+v} = nL. \tag{9}$$

Rewriting the labor market clearing condition in the traditional sector, equation 4, gives

$$\begin{aligned}(1-m)\,Y &= L - nL \\ &= L - mY\frac{1}{1+v}\end{aligned}$$

so

$$\begin{aligned}m^* &= \frac{Y-L}{Y}\frac{1}{1-\frac{1}{1+v}} \\ &= \frac{1-\frac{L}{Y}}{1-\frac{1}{1+v}}. \qquad (10)\end{aligned}$$

19 Zero profit in modern firms may be viewed as an approximation of positive, but small profits if these firms set price $1 + \in$ slightly above the marginal cost of competing traditional firms.

Given that Π = 0, the aggregate income equation implies the following:

$$Y = (1-n)\,L + nL\,(1+v)$$

or

$$1 > \frac{L}{Y} > \frac{1}{1+v}. \tag{11}$$

Therefore, equation 10 implies that $0 < m^* < 1$.

From equation 9 we have

$$\begin{aligned} n^* &= m^* \frac{1}{1+v}\frac{Y}{L} \\ &= \frac{\frac{Y}{L}-1}{v}, \end{aligned}$$

which also implies that $0 < n^* < 1$.

Lastly, equation 8 implies the following:

$$Y^* = \frac{F\,(1+v)}{1-\frac{1+v}{\alpha}}. \tag{12}$$

Satisfying condition 11 requires

$$1 > \frac{L}{\frac{F(1+v)}{1-\frac{1+v}{\alpha}}} > \frac{1}{1+v}$$

or

$$\underline{F} < F < L\left(1-\frac{1+v}{\alpha}\right) = F^*. \tag{13}$$

One may easily show that $F^* < \bar{F}$. So., combining the equilibrium conditions (7) and (13) and noticing that, because $\alpha > 1 + v$, one has the following proposition:

Proposition 1 if the fixed cost F satisfies

$$\underline{F} < F < F^*.$$

The economy admits three equilibria: (1) no industrialization: case 1, (2) full industrialization: case 2, and (3) partial industrialization: case 3.

The model yields policy implications different from previous work in this area. First, like Murphy, Shleifer, and Vishny (1989), the analysis shows why markets alone will not be able to push an economy toward industrialization and that policy interventions are needed to accomplish this. But, in contrast to the traditional big push pioneers such as Rosenstein-Rodan (1943), the policy interventions needed are the targeted policies that could be simple, qualitative, affordable, and within the capability of developing countries, rather than the type of massive investment generally associated with the big push (Dinh et al. 2012). Second, countries can have multiple equilibriums so that government intervention is important to nudge the economy toward higher equilibrium by reducing the fixed costs of embarking on a modern industry or subsector. These fixed costs vary by sector and by the stage of a country's development so that, for a low-income country, they denote infrastructure, logistics, access to land, access to finance, and so on, while, for a middle-income country, they denote worker skills, entrepreneurial skills, innovation, and so on. Yet, for advanced countries, these costs could denote the transition cost of the short-to-medium term adjustment (when demand and supply do not match because of different adjustment speeds or because of the low employment elasticity of the jobs created. Finally, the analysis shows that the sectors first picked to industrialize do matter. Sectors with the highest linkages will contribute to the speed of industrialization. An economy would industrialize more rapidly if the sectors that industrialize first are the ones that consume the greatest amount of intermediate goods in terms of quality and the number of intermediate goods needed to produce output.

Annex 2C. Calculation Of The Export Variety And Export Quality Indexes[20]

Data

The main dataset used is product-level U.S. import data of 1972–2012. The database was constructed by Feenstra (1996) and Feenstra, Romalis, and Schott (2002). For this book, import data have been extended to 2012 through data purchased from the U.S. Census Bureau. U.S. imports are classified under the 7-digit Tariff Schedule of the U.S. Annotated classification for 1972–1988, while, after 1989, the 10-digit Harmonized System classification is used.

Methodology

Export variety: Feenstra (1994) and Feenstra and Markusen (1994) establish a measure of export variety index from a CES utility function model, which enables both a comparison across countries and over time. Since then, a growing body of empirical

20 This annex was prepared jointly with Yingjun Su of Jinan University, Guangzhou, China and is part of a more comprehensive paper by Dinh and Su (2017).

application of this method has arisen to carry out trade and growth related studies. Existing studies have provided supportive evidence that export variety has far-reaching impacts on economic performances, particularly growth. Feenstra et al. (1999) evaluate the endogenous growth hypothesis using sectoral productivity data and the export variety of Korea and Taiwan. They find significant a effect of changes in export variety on total factor productivity in 9 of the 16 sectors under study. Funke and Ruhwedel (2001a) utilize panel data for OECD countries to provide supportive evidence for the hypothesis that a greater degree of product variety relative to the United States helps to explain relative per capita GDP levels. Funke and Ruhwedel (2001b) investigate whether increasing export variety has contributed to the export growth of 10 East Asian countries and do find supportive evidence. Feenstra and Kee (2008) estimate the relation between export variety and productivity using a GDP function across countries and over time. They argue that the growth of export varieties benefits aggregate productivity in the exporting country. Besides the impacts of export variety on exporting countries' performances, Broda and Weinstein (2006) document that the expansion of import varieties in the United States has had a significant impact on lowering the true import price index and has thereby raised U.S. welfare.

Besides the application of Feenstra variety index, Saviotti and Frenken (2008) explore the relationship between export variety and economic development by using the entropy measure applied to the distribution of sectors in a country's export portfolio. Their findings are aligned with the ones based on Feenstra measure as discussed above. They mainly show that related export variety is a determinant of GDP per capita and labor productivity growth among OECD countries in 1964–2003. In particular, while only the related variety is a determinant of growth in the short run, unrelated variety can become a determinant if the time horizon is lengthened.

The literature mostly emphasizes potential impacts brought about by variety expansion per se, but ignore the underlying driving forces. Feenstra and Kee (2007) explore the impact of trade liberalization on export variety in China and Mexico. They find that the decade under study witnessed a significant expansion in export variety both in China and Mexico, an important driving force of which was tariff liberalization, as demonstrated by their empirical results. Addison (2003) looks into a more fundamental dimension as to shed some light on important determinants of product variety. In particular, he finds that the correlation between variety growth and productivity growth can be found in both developed and developing countries. Developed nations tend to generate most of their productivity gains through R&D employment in a stable environment that results in better production processes and product quality. The largest source of productivity growth in developing countries is product variety imitation, the ability of which is being improved by educational attainment and by productivity gains.

Calculating export variety: The measure of export variety is derived from a CES utility function by Feenstra (1994) and has been widely employed recently.[21] This measure enables both a comparison in terms of changes in product variety over time and that of two countries at a same time point. Suppose the sets of exports from two countries a and c have some export varieties in common. The common set is denoted by $\boldsymbol{I} \equiv (\boldsymbol{I}_t^a \cap \boldsymbol{I}_t^c) \neq \emptyset$. An inverse measure of export variety from country c relative to country a is $\boldsymbol{\lambda}_t^c(\boldsymbol{I})/\boldsymbol{\lambda}_t^a(\boldsymbol{I})$, where $\boldsymbol{\lambda}_t^c(\boldsymbol{I}) \equiv \frac{\sum_{i \in I} p_{it}^c q_{it}^c}{\sum_{i \in I_t^c} p_{it}^c q_{it}^c}$. Note that $\boldsymbol{\lambda}_t^c(\boldsymbol{I})$ is weakly less than 1. The more it approaches 0, the more unique products the country exports. In the same sense, the smaller $\boldsymbol{\lambda}_t^c(\boldsymbol{I})/\boldsymbol{\lambda}_t^a(\boldsymbol{I})$ is, the more varieties country c exports relative to country a. Hence, $\boldsymbol{\lambda}_t^a(\boldsymbol{I})/\boldsymbol{\lambda}_t^c(\boldsymbol{I})$ is taken as a relative measure for export variety between two countries. Using worldwide measure would certainly be preferable, the U.S. merchandise import data utilized here are more highly disaggregated and allow for a finer measurement of unique products sold by one country and not another, as argued in Feenstra and Kee (2007, 2008). U.S. import data were classified according to the 7-digit Tariff Schedules of the United States, Annotated, classification before 1988, and according to the 10-digit Harmonized System after 1988. The objective is to compare export variety across a number of economies over time. To this end, a consistent comparator country, a, is required. Worldwide exports from all countries to the United States that have been averaged over years are adopted here as a virtual country a. Hence, the set $\boldsymbol{I^a} \equiv \cup_{c,t} \boldsymbol{I}_t^c$ includes varieties from all countries over all years while $\boldsymbol{p_{it}^a q_{it}^a}$ is the real average value of imports for product *i* (summed over all source countries and averaged across years). Note that the set $\boldsymbol{I^a}$ is invariant, which enables the comparison across countries and over time. In this particular case, the common set $\equiv (\boldsymbol{I}^a \cap \boldsymbol{I}_t^c) = \boldsymbol{I}_t^c$, so the set of goods exported by country c. It is now quite straightforward that $\boldsymbol{\lambda}_t^c(\boldsymbol{I}) = \mathbf{1}.$ Finally, country c's export variety index boils down to the following formula:

$$\boldsymbol{Variety_t^c} \equiv \frac{\lambda_t^a(I)}{\lambda_t^c(I)} = \frac{\sum_{i \in I_t^c} p_i^a q_i^a}{\sum_{i \in I^a} p_i^a q_i^a} \qquad (1)$$

This is interpreted as the share of total U.S. imports from products that are exported by country c. More generally, instead of imposing equal weights to each category exported from country c, they are weighted by their importance in U.S. imports. It is worth noting that the above expression depends on the set of products exported by country c but irrelevant with its values. In particular, $p_i^a q_i^a$ could be interpreted as an aggregate weight assigned to product exported by country c.

21 For example, Broda and Weinstein (2006); Feenstra and Kee (2007, 2008); Hummels and Klenow (2005); and so on. In this paper, the methodology follows closely Feenstra and Kee (2007).

Export quality: While horizontal differentiation has been studied on one part, another stream of studies arises to incorporate vertical differentiation as well. Hummels and Klenow (2005) analyze the extent to which the extensive margin, intensive margin, higher-quality goods each contributes to the growth of world trade. Although quality margin is not directly observable but can be inferred by examining projections of price and quantity on GDP and its components. They find that the extensive margin accounts for around 60 percent of the greater exports of larger economies. Furthermore, richer countries export higher quantities at modestly higher prices to a given market, which is consistent with producing higher quality. Álvarez and Claro (2006, 2007) build on the solid foundation of Hummels and Klenow (2005) to explore sources of China's export growth. Their primary findings suggest that the growth of China's exports is mainly driven by an increase in intensive margin, which is further explained by an increase in exported quantities without a significant fall in the relative prices. In addition, it shows that exports from China have increased their similarity with exports from rich countries, and that the quality has improved over time. This is claimed to be consistent with the idea that product quality is an important dimension of Chinese export growth. Benkovskis and Rimgailaite (2011) examine export quality and variety for the new European Union member states. The exports of all new members were of lower quality in 2009 relative to Germany. Export quality is heterogeneous across industries within one country. But all new members were able to raise average quality in 1999–2009, although there is evidence of differences across countries.

Methodologically, there are different strategies to identify quality. Khandelwal (2010) utilizes both unit value and quantity information (market share) to infer quality, which has a straightforward intuition: conditional on price, imports with higher market shares are assigned higher quality. Particularly, quality estimation is based on the nested logit framework. The estimated qualities of U.S. product imports from 1989 to 2001 reveal that there is substantial heterogeneity in quality ladders. The longer the the ladder, more tenable is price-equal-quality assumption. Hallak and Schott (2011) rely on trade balance to identify quality. Two countries with the same export prices but different global trade balances must have products with different levels of quality, this is because consumers are assumed to care about price relative to quality in choosing among products. They find that the initial quality gap between high- and low-income countries is smaller than the initial income gap and that the former narrows considerably more quickly over time. Henn, Papageorgiou, and Spatafora (2013) develop export quality estimates for 178 countries over 1962–2010 based on the empirical specification established in Hallak (2006). A key aspect of the methodology is the strategy for identifying unobserved cross-country differences in product quality, measured by a price index based on cross-country variation in export unit values. The empirical specification in Hallak (2006) is built on a static theoretical framework, therefore it would be problematic when applying directly to a dynamic environment spanning several decades. The dynamic feature of product quality is not captured in this case. Feenstra and Romalis (2012) employ a demand system to model consumer demand with endogenous quality. They estimate the implied gravity equation that includes new terms reflecting quality. However, the estimation requires unit prices reported by both the exporter and the importer, which are subject to measurement errors. Also, exporter-reported data are not available for many exports from low-income countries, especially for the earlier years.

Model

The analysis follows Khandelwal (2010) to establish quality estimates using information on export prices and quantities from disaggregated U.S. import data spanning 1974–2011. First, the Khandelwal method enables recovery of quality estimates at a detailed variety level (10-digit product from each exporter); second, because the focus lies in both horizontal diversification (variety) and quality upgrading, it is essential to keep the two dimensions in the same scope throughout the analysis to maintain a proper view on U.S. imports. The regression equation is based on a nested logit framework developed by Berry (1994). Because there is a change in the product classification (described in the data section), the use of a long panel for 1974–2011 would result in inconsistent measurements. So, the following equation is estimated for 1153 SITC (rev.2) industries for 1974–1988 and for 2289 SITC (rev.3) industries for 1989–2011, with standard errors clustered by exporting country.[22] Here, industry index is suppressed for simplicity:

$$\ln(s_{cht}) - \ln(s_{0t}) = \lambda_{1,ch} + \lambda_{2,t} + \alpha p_{cht} + \sigma \ln(ns_{cht}) + \gamma lnpop_{ct} + \lambda_{3,cht} \quad (2)$$

where s_{0t} is the market share for outside variety (here taken as the domestic variety), which is set at 1, minus the industry's import penetration.[23] s_{cht} is the overall

22 The reason regressions are run at SITC rev.3 instead of rev.2 industries is that trade data for the most recent years (2007–2012) are reported according to SITC rev.4 industries. The mapping from rev. 4 to rev. 2 would result in quite a bit of mismatching. The aggregate industries are fairly stable over time, although within each classification varies at more disaggregate levels. The dataset was also trimmed vis-à-vis the procedures in Khandelwal (2010) except that the sample includes all manufacturing industries from 20–39 (U.S. Standard Industrial Classification 1987 2-digit), while Khandelwal (2010) restricts the sample to SITC 5–8.

23 Information on import penetration in 1974–1996 is extracted from Bernard, Jensen, and Schott (2006). Data on import penetration in 1997–2011 and on industrial production are taken from Data (database), National Bureau of Economic Research, Cambridge, MA, http://www.nber.org/data_index.html/; NAICS (North American Industry Classification System) (database), U.S. Census Bureau, Suitland, MD, https://www.census.gov/eos/www/naics/. Data on import penetration from the NAICS database are mapped to the system described in SITC

market share of product *h* imported from country *c*. Once s_{0t} is known, total industry consumption can be calculated: $D_t = \sum_{ch\neq 0} q_{cht}/(1-s_{0t})$, where represents the import quantity of variety *ch* in year *t*. Then, $s_{cht} = q_{cht}/D_t \cdot p_{cht}$ is defined as the price for variety *ch* and pop_{ct} is country *c*'s population that controls for hidden varieties. ns_{cht} is the market share of product *ch* within product *h* (nest share). $\lambda_{1,ch}$ is the time-invariant valuation that the consumer assigns to variety *ch*, $\lambda_{2,t}$ captures time trends common to all varieties while $\lambda_{3,cht}$ is the error term, which is considered as a variety-time deviation from the fixed effect. The identification strategy lies in the rationale that after controlling for prices and exporter size (hidden varieties), quality could be inferred from relative market share of a certain imported variety. Thereby, the quality of variety *ch* at time *t* is defined as below based on the estimated parameters:

$$\lambda_{cht} = \hat{\lambda}_{1,ch} + \hat{\lambda}_{2,t} + \hat{\lambda}_{3,cht} \quad (3)$$

Instrumental Variables

Price, p_{cht} is potentially correlated with $\lambda_{3,cht}$, unit transport cost, together with exchange rates. The interaction of oil prices and distance to the United States is taken as an instrument in identifying price coefficients (Khandelwal 2010). In addition, ns_{cht} is endogenous; so, it is instrumented in the number of varieties within product *h* and the number of varieties exported by country *c*.

Country Quality Estimates

To enable cross-product comparisons, all quality estimates are normalized between the range [0, 1] in the relevant product (h)–year (t) combination before aggregating to higher-level industries.[24] Country totals are then constructed by using product-year trade value shares as the weight. The next step involves developing quality indexes. Each year, the country with the highest quality estimate is indexed as 100, which is considered the quality frontier. By examining the indexes over time, one may easily learn how countries are doing in attempting to catch up with quality frontiers, that is, the higher the index, the better the quality of manufacturing goods. The entire manufacturing sector is also broken down into nine subindustries based on the 2-digit U.S. Standard Industrial Classification, and the above analyses are conducted, accordingly. The results are

(Standard International Trade Classification) (database), Statistics Division, United Nations, New York, https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=14.

24 The normalization takes the formula normalized quality $= \frac{(\lambda - \lambda_{min})}{\lambda_{max} - \lambda_{min}}$ where λ_{max} and λ_{min} are maximum and minimum values within each product-year category.

reported in the next section.

The Industry Quality Ladder

A quality ladder is first constructed at the 10-digit product level, that is, $\boldsymbol{ladder_h = \lambda_h^{max} - \lambda_h^{min}}$. Note that the quality ladder at each product level could vary over time according to R&D spending, technological progress, and so on. To mitigate endogeneity concerns, the product's quality ladder is fixed at the length measured during the period when the product first appears in the sample. As in Khandelwal (2010), the correlation coefficient is also tested between a product's initial ladder length and its end of sample length; the magnitudes 0.86 (1974–1988) and 0.75 (1989–2011) imply that there is persistence in a product's ladder length over time. Therefore, the scope for quality differentiation is an intrinsic feature of products. The quality ladder is then aggregated to the industry level, $\boldsymbol{Indladder_m = \sum_{h=1}^{H_m} w_h * ladder_h}$. In each industry *m*, the quality ladders of all products within the industry are summed, taking the product import share w_h as the weight.

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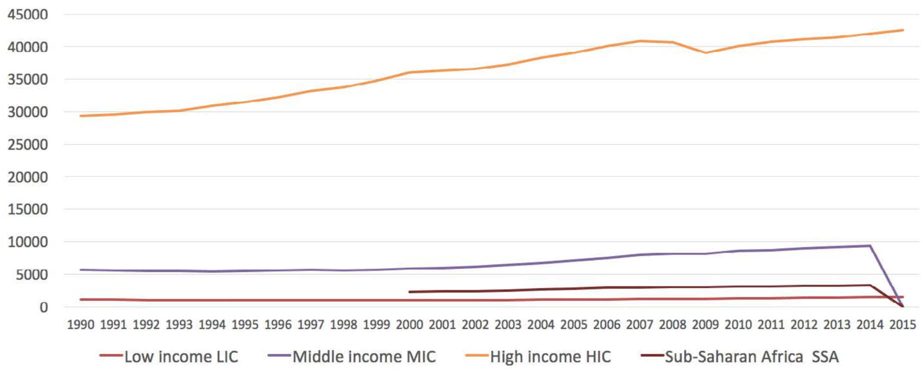
Chapter 3: The Low-Income Countries

This chapter assesses progress in growth and structural transformation of the low-income countries over the last two decades. Unlike the advanced countries and some of the middle-income countries examined in later chapters, data paucity does not permit the analysis over a long period. But the available data show that the economic performance of these countries in both areas has been poor compared with other developing countries. In particular, the sub-Saharan African countries have not done well compared with countries that were at the same level of development at the beginning of the period. Through the productivity decomposition method, the chapter breaks down the within and the between productivity growth and finds that some amount of reserve structural transformation, or deindustrialization, took place over the last two decades. Using two new indexes on export variety and export quality to measure progress in economic upgrading, the chapter discusses structural issues in these low-income countries. It concludes that, without urgent and innovative policy reforms, the gap between these countries and the rest of the world will widen, and these countries risk falling further behind in the next decade, at a time when demographic pressures call for accelerating growth. The upside of this situation is that there is a tremendous opportunity for lifting growth through structural transformation, that is, shifting resources to higher-productivity sectors.

Growth & Structural Transformation

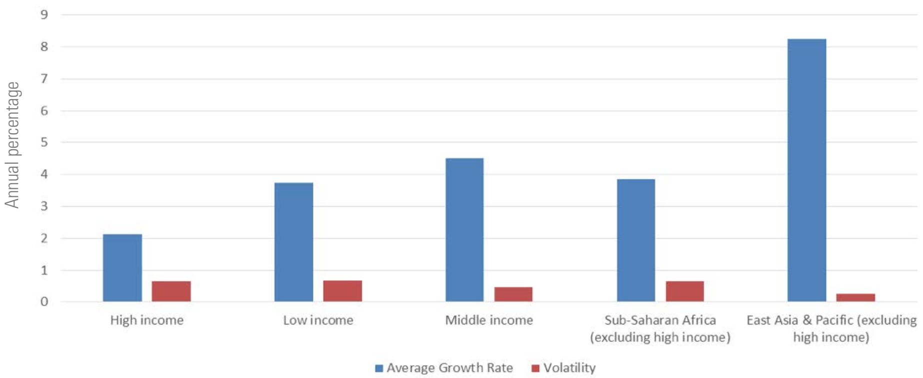
Over the last two decades, income per capita in low-income countries has been stagnant, and the gap among different income groups has widened (Figure 3.1). Moreover, in addition to growth, volatility is also an issue. Figure 3.2 illustrates growth and volatility (reflected in the coefficient of variation) by income group. It is clear from Figure 3.2 that, in terms of growth, the group of low-income countries, including the sub-Saharan African countries, is not doing so bad. Indeed, many countries in this group are commodity exporters, and growth has been fueled by price and volume increases in the international commodity market over recent decades. Nonetheless, as argued in the next chapter, this kind of economic growth is artificial and masks serious weaknesses in economic structure; these weaknesses will surface when commodity prices drop. The commodity price fluctuations explain the high volatility among the low-income group, particularly in in sub-Saharan African countries, compared with East Asian countries.

Figure 3.1. Trends in GNI per Capita, by Income Group (Constant PPP US$), 1990–2015



Source: 2016 data, WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

Figure 3.2. Growth and Volatility, by Income Group, 1990–2015



Source: 2016 data, WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

A meaningful discussion about structural transformation cannot be conducted at the level of country groups. It has to be carried out at the individual country level. In this section we analyze the pattern of structural transformation for Ethiopia and Senegal, both large countries in East and West Africa respectively. The differences between these two countries in terms of geographical locations, cultures, and languages serve to validate our findings. The choice of these countries was also dictated by the availability of data in the University of Groningen database, which consists of consistent data on employment, value added, and productivity in a group of developed and developing countries.[25] The methodology is that described by McMillan and Rodrik (2011) and Timmer, de Vries, and de Vries (2014) to measure the contribution of employment reallocation to productivity growth.

Ethiopia

Table 3.1 shows the sector productivity per worker of Ethiopia over five decades, expressed in thousands at 2005 prices. The first finding one notices in the table is that, in Ethiopia as in other developing countries, there is huge variation in productivity per worker across sectors. Even if one excludes highly capital-intensive sectors such as utilities, the ratio of productivity of a sector such as finance to productivity in agriculture (the sector showing the lowest productivity) exceeds a factor of 24 in 2010. In a way, this is good news, because, even if sector productivity remains the same, Ethiopia can achieve much higher and sustainable growth by shifting activities from low-productivity sectors to higher-productivity sectors. McMillan, Rodrik, and Verduzco-Gallo (2014) note that this feature seems to exist only in developing countries because there are less pronounced differentials in productivity across sectors in developed economies.

25 See data on 2014 in GGDC (database), Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen, Groningen, the Netherlands. http://www.rug.nl/ggdc/.

Table 3.1. Productivity per Worker, by Sector, Ethiopia, 1961–2010

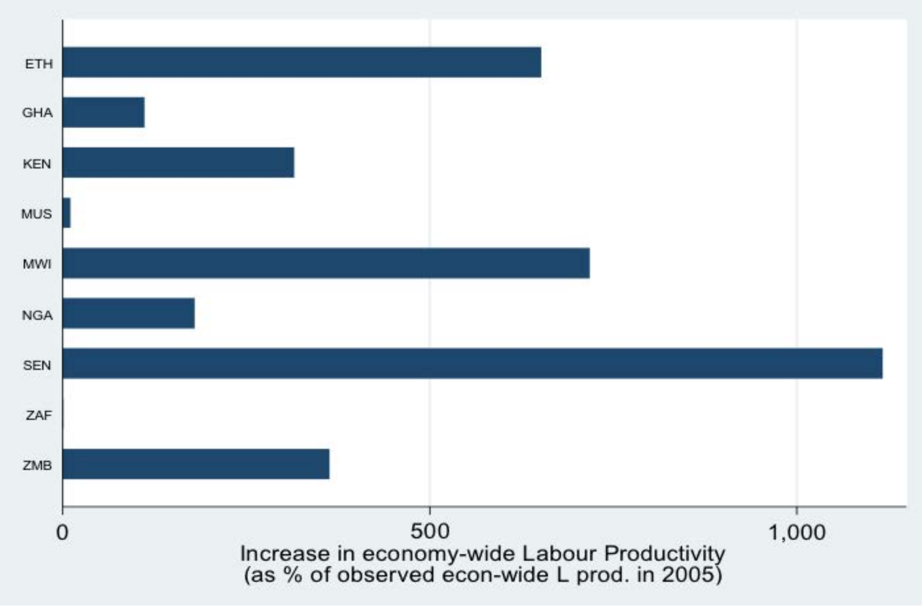
	Thousands of local currency at 2005 prices						Employment Growth	
Year	**1961**	**1970**	**1980**	**1990**	**2000**	**2010**	**1961-90**	**1990-2010**
Agriculture	2.6	2.6	2.3	1.7	1.5	2.2	2.7%	2.2%
Mining	72.3	61.8	13.0	6.4	5.5	4.7	14.1%	7.3%
Manufacturing	4.8	5.7	6.9	6.2	4.5	3.3	3.5%	10.1%
Utilities	77.5	70.4	63.2	63.2	67.8	72.7	7.9%	4.6%
Construction	47.6	48.6	49.7	35.5	20.0	11.2	3.6%	16.0%
Trade, restaurants and hotels	20.0	14.6	10.3	8.5	7.9	7.3	8.2%	8.5%
Transport, storage and communication	18.8	18.5	18.3	22.3	31.5	44.4	6.4%	4.6%
Finance, insurance, real estate and business services	9.8	25.3	62.7	67.8	72.2	54.8	1.2%	11.3%
Government services	6.7	5.2	3.9	5.1	9.5	17.6	7.4%	3.4%
Community, social and personal services	5.5	3.5	2.1	2.2	3.3	4.8	9.2%	2.9%
Total	3.0	3.3	3.0	2.4	2.5	4.0	3.0%	3.0%

Source: Author's calculation based on 2014 data in GGDC (database), Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen, Groningen, the Netherlands. http://www.rug.nl/ggdc/.

Second, agriculture has the lowest productivity of all the sectors. In the early 2010s, over 70 percent of the labor force still remains in agriculture and the sector contributes about 40 percent of GDP. Policy measures to improve productivity in agriculture therefore are essential for structural transformation in Ethiopia, and they should cover two areas simultaneously: measures to improve productivity within agriculture itself, such as improvement in yield, input distribution, and so on, and measures to improve opportunities outside agriculture that show greater productivity so that the surplus labor can respond to these opportunities. The second point is the main focus of this book.

To illustrate the second point, Figure 3.3 shows what happens to Ethiopia and other African countries if resources are shifted to mirror the structure in developed countries, while holding African sectoral productivity constant. Thus, even if within-sector productivity does not improve, Ethiopia can gain tremendously by creating opportunities outside agriculture so resources can move there. Ethiopia's gains would be substantial relative to other African countries.

Figure 3.3. Counterfactual Impact of Changed Economic Structure on Economy-Wide Labor Productivity, African Countries



Source: McMillan, Rodrik, and Verduzco-Gallo 2014.
Note: The figure shows the percent increase in economy-wide average labor productivity obtained under the assumption that the intersectoral composition of the labor force matches the pattern observed in the rich countries.

Recall equation (1) in chapter 2:

$$\Delta Y_t = \sum_{i=1,n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=1,n} y_{i,t} \Delta \theta_{i,t} \qquad (1)$$

Table 3.2 shows the breakdown of productivity growth over 1990–2010 into the two components on the right-hand side of equation 1. The first component is the within part of productivity growth, which occurs if capital deepening or new technology (high variety yields, better inputs, and so on) is adopted in each sector of the economy. The second term captures the productivity effect of labor reallocation across sectors. If changes in employment shares are positively correlated with productivity, this term will be positive, and structural change will increase economy-wide productivity growth.

Table 3.2. Decomposition of Productivity Change, Ethiopia, 1990-2010

	Annual Growth Decomposition (1990-2010)	
	Within	**Between**
Agriculture	0.8%	-0.5%
Mining	0.0%	0.0%
Manufacturing	-0.1%	0.2%
Utilities	0.0%	0.0%
Construction	-0.1%	0.3%
Trade, restaurants and hotels	-0.1%	0.8%
Transport, storage and communication	0.1%	0.1%
Finance, insurance, real estate and business services	0.0%	0.3%
Government services	0.4%	0.1%
Community, social and personal services	0.1%	0.0%
Summation of sector GDP	1.2%	1.4%

Annual growth in productivity 1990-2010	2.6%
Within	1.2%
Between	1.4%

Source: Author's calculations

Table 3.2 shows that, while economy-wide productivity increased by 2.6 percent a year over the 20-year period, more than half of this increase was associated with the structural transformation effect. Table 3.1 shows that, over the period, the economy registered a 3 percent a year increase in labor force growth.

To examine the structural transformation pattern in further detail, the structural transformation effect is decomposed into two components (see Chapter 2, equation 2), termed the static and dynamic reallocation effects by Timmer, de Vries, and de Vries (2014). The static effect measures the change in output brought about by the sectoral gain or loss in employment share, assuming there is no change in productivity over the period. As such, it measures the pure effect of labor movement on productivity change. The dynamic effect measures the right or wrong direction of change. This term is positive if the economy is advancing along the path of structural transformation, that is, if resources are being moved from low-productivity to high-productivity sectors. It is negative if the reverse is occurring, that is, if resources are being moved from high- to low-productivity sectors. The results are presented in Table 3.3.

Table 3.3. Further Decomposition of Growth, Ethiopia, 1990–2010

	Annual Growth Decomposition 1990-2010		
	Within	**Static Between**	**Dynamic Between**
Agriculture	0.8%	-0.4%	-0.1%
Mining	0.0%	0.0%	0.0%
Manufacturing	-0.1%	0.4%	-0.2%
Utilities	0.0%	0.0%	0.0%
Construction	-0.1%	1.0%	-0.7%
Trade, restaurants and hotels	-0.1%	0.9%	-0.1%
Transport, storage and communication	0.1%	0.0%	0.0%
Finance, insurance, real estate and business services	0.0%	0.4%	-0.1%
Government services	0.4%	0.0%	0.1%
Community, social and personal services	0.1%	0.0%	0.0%
Summation of sector GDP	1.2%	2.5%	-1.1%
Annual growth in productivity 1990-2010			2.6%
First term			1.2%
Second Term			2.5%
Third Term			-1.1%

Source: Author's calculations.

The detailed decomposition of the between effect shows clearly the root cause of Ethiopia's problem: there was a large movement of labor, but not all in the appropriate direction. In the extreme, if the labor force distribution had retained the same pattern over the years (that is, if the dynamic effect had been zero), the growth in productivity would have increased from 2.6 percent a year to 3.7 percent a year, a 42.0 percent increase that, given the compound growth power over a 20-year period, would have raised Ethiopia to middle-income status today.

Of course, no structural transformation can take place if there are no jobs in higher-productivity sectors. Moreover, sectors with higher productivity are often capital intensive so that there may not be any possibility of additional job creation because of demand constraints. This is the case with many utilities and natural resource–based sectors. Note that the decomposition technique above clarifies how partial analyses of productivity performance within individual sectors (for example, agriculture) can be misleading if there are large differences in labor productivity across economic activities, such as the case in developing countries. In particular, a high rate of productivity growth within an industry can have quite ambiguous implications for overall economic performance if the industry's share of employment shrinks rather than expands (because of greater productivity). If the displaced labor ends up in activities exhibiting lower productivity, economy-wide growth will suffer and may even turn negative.

To analyze the more recent pattern of structural transformation, the decomposition of total productivity is reviewed over a shorter period (two periods of 10 years instead of the 20 years in Tables 3.2 and 3.3). Table 3.4 shows the results. The growth of productivity was significantly higher in 2000–2010 than in 1990–2010: more than seven times higher. Similar to the limited productivity growth during the 1990s, the high growth rate during the first decade of the 2000s was also fueled by labor growth. In addition, the 2000s witnessed a reverse structural transformation caused by the movement of labor in the wrong direction. The dynamic between effect cut substantially into potential growth. For example, had there not been this effect, overall growth would have been 1.2 percent a year greater. Over time, this increase would have been compounded and would have exerted a large impact on economic growth and poverty reduction. The relatively new phenomenon could be attributed to the shedding of labor from agriculture and the absorption of labor into trade, restaurants, and other services.

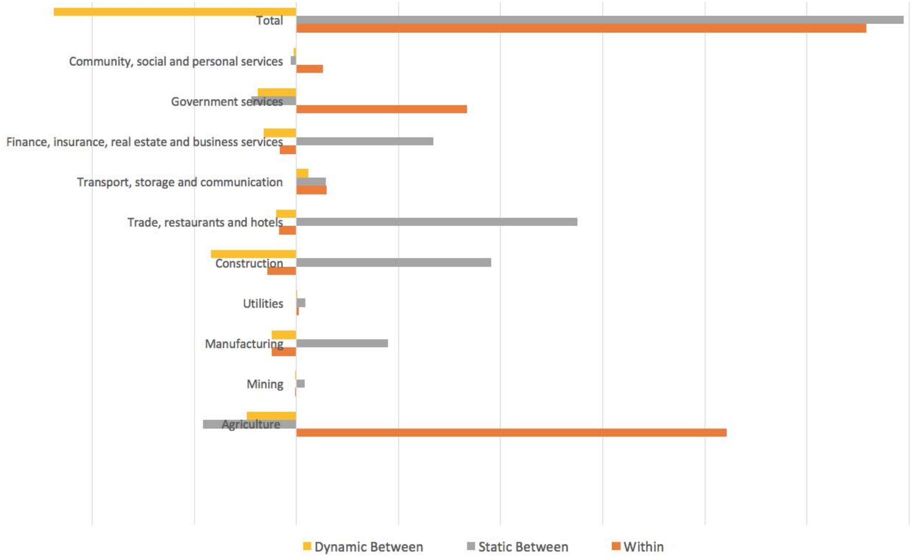
Table 3.4. Decomposition of Growth, Ethiopia,1990–2000 and 2000-2010

	Annual Growth Decomposition					
	1990-2000			2000-2010		
	Within	Static Between	Dynamic Between	Within	Static Between	Dynamic Between
Agriculture	-0.8%	-0.3%	0.0%	2.1%	-0.5%	-0.2%
Mining	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing	-0.1%	0.3%	-0.1%	-0.1%	0.4%	-0.1%
Utilities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Construction	-0.2%	0.4%	-0.2%	-0.1%	1.0%	-0.4%
Trade. restaurants and hotels	-0.1%	0.4%	0.0%	-0.1%	1.4%	-0.1%
Transport. storage and communication	0.2%	0.0%	0.0%	0.1%	0.1%	0.1%
Finance. insurance. real estate and business services	0.0%	0.2%	0.0%	-0.1%	0.7%	-0.2%
Government services	0.4%	0.2%	0.2%	0.8%	-0.2%	-0.2%
Community. social and personal services	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%
Summation of sector GDP	-0.6%	1.2%	0.0%	2.8%	3.0%	-1.2%
Annual growth in productivity 1990-2000			0.6%	Annual growth in productivity 2000-2010		4.6%
First term			-0.6%	First term		2.8%
Second Term			1.2%	Second Term		3.0%
Third Term			0.0%	Third Term		-1.2%

Source: Author's calculations.

Figure 3.4 presents the results of Table 3.4 in graphic terms. Sectors such as transport and finance do exhibit higher productivity than manufacturing, but they do not absorb many workers, and their rising productivity means that fewer and fewer workers will be employed as the economy expands. Indeed, over the period, the three sectors that absorbed the most workers were agriculture, trade and hotels, and manufacturing. The scope for moving workers out of agriculture into higher-productivity activities is considerable, provided jobs exist in these new sectors.

Figure 3.4. Contributions to Productivity Growth, by Type of Effect and Sector, Ethiopia, 2000-2010



Source: Author's calculations.

Senegal

Table 3.5 shows sector productivity per worker in Senegal in constant 2005 local prices in 1999–2010. Even more than in Ethiopia, there is huge variation in productivity per worker across sectors. If we exclude the highly capital-intensive sectors such as utilities, the ratio of productivity in a sector such as finance to productivity in agriculture (the lowest productivity sector) can exceed a factor of 46. In a way, this is good news, because, even if sector productivity remains the same, Senegal can achieve much higher and sustainable growth by shifting activities from low-productivity to higher-productivity sectors. McMillan, Rodrik, and Verduzco-Gallo (2014) note that this feature seems to exist only in developing countries because there are less pronounced differentials in productivity across sectors in developed economies.

Table 3.5. Senegal: Productivity per Worker, by Sector, Senegal, 1999–2010

	In '000 of Local Currency at 2005 Prices					Annual Emp. Growth	
	1970	1980	1990	2000	2010	1970-1990	1990-2010
Agriculture	580.1	354.7	274.8	338.4	362.7	4.3%	1.0%
Mining	11521.8	13862.6	16678.9	10440.2	6077.4	-0.8%	7.4%
Manufacturing	3812.0	3061.1	2458.1	1957.0	1556.5	4.9%	5.4%
Utilities	8482.2	4690.1	2593.3	11768.0	67471.1	9.0%	-11.1%
Construction	1737.8	1607.3	1486.6	1466.5	1457.0	6.9%	8.0%
Trade, restaurants and hotels	4602.7	2598.7	1467.2	1193.3	1010.6	8.3%	5.1%
Transport, storage and communication	6492.5	4548.6	3186.7	3729.8	4621.7	5.1%	6.3%
Finance, insurance, real estate and business services	15164.8	28949.2	23092.0	18219.3	16991.0	6.2%	7.1%
Government services	4770.2	3684.9	2846.5	2723.4	2668.2	5.0%	2.9%
Community, social and personal services	638.4	504.9	399.4	445.2	515.7	4.9%	2.5%
Total	1467.9	1098.5	863.5	944.6	1057.1	4.9%	2.5%

Source: Author's calculation based on 2014 data in GGDC (database), Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen, Groningen, the Netherlands. http://www.rug.nl/ggdc/.

Second, as in Ethiopia, agriculture has the lowest productivity of all the sectors. While over 50 percent of the labor force remains in agriculture, this sectors contributes less than 20 percent of GDP. Policy measures to improve productivity in agriculture therefore are essential for structural transformation in Senegal.

To illustrate the second point, Figure 3.3 shows what happens to Senegal and other African countries if resources are shifted to mirror the structure in developed countries, while holding African sectoral productivity constant (see above). Thus, even if within-sector productivity does not improve, Senegal can gain tremendously by creating opportunities outside agriculture so resources can be moved there. While all African countries in the sample seem to gain from such a shift in resources, Senegal gains the most: over 10 times the average productivity.

This point confirms the hypothesis regarding African countries: even more costly than the slow economic growth of these countries because of exchange rate and monetary arrangements is the lost opportunity for structural transformation. To investigate this issue further, the productivity equation is decomposed in Table 3.6 to reveal the increase in within productivity and the transformation effect.

Table 3.6. Decomposition of Productivity Change, Senegal, 1990–2010 annual change, %

Sector	Within	Between	Total
Agriculture	0.3	–0.3	
Mining	0.0	0.0	
Manufacturing	–0.3	0.3	
Utilities	2.3	–2.3	
Construction	0.0	0.2	
Trade, restaurants and hotels	–0.3	0.4	
Transport, storage and communication	0.2	0.3	
Finance, insurance, real estate and business services	–0.1	0.2	
Government services	0.0	0.0	
Community, social and personal services	0.0	0.0	
GDP	2.1	–1.1	1.0

Source: Author's calculations.

Table 3.6 shows that, while economy-wide productivity rose by 1 percent a year over the 20-year period, this poor performance was caused by a reverse structural transformation, that is, a worrisome movement of resources from high- to low-productivity activities, most likely from manufacturing to informal trade and even agriculture. If this adverse effect had not occurred, the Senegalese would have doubled the productivity growth rate, from 1 percent to 2.1 percent.

As in the case of Ethiopia, the structural transformation effect is decomposed into a static and a dynamic component (Table 3.7).

Table 3.7. Decomposition of the Between Effect, Senegal, 1990–2010 annual change, %

Sector	Static Between	Dynamic Between	Total Between
Agriculture	–0.2	–0.1	–0.3
Mining	0.1	–0.1	0.0
Manufacturing	0.5	–0.2	0.3
Utilities	–0.1	–2.2	–2.3
Construction	0.2	0.0	0.2
Trade, restaurants and hotels	0.6	–0.2	0.4
Transport, storage and communication	0.2	0.1	0.3
Finance, insurance, real estate and business services	0.3	–0.1	0.2
Government services	0.0	0.0	0.0
Community, social and personal services	0.0	0.0	0.0
GDP	1.7	–2.7	–1.1

Source: Author's calculations.

The detailed decomposition of the between effect shows clearly the root cause of Senegal's problem: labor actually moved from high-productivity capital-intensive sectors such as utilities to lower-productivity sectors such as domestic trade and restaurants.

To analyze the more recent pattern of (reverse) structural transformation, the total productivity change by sector is reviewed over a more recent period, the last 10 years instead of the last 20 years as in Table 3.7. Table 3.8 shows the evidence. The growth of total within productivity in 2000–2010 is roughly the same as in 1990–2010, about 1.1 percent a year compared with 1.0 percent. This time, the between effect is no longer negative; it contributes roughly half the increase in overall productivity growth. So, there appears to be some limited improvement. However, on examining in detail the breakdown of the between effect, one sees that the dynamic effect—the structural transformation part—is heavily negative (–0.9 percent; see Table 3.8). This poor performance is explained mostly by the (reverse) structural transformation that slowed the economy. Without this adverse effect, the growth rate in the productivity of the economy would have doubled.

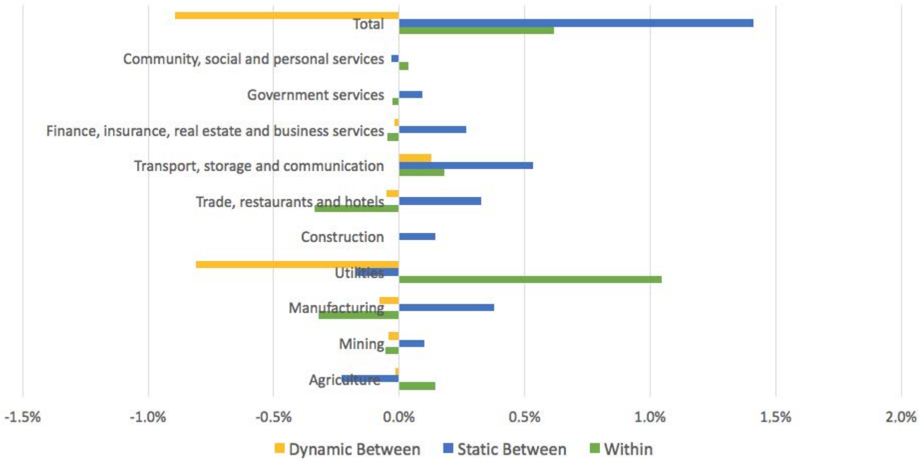
Table 3.8. Decomposition of Changes in Productivity, Senegal, 2000–2010 annual change, %

	Within effect	Between static	Between dynamic
Agriculture	0.1	–0.2	0.0
Mining	–0.1	0.1	0.0
Manufacturing	–0.3	0.4	–0.1
Utilities	1.0	–0.2	–0.8
Construction	0.0	0.1	0.0
Trade, restaurants and hotels	–0.3	0.3	–0.1
Transport, storage and communication	0.2	0.5	0.1
Finance, insurance, real estate and business services	0.0	0.3	0.0
Government services	0.0	0.1	0.0
Community, social and personal services	0.0	0.0	0.0
GDP	0.6	1.4	–0.9

Source: Author's calculations.

Figure 3.5 presents the results of Table 3.8 in graphic terms. Sectors such as transport and finance do exhibit higher productivity than manufacturing, but they do not absorb many workers, and their rising productivity means that fewer and fewer workers will be employed as the economy grows. Indeed, over the period, the three sectors that absorbed the most workers were still agriculture, trade and hotels, and manufacturing. The scope for moving workers out of agriculture into higher-productivity activities is considerable, provided jobs exist in these new sectors.

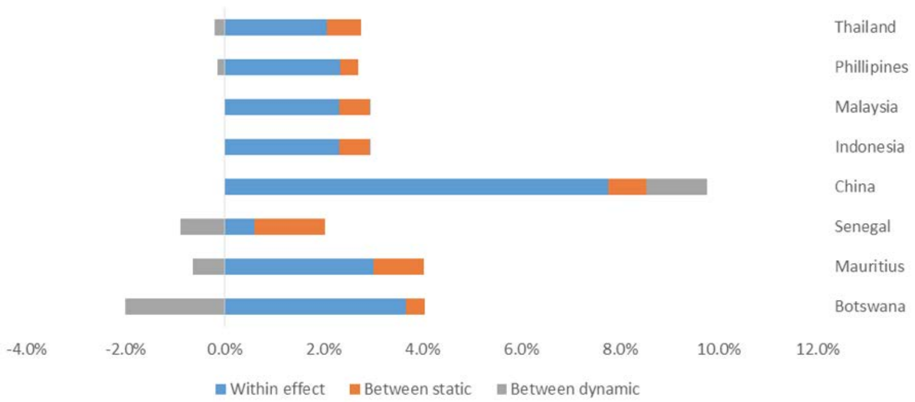
Figure 3.5. Contributions to Productivity Growth, by Sector and Type of Effect, Senegal, 2000–2010



Source: Author's calculations.

Figure 3.6 shows how Senegal performed in terms of structural transformation compared with other countries in Africa and Asia.

Figure 3.6. Decomposition of Productivity Growth, Selected Countries, 2000–2010



Source: Author's calculations.

The dispersion between sectoral productivity is also measured in the sample using the coefficient of variation. The productivity gap is supposed to shrink as economic development advances, thereby making agriculture comparable with other sectors in the economy in terms of productivity. Senegal has the highest dispersion among the countries in Figure 3.6, implying that the greatest gains in productivity for Senegal will come from structural transformation.

McMillan, Rodrik, and Verduzco-Gallo (2014) note a disturbing aspect of many African countries: the reallocation of factors was observed in the opposite direction, meaning that the labor factor shifted to lower than average productivity, indicating negative structural transformation. Latin America and Africa are the only two regions in the world in which this occurs (McMillan and Rodrik 2011). They note that the exchange rate played a role in this process:

> "We find that countries that maintain competitive or undervalued currencies tend to experience more growth-enhancing structural change. This is in line with other work that documents the positive effects of undervaluation on modern, tradable industries (Rodrik 2008). Undervaluation acts as a subsidy on those industries and facilitates their expansion."
>
> (McMillan, Rodrik, and Verduzco-Gallo 2014, 12)

Indeed, Senegal, with its fixed exchange rate regime tied to the franc of the Communauté Financière d'Afrique (Financial Community of Africa) experienced low growth and little structural transformation.

In summary, the analysis of the case of Senegal shows there is considerable room for growth through structural transformation. Even if capital deepening or new technology is not taking place, job creation in higher-productivity sectors such as manufacturing will speed up growth, generate higher income, and generate jobs for an expanding workforce. Looking ahead, it is essential that in sub-Saharan African countries enhance both the scope and the quality of the tradable sectors.

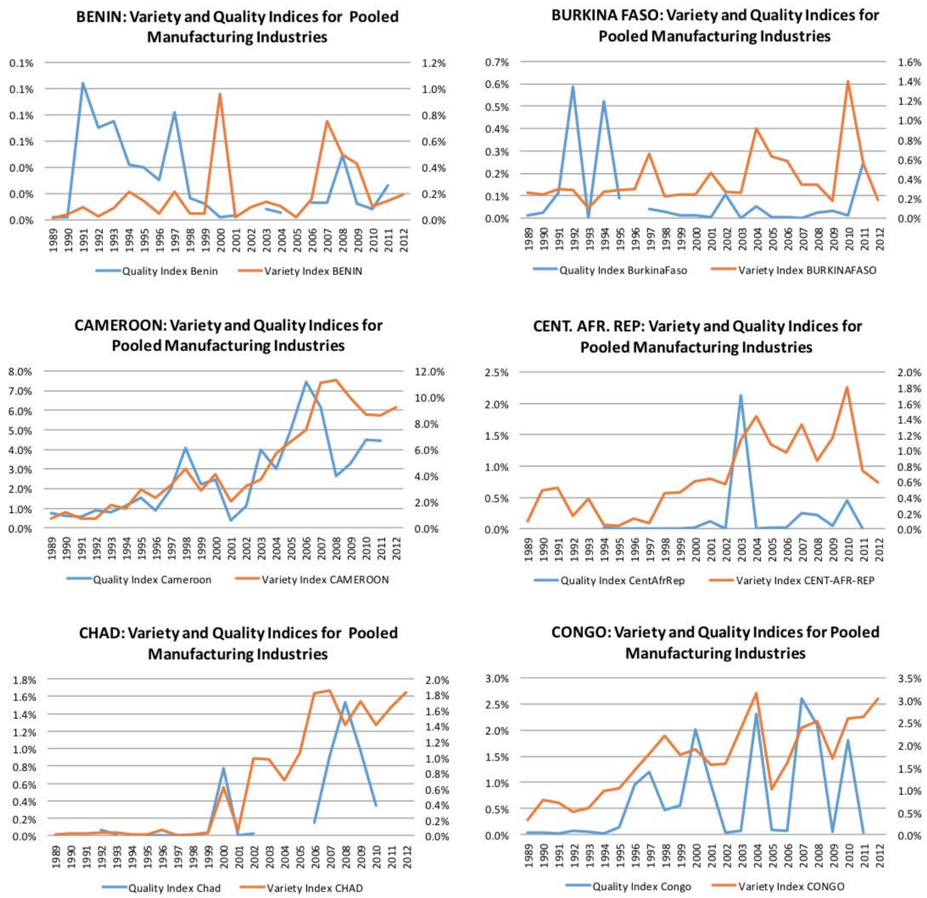
Structural Transformation By Upgrading Production & Exports

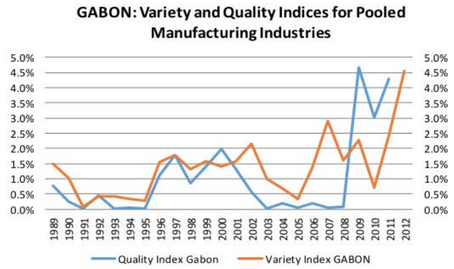
Two indexes are proposed that may be used to measure structural transformation in the production pattern of a country: the export variety index and the export quality index (see Chapter 2). Horizontal diversification (variety expansion) and quality upgrading are two important facets that relate to the transformation of a country's economic structure. The ability to transition from simple, low-quality products to sophisticated, high-quality products is viewed as a necessary condition for export success and, eventually, economic development (Khandelwal 2010). The analysis is confined in the manufacturing sector.

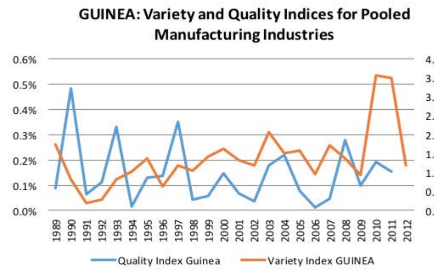
Quality upgrading tends to be greater in manufactures than in agriculture and natural resources (Henn, Papageorgiou, and Spatafora 2013). Meanwhile, manufacturing exports account for a large proportion of total exports even in Latin America.

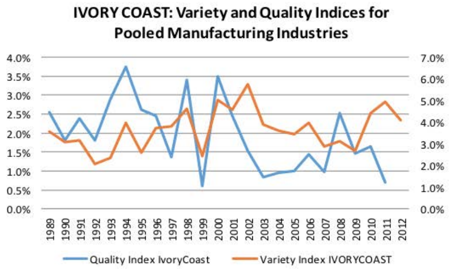
Figure 3.7 shows the performance of these two indexes over 1989–2010 in selected countries in Africa. Overall, there was hardly any noticeable change in the movement of the two indexes. Of the two, the export variety index is particularly important because it relates to the horizontal expansion of production and exports, which is more appropriate for low-income countries. The need to raise value added through higher quality (via innovation activities) is more appropriate for countries at the middle-income stage.

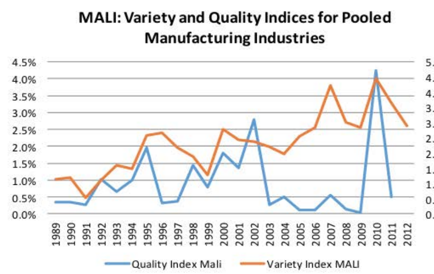
Figure 3.7. Variety and Quality Indexes, Pooled Manufacturing Industries, Selected African Countries, 1989–2010

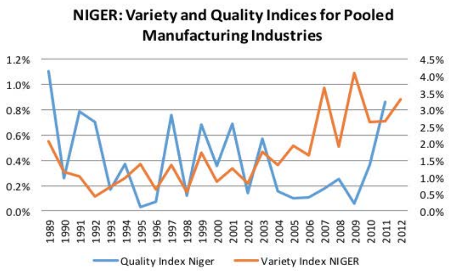


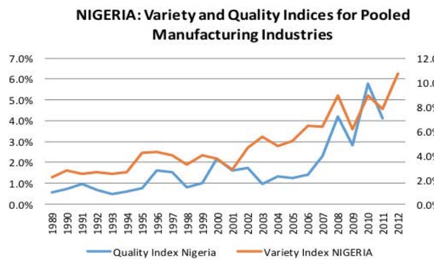


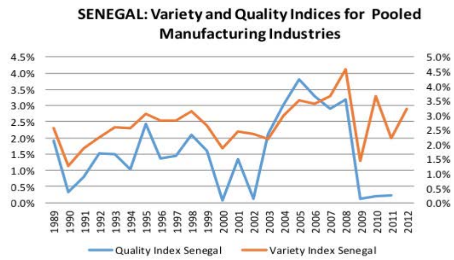


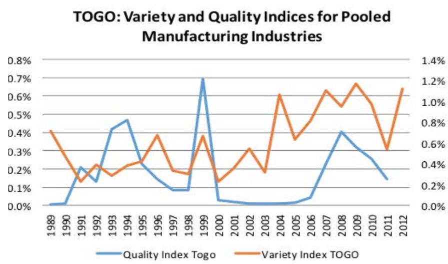












Source: Author's calculations.

The structural analysis discussed in this chapter reveals a number of key policy implications for low-income countries. First, given the wide variations in sectoral productivity, the impact of productivity improvement through the intersectoral allocation of resources is more important than the intrasectoral allocation of resources, such as more investment in a particular sector. Thus, it pays to move resources from low- to high-productivity sectors. Second, for this to occur, there must be more jobs created in the higher-productivity sectors so that idle or laid-off workers can find employment there. Third, moving to rising productivity sectors (such as finance and high-value services) is not an optimal strategy simply because there will be more surplus workers as more efficiency is sought unless these sectors are expanding at a more rapid rate than the rate of productivity growth within the sector. Indeed, the best structural transformation is one whereby activities rise from lower productivity to higher productivity that remains constant such as in manufacturing (Timmer 2012). Job creation in the right sectors is therefore at the core of the strategy to boost growth and structural transformation in Africa.

Two other features of African countries strengthen the above policy conclusions. First, the population dynamics in these countries, with young and rising youth with high aspirations, puts increasing pressures on the authorities to create jobs. Second, many countries in these two groups are resource-based economies, and already have unemployment issues themselves. So the job creation issue is at the forefront of the policy agenda, to which we now turn.

A Strategy To Create Jobs In Low-income Countries

In a series of books and articles, we argue that, in low-income countries, light manufacturing—with its low capital requirements, limited scale economies, readily available technology, and sales possibilities in domestic and international markets—retains potential as a springboard and the best hope to expand output, employment, productivity, and exports. By leveraging the large low-wage, low-skilled labor force as well as access to abundant resources, light manufacturing offers huge potential for making sustainable growth a reality. In some cases, this may require governments to remove obstacles so that the light manufacturing firms may flourish. Over the past 20 years, light manufacturing has been an important stepping-stone toward economic transformation in economically successful developing countries (for example, China, Mauritius, Vietnam, and the Asian tigers). As they grow, light manufacturing firms earn and save foreign exchange, provide higher wages to the vast pools of underemployed labor, and develop new technical and managerial skills. In addition to their low labor costs, low-income countries, particularly those in sub-Saharan Africa, also have the opportunity to leverage competitive (or potentially competitive) input industries (for example, agricultural products, leather, and wood) to develop competitive light manufacturing industries.

Manufacturing has long been recognized as an engine of growth in industrial countries. Kaldor's first law of economic growth states as follows:

> "the faster the rate of growth of the manufacturing sector, the faster will be the rate of growth of . . . [GDP] . . . for fundamental economic reasons connected with induced productivity growth inside and outside the manufacturing sector."
>
> (Thirlwall 1983, 345)

In a study on economic growth in developed countries, Kuznets (1959) notes that modern economic development is characterized by long periods of rapid output growth that coincide with a structural shift in the composition of output away from agriculture and into manufacturing. Even in developed countries where the share of manufacturing in output and employment has been stagnant or declining, there is evidence that manufacturing involves more production linkages with other sectors and the transfer of more production skills than is the case in nonmanufacturing sectors. A United States Department of Commerce (1995) study of the effects of changes in final demand on flows of goods and services within and between industries finds that manufacturing has a much higher activity ratio than does nonmanufacturing; manufacturing industries draw more heavily on nonmanufacturing industries than the reverse; and gross output per unit of final demand is higher in manufacturing industries than in nonmanufacturing industries.

Light industries, such as textiles and clothing, agricultural processing, meat and fish preservation and packaging, leather goods, and woodworking, have represented the leading edge in early industrialization both historically and today. Why? There are many reasons, including the ready availability of raw materials and labor, the universal demand for food and clothing, the simplicity and widespread diffusion of the relevant technologies, the limited capital and skill requirements, and the absence of scale economies. These circumstances allow small start-ups to produce light manufactures without deep technical knowledge, large-scale financing, or complex equipment.

Among the early industrialized countries, organic growth powered a gradual transition, whereby capable (and lucky) entrepreneurs managed to outpace small-scale rivals and build their firms into large, well-capitalized, sophisticated operations that established national and, eventually, international distribution networks.

This sequence of easy entry, natural growth, and the gradual emergence of large, sophisticated producers pushed light manufacturing to the fore early in the development of today's rich countries. The United Kingdom pioneered this long-term process of modern economic growth, as Kuznets (1971) characterized it. Subsequent work by Syrquin and Chenery (1989, 82) confirms that "the main features of transformation, identified by Kuznets as the core of modern economic growth on the basis of long-term experience in advanced countries, can clearly be identified in the shorter time-series of a large number of developing countries." (See also Chenery and Syrquin 1975.)

The combined impacts of the Great Depression, World War II, and the Soviet Union's rapid industrial growth under policies of near autarchy convinced many economists and policy makers that low-income countries could not compete effectively with the West in producing manufactured products. The implication that poor countries could industrialize only by relying on domestic demand encouraged inward-looking import-substitution policies in these countries.

The thinking turned out to be wrong. Led by Taiwan, succession of low-income economies, mostly in East and Southeast Asia, showed how exports, particularly of light manufactures, could rapidly advance the economy-wide growth of production, income, employment, productivity, and exports more generally. Between 1965 and 1990, the combined share of Hong Kong, Korea, Singapore, and Taiwan in global exports jumped from 3 percent to 9 percent, and their share in the exports of developing economies rose from 12 percent to 46 percent (World Bank 1993).

The accelerating pace of globalization offers opportunities for many low-income countries today. In the same way as rising costs in Hong Kong and Taiwan opened the door to China's emergence as a major exporter of light manufactures beginning in the 1980s, rapid cost increases in China's leading centers of labor-intensive industry, particularly the costs of unskilled labor, are now creating openings for new entrants to become established in global markets for low-end manufactures. Existing flows of imports provide would-be entrants with precise details on the product characteristics and retail prices needed to challenge incumbent suppliers. An additional benefit of globalization is the proliferation of footloose entrepreneurs and procurement companies that possess the knowledge and capital resources to support new exporters, as occurred in China several decades ago.

Now, the coastal regions that powered China's export boom are rapidly losing traction as low-cost exporters of textiles, garments, toys, footwear, and other labor-intensive products. The erosion of competitiveness is concentrated at the low end of the price-quality spectrum, precisely the spot at which producers in low-income countries may find opportunities to break into international markets. The gradual withdrawal of

China-based firms from low-cost, low-technology production space is creating new opportunities for the expansion of light manufactures in low-income economies.

The Potential Of Light Manufacturing

Many developing countries, especially those in Africa, have all the inputs needed for a competitive light manufacturing sector: a comparative advantage in low-wage labor, abundant natural resources sufficient to offset lower labor productivity relative to major competitors (for example, China), privileged access to high-income markets for exports, and, in most cases, a sufficiently large local or regional market to allow emerging producers to develop capabilities in quick-response, high-volume production and quality control in preparation for breaking into highly competitive export markets. They can accomplish this by accelerating the realization of latent comparative advantage in areas of light manufacturing in which specific, feasible, sharply focused, low-cost policy interventions can deliver a quick boost to output, productivity, and, perhaps, exports, opening the door to expanded entry and growth.

In recent years, four factors have helped open new markets for light manufacturing firms in Africa and Southeast Asia:

- More rapid economic growth has expanded the size of the domestic market for manufactures in most countries. New markets thus offer new opportunities.
- Foreign investors and aid agencies are investing in manufactures destined for foreign markets. Examples include the U.S. Agency for International Development's technical assistance to Zambian farmers.
- For globally competitive light manufacturing firms in sub-Saharan Africa, the market is the world. The United States established new trade preferences under the African Growth and Opportunity Act, granting products from eligible sub-Saharan African countries exceptionally favorable access to the United States, while the European Union adopted similar measures under the Cotonou Agreement. These trade preferences are critical to the success of African exporters in the global apparel market; without the preferences, the countries are noncompetitive with efficient global exporters in markets in the European Union and the United States.
- Regional integration within Africa and within Southeast Asia increases the attractiveness of regional markets. For example, participation in regional trade agreements has opened up new markets for Tanzania and Zambia.

Why Did Light Manufacturing Not Take Off In Africa And Other Low-Income Countries?

Despite widespread agreement among economists that labor-intensive manufacturing has contributed mightily to speedy development in East Asian and other rapidly growing economies, most developing countries have had little success in raising the share of manufacturing in production, employment, or exports (Clarke 2012; Collier 2007). So, what is wrong?

Overwhelming evidence from our research project (Dinh et al. 2012) indicates that the constraints on firms vary by sector; so, a one-size-fits-all approach is unlikely to be effective. The wide range of constraints shows, first, that solving problems in light manufacturing may involve specific solutions across other sectors. Solving the manufacturing inputs problem requires that specific issues be addressed in agriculture, education, and infrastructure. Second, precisely because of these linkages, developing countries cannot afford to wait until all the problems across sectors are eliminated. Instead, a focused approach to relieve specific bottlenecks and momentum in reform is needed. Third, because of the unique structure of Africa's light manufacturing sector, the constraints vary by firm size. Fourth, some of the constraints can be addressed through factory-level measures, others only by government policy, and still others only by strengthening competition.

The Challenges To Light Manufacturing Growth In Low-income Countries

Our research has shown that light manufacturing faces a number of constraints in low-income countries.

- **Dual structure:** The current industrial structure in Africa is characterized by the following:
    - Few medium or large companies, and those that survive must struggle to compete with imports. The striking paucity of medium and large firms represents an immediate reason why light manufacturing in sub-Saharan Africa cannot expand and chart an export-led growth trajectory. The small number of medium and large firms inhibits competition, discourages large new entrants, including would-be foreign investors, and stunts the sector.
    - A significant number of small, mostly informal firms engage in low-productivity work. The vast majority of firms in sub-Saharan Africa are small; many are owned and operated by households, mostly in the informal

sector.[26] In Zambia, for example, about 84 percent of workers are in the informal sector. In many countries in the region, wages are far lower in the informal sector than in the formal sector. Workers in large, privately owned firms in Ghana and Tanzania earn more than twice as much as similar workers in small firms and self-employed persons (Rankin, Sandefur, and Teal 2010). The pattern is similar in Zambia, where sales and labor costs per worker are low among SMEs.

This finding confirms the findings of other studies (for example, Sutton and Kellow 2010). The dual structure implies that improvement in the productivity of the whole economy depends on raising the productivity of large formal firms as well as that of micro, small, and informal firms. Each type of firm requires a different set of policy measures. Small and large firms need to be treated separately, with the eventual goal of integrating them into comprehensive value chains. In light manufacturing, in particular, a prerequisite for exporting today is possessing the ability to fulfill large orders competitively (in price and quality) and in a short time. This requires tapping into scale economies associated with labor-intensive assembly-line production chains, that is, large firm operations. By definition, smaller firms cannot do this.

- **Constraints vary by subsector and by size:** Overwhelming evidence from our research project indicates that the constraints on firms vary by sector and by firm size; so, a one-size-fits-all approach is likely to be ineffective. The wide range of constraints indicates, first, that solving light manufacturing problems may involve specific solutions across other sectors. Solving the manufacturing inputs problem requires solving specific issues in agriculture, education, and infrastructure, for example. Second, precisely because of these linkages, developing countries cannot afford to wait until all the problems across sectors are resolved. Instead, a focused approach to relieve the specific bottlenecks and to create a momentum of reforms is needed. Third, because of the unique structure of Africa's light manufacturing sector, the constraints vary by firm size. Fourth, some of the constraints can be addressed through factory-level measures; others, only by government policy; and still others, only by strengthening competition.

26 Although it is difficult to compare the size of the informal sector across countries because of differences in definitions and measurement methods, most evidence suggests that the informal sector is larger in sub-Saharan Africa than in other regions. Schneider (2005) estimates that in 1999/2000, the informal sector accounted for about 41 percent of GDP in the 37 African countries on which there are data. This is similar to the share in Latin America, but higher than the share in most other regions. As in most regions, informality is generally more prevalent in low-income countries (Dinh et al. 2012).

The Vicious Circle Of Extreme Poverty And Limited Industrialization

Both the dual structure and the different binding constraints make it difficult for low-income countries to industrialize. Poor countries are therefore trapped in a vicious circle of pervasive poverty and low industrialization. This was pointed out by Rosenstein-Rodan (1943), and his big push theory was made more popular by Murphy, Shleifer, and Vishney (1989).

Rosenstein-Rodan (1943) argues that, if left to the markets, industrialization would not come about because of the divergence between private and social marginal net product: the cost of training a peasant to be an industrialist is too big for any one firm to bear. Even for the entire country, the training cost should be considered a capital cost rather than a recurrent cost. The idea of a big push refers to the investment of a large number of industries to generate the demand or momentum needed to lift the economy 'much like getting an airplane off the ground'. Besides the divergence between social and private marginal net product, the reasons for the big push include externalities and indivisibilities.[27] (See Annex 2B for a general model of the big push and the link to the binding constraints discussed in this book.)

Critics of the big push theory include Ellis (1958), who, like Viner (1958), argues that externalities are not important in developing countries because these countries tend to be primary exporters. But this criticism is misplaced because it is precisely these primary commodity exporters that need to create productive jobs through industrialization. The same can be said about the argument that the big push implicitly favors industry over agriculture and other primary industries. As agricultural productivity improves, the surplus of labor released from the countryside has to be employed somewhere. And job creation in services tends to be either too limited or too specialized, leaving manufacturing as the most suitable sector for employment creation. A more serious criticism relates to the fact that the big push itself offers no guarantee that it can be successful if it is carried out by the public sector rather than the private sector and that relatively small investment also pays off handsomely. Moreover, from a policy maker's standpoint, it is not clear what constitutes a big push rather than a small push or what the criteria are in the selection of the sectors to be targeted. One could use the concept of backward and forward linkages, as pointed out by Hirschman (1988), to determine

27 Rosenstein-Rodan defines two types of externalities: a Marshallian one, which is the externality conferred upon a firm within a growing industry, and a second type that is conferred upon an industry because of the growth of other industries. He distinguishes three types of indivisibilities: (a) the indivisibility of inputs, processes, or output; (b) the indivisibility of social overhead capital; and (c) the indivisibility of the low price elasticity of the supply of savings and the high income elasticity of savings.

what sectors should be involved, but Hirschman himself was critical of the big push and advocated instead for stepwise or unbalanced investments and, therefore, a type of unbalanced growth.

In reality, the concept of the big push is no longer relevant for low-income countries because the public investment programs in these countries are negligible and are influenced in any case by donors and international organizations whose focus on public policy does not usually include manufacturing or industry in general.[28] Moreover, the Millennium Declaration and the Millennium Development Goals have shifted the paradigm of economic development from the development of the capacities of a society, such as economic transformation, to a global consensus on specific targets in poverty reduction. The advantage of such an approach lies in the reliance only on the ability to forge a consensus on the need for policy actions to achieve the goals. But the flexibility of this approach means that there is a vacuum in terms of guidance about the choice of a suitable development strategy to achieve the goals. In the event and perhaps because of their weak capacity, many low-income countries have lost control of the development agenda.

But to revive sustained economic growth in low-income countries, the movement away from public investment programs in industry should not entail an abandonment of public policy in industry. From a theoretical standpoint, a big push can still be obtained through a reduction in the fixed cost or a reduction in the relative factor costs. This strategy, consistent with the endogenous growth theory, can be realized through an emphasis on cooperation between the public and private sectors in addressing the binding constraints, especially labor and managerial skills, on strengthening the government's role to resolve the coordination failure (such as cattle disease control in Ethiopia, where the shortage of the good-quality hides needed for the production of leather products is caused by ectoparasites, a disease that can be easily eliminated by vaccination, see Dinh et al. 2012), and on encouraging cluster development (to foster externalities and complementary investments) as well as on trading companies (to reduce transaction costs).

Another reason for not waiting for the market approach to work itself out in Africa is the length of time required. Most research on industrialization in Africa points to the lack of infrastructure as a key constraint on industrial growth. However, addressing sub-Saharan Africa's needs in infrastructure is a huge challenge and cannot be achieved in one or two decades. Part of the difficulty is that Africa's infrastructure deficit is

28 In this book, we define low-income countries as countries with US$1,035 or less in GNI per capita in 2012, calculated using the World Bank Atlas method. See "How We Classify Countries," World Bank, Washington, DC, http://data.worldbank.org/about/country-classifications.

huge because of the years of neglect associated with poverty, but also because of the continent's characteristics, including low population density, low rates of urbanization, the large number of landlocked countries, and the numerous small economies. Foster and Briceño-Garmendia (2010, 4) succinctly explain this issue as follows:

> *Sub-Saharan Africa comprises 48 nation-states, many of which are small. The bulk of those countries have populations of fewer than 20 million and economies smaller than US$10 billion. International frontiers bear little relation either to natural features (such as river basins) or to artificial features (such as cities and their accessibility to trading channels, such as ports). Intraregional connectivity is therefore low, whether measured in transcontinental highway links, power interconnectors, or fiber-optic backbones. Most continuous transport corridors are concerned with providing access to seaports, whereas the intraregional road network is characterized by major discontinuities. Few cross-border interconnectors exist to support regional power exchange, even though many countries are too small to produce power economically on their own.*
>
> *The prices paid by consumers for infrastructure services are exceptionally high in Africa. This reflects production costs (such as in power), or high profit (as in freight tariffs), or both (as in international telephone and Internet services). Power tariffs vary from US$0.02 to US$0.46 per kilowatt-hour in Africa compared with US$0.05 to US$0.10 in other developing regions, while road freight tariffs range from US$0.04 to US$0.14 per ton-kilometer compared with US$0.01 to US$0.04 in other developing regions (Foster and Briceño-Garmendia 2010).*

The cost of addressing Africa's infrastructure needs is estimated by Foster and Briceño-Garmendia (2010) at US$93 billion a year (some 15 percent of Africa's GDP), about two-thirds for investment, and one third for maintenance. About half the capital investment needs are required to produce power, which has been reported by enterprises in sub-Saharan Africa as their most serious obstacle, along with access to finance (Dinh, Mavridis, and Nguyen 2012). Foster and Briceño-Garmendia (2010) estimate that, of the US$93 billion annual infrastructure needs, about US$45 billion are expected to come from governments, infrastructure users, the private sector, and external sources. The remaining financing gaps mean that, even under an optimistic scenario whereby efficiency gains are fully exploited through reforms, nonfragile and resource-rich low-income countries in Africa could only meet the more modest targets in infrastructure needs after 20 years at the existing rates of expenditure. If the efficiency gains are not fully exploited, it would take 30 years. Fragile low-income states could reach these targets in 30 years under the optimistic scenario, but in a much longer time if efficiency gains are not fully exploited (Foster and Briceño-Garmendia 2010).

But can Africa afford to wait another 20 or 30 years to begin the industrialization process? And even if it does, would industrialization come?

China's Growing Labor Cost Disadvantage: An Opportunity

Chinese products have penetrated every corner of the globe. To export light manufacturing products successfully, sub-Saharan African producers will have to compete with China. But the capacity of coastal Chinese firms to outperform rivals in low-income countries on price and quality in labor-intensive light industry manufactures is declining rapidly. Growing numbers of export firms in China's coastal provinces are beginning to be priced out of global markets for an expanding array of labor-intensive light industrial products because the domestic labor market is absorbing China's large pool of less-skilled workers, and domestic labor costs are rising quickly.

Rising wages, stricter enforcement of labor and environmental regulations, gradual expansion in costly safety net provisions, and likely additional increases in the international value of the yuan mean that China's comparative advantage in the exportation of labor-intensive manufactures will continue to erode, perhaps at an even more rapid rate. China's efforts to limit the upward drift of its currency have contributed to domestic inflation, which is spurring wage demands and accelerating the narrowing of the country's cost advantages in labor-intensive manufactures (Dinh et al. 2013). These conditions are creating an opening for other low-wage producers if they can learn to compete. For sub-Saharan African countries, this translates into an opportunity to undertake the structural changes that hold the promise of delivering large, sustained increases in output, exports, employment, productivity, and incomes.

Breaking The Vicious Circle: A Selective, Practical Approach

Is there a way for low-income countries, especially sub-Saharan Africa, to break out of the vicious circle of poverty and limited industrialization and take advantage of the new opportunities? Studies of the constraints on the expansion of light manufacturing in sub-Saharan Africa have typically produced staggeringly long lists, which seems to suggest that no feasible set of policy adjustments can make the countries attractive to investors. Often, the implication has been that, unless all the shortcomings are fixed, light manufacturing cannot grow.

Yet, developing economies in other regions have expanded the production and export of light manufactures without first resolving the sorts of constraints observed in sub-Saharan Africa. China in the mid-1970s and early 1980s suffered from low product quality, passive management, administrative confusion, and so on (Dinh et al. 2013).

The vicious circle of pervasive poverty and low industrialization means that the economy-wide policies recommended by the Washington Consensus are unlikely to overcome the inertia that is impeding the progress in low-income countries. Furthermore, because the binding constraints vary by subsector and by size, economy-wide policies are not even effective in addressing the constraints. Development experience from as early as the 1950s demonstrates that such policies, however fruitful in improving long-term prospects, do not establish a self-supporting process of reform and development. What these economies need is a focused initiative to inject new elements of prosperity and growth even as large segments of the economies remain unaffected. Without such a breakthrough, poor countries are unlikely to eliminate the persistent low equilibrium of poverty and limited industrialization. The targeted development of light manufacturing – specifically, consumer goods manufactured using modest inputs of fixed capital and technology and the extensive application of unskilled or semi-skilled labor – is a promising entry point for accelerating industrialization and prosperity in low-income countries.

The approach followed in our project builds on the work of Hausmann, Rodrik, and Velasco (2005), who visualize development as a continuous process of specifying the binding constraints that limit growth, formulating and implementing policies to relax these constraints, securing modest improvements in performance, and then renewing growth by identifying and addressing the factors that limit expansion in the new environment. Our approach emphasizes that development begins somewhere, but not everywhere. In Africa, as in China, applying limited funding and administrative personnel to implement a set of tightly focused reforms holds the promise of initiating new clusters of production, employment, and, eventually, exports without first resolving economy-wide problems of land acquisition, utility services, skill shortages, administrative shortcomings, and the like. Our approach is also consistent with the new structural economics, which views economic development as a process that requires the continuous injection of improved technologies and the constant upgrading of skills (Lin 2012).

The first volume of our project, Light Manufacturing in Africa: Targeted Policies to Enhance Private Investment and Create Jobs, shows that, to grow the light manufacturing sector, policy makers in developing countries need first to identify, prioritize, and remove the most binding constraints in each sector (Dinh et al. 2012a). We have identified six binding constraints on African competitiveness in light manufacturing: (a) the availability, cost, and quality of inputs; (b) access to industrial land; (c) access to finance; (d) trade logistics; (e) entrepreneurial capabilities, both technical and managerial; and (f) worker skills. These constraints vary by country, sector, and firm size. Thus, among small firms, entrepreneurial skills, land, inputs, and finance are the most important constraints, while, among large firms, trade logistics, land, and inputs are among the most important.

- **The Availability, Cost, And Quality Of Inputs**

Large and small firms alike identify the poor supply of inputs, including problems in availability, quality, and cost, as a leading obstacle to the development of competitive light manufacturing in Ethiopia, Tanzania, and Zambia. Inputs are a binding constraint in two of five light manufacturing sectors (agribusiness and wood products) and an important constraint in another three (apparel, leather, and metal products). On average across these five sectors, inputs are more than 25 percent costlier in the three countries than in China, implying a 20 percent production cost penalty given that inputs represent more than 70 percent of the total production cost in these sectors. In most cases, the higher input costs wipe out Africa's labor cost advantage.

Because farm products and wood are major inputs in four of these five light manufacturing sectors that our project identifies as particularly suitable for policy attention, improving the performance of agriculture and forestry quickly emerges as a key item on the policy agenda to enhance the competitiveness of African light manufacturing.

The main input policy issues are import tariffs (all sectors); price controls and export bans on agricultural products; barriers to the import and distribution of high-yield seeds; disease control in the livestock sector; and difficulties in gaining access to land and finance in commercial farming, forestry, and livestock. For example, despite abundant livestock and skins, Ethiopian firms have problems finding large volumes of quality leather because of the lack of veterinary services (diseases reduce the quality of skins). A United States Agency for International Development study finds that the infestation rate of the ectoparasites that cause an animal skin disease in Ethiopia could be substantially reduced, from 90 percent to 5 percent, if each animal were treated four times a year, costing about US$0.10 for all four treatments (USAID 2008). The total cost for such a program covering the whole country would be less than US$10 million a year, a modest amount in relation to the potential benefits.

Our investigations show that allowing processed leather imports and eliminating import duties on leather and on other shoe parts (chemicals, glues, treads, laces, and soles) would enable Ethiopian shoes and other leather goods to become competitive in international markets in advance of any improvement in the currently poor state of the relevant trade logistics (Dinh et al. 2012a). Importing leather would incur a US$1.00 cost penalty per pair of shoes (a 6 percent production cost penalty), which would be more than offset by Ethiopia's US$5.00 labor cost advantage per pair of shoes (a US$3.50 advantage in Tanzania and Zambia). The removal of import duties on leather and other shoe parts would also expand the opportunities for the small-scale production of shoes and other leather goods for domestic consumption.

- **Industrial Land**

A lack of access to industrial land can cripple efforts by smaller and larger firms to take advantage of market opportunities and attain a competitive operational scale. Smaller firms need land to set up and expand businesses; larger firms need land to expand factories, and both can benefit from the use of land as collateral to obtain loans. It is ironic that land is a constraint on most manufacturing firms in land-abundant sub-Saharan Africa. Because all manufacturing firms need industrial land that is equipped with utilities and transport links to markets, sub-Saharan Africa's huge deficit in industrial land puts land policy at the core of the industrial development agenda (Dollar, Hallward-Driemeier, and Mengistae 2004; Limão and Venables 2001; Subramanian, Anderson, and Lee 2005).

Our qualitative interviews suggest that problems with land acquisition in sub-Saharan Africa often prevent firms with 4–5 employees from growing into firms with more than 10–15 employees. To grow in this way, small firms need access to larger work areas connected to affordable, reliable utilities and offering good transport links to input and output markets. Most small firms are located in the homes of the owners or in small workshops. Connecting to utilities requires large fixed investments that are typically beyond the means of small informal operators.

The problems of access to industrial land are diminished among larger firms, though land access among large firms is far more difficult in sub-Saharan Africa than in East Asia. In Ethiopia, exporters (typically the larger firms) in apparel and leather products receive preferential access to cheap industrial land. In sub-Saharan Africa more generally, industrial zones are usually reserved for large exporters, most often firms with foreign ownership (Farole 2011).

The comparative value chain analysis conducted for the project reported in this book indicates the centrality of land as a key input for the production of heavyweight, high-volume farm-grown raw materials for light manufacturing such as agroprocessing (dairy and wheat), leather (ranches where cattle are bred for the meat and leather industries), and wood (planned afforestation). The cost savings from the large-scale production of local raw materials can make a significant difference in the competitiveness of light manufacturing.

Sourcing domestic raw materials requires commercial land. The absence of a land market in Ethiopia hinders commercial farming and forestry. Land policy limits the entry of large farmers; there are only two or three large farms with industrial operations in Ethiopia. The success associated with exceptional cases, notably rose plantations that now employ as many as 50,000 workers, illustrates the large potential payoff of an enterprise-friendly reform of landholding arrangements.

Land is also needed for affordable worker housing and for space for business transactions. Shortages of residential housing and affordable transport for industrial workers in sub-Saharan Africa lead to various combinations of higher wages (to attract workers) and higher living costs (to travel to and from distant workplaces). Few SMEs in sub-Saharan Africa have access to land for business transactions. The paucity of showroom space forces small producers to manufacture products only on order. Without storage space, owners must purchase inputs at retail prices rather than wholesale prices. The same constraint on grain milling firms leads to high spoilage rates because of mice and moisture.

- **Finance**

The main source of financing is retained earnings in all five countries in our study. The need for capital investments is relatively small in light manufacturing, but, if we consider the growth of successful small firms into medium or large firms, the lack of formal financing options is a key constraint in sub-Saharan Africa. Difficulties in accessing finance can contribute to the missing middle phenomenon, leaving small enterprises trapped in low technology and low productivity and without the means to upgrade skills and technology (Dinh, Mavridis, and Nguyen 2012). Inadequate financial sector development affects firm size and skews the distribution toward SMEs, especially among firms that perceive access to finance as an obstacle.

Among firms that do borrow, the cost and collateral requirements are significantly greater in sub-Saharan Africa than in Asia. Overdraft facilities appear to help Chinese manufacturing firms obtain short-term financing.

- **Trade Logistics**

Poor trade logistics penalize firms that rely on imported inputs and doubly hit exporters (in Africa, mostly medium and large firms). On average, poor logistics add roughly a 10 percent production cost penalty across the five sectors in the three African countries. Poor trade logistics also cause long and uncertain delays, unacceptable to most global buyers, especially in the time-sensitive apparel industry. As a result, production in Ethiopia and Tanzania is mostly confined to small market niches. Ethiopia exports small volumes of low-value products; the free on board price of an Ethiopian polo shirt in 2010 was around US$3.20, much lower than the US$5.50 price of an equivalent Chinese shirt. The higher Chinese free on board price results because of the higher-quality shirts and the premium global buyers put on China's capacity to offer greater choice, bigger volumes, and less time-consuming and more certain deliveries. Tanzania exports polo shirts at a free on board price similar to China's, but these are small-volume specialty products for which the orders are as low as 1,000 pieces per style, not the fairly standard orders of 15,000–60,000 pieces. The small orders mean higher input costs, lower capacity use, and greater overhead.

- **Entrepreneurial Skills**

There is considerable heterogeneity in firm performance in Africa, reflecting partly the differences in entrepreneurial and management skills and partly the lack of competitive pressure in many countries (Clarke 2012). Inefficient firms are not driven from the market, and entrepreneurs find entry difficult. The gaps between the least and most productive African firms are large. In Tanzania, a firm at the 25th percentile in labor productivity manufactures about US$1,250 of output per worker. The firm at the 75th percentile produces about US$9,050 per worker, about seven times more. The large productivity variations within narrowly defined industries arise because of multiple factors: limited competitive pressure, limited dispersion of entrepreneurial and technical skills, and the market segmentation arising from policy interventions (such as tariffs or entry restrictions) or geography (for example, poor roads).

Entrepreneurial skills can be enhanced through sector-specific technical assistance and through measures to encourage first movers: the case of the Ramsay shoe factory in Ethiopia shows that appropriate technical assistance for owner-managers can have a big impact on factory performance. Also, first movers in late-mover countries typically face higher costs and risks, especially in Africa, which has limited infrastructure and exhibits significant regulatory and governance risk. But strategic first movers can catalyze the growth of competitive new industries. The first rose farm in Ethiopia led to the creation of a new industry that, since 2000, has generated more than US$200 million a year in foreign exchange and created 50,000 jobs (Dinh et al. 2012a)

- **Worker Skills**

Notwithstanding the differences in skills, the efficiency of African workers in all but one sector (wood products) overlaps the range observed in China and Vietnam. The numbers suggest that low-level skills are sufficient for jobs in computer management technology operations in the apparel industry, for example. Africa's potential can also be inferred by the significant positive impact that targeted technical assistance programs have had on both efficiency and quality (for instance, the Ethiopian shoe industry). So, because there is a plentiful supply of trainable unskilled workers, sub-Saharan Africa can be competitive in light industries that do not require semi-skilled workers.

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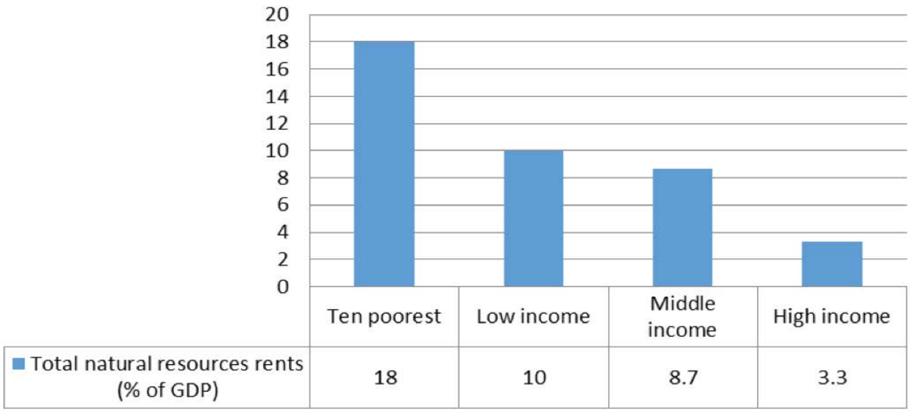
Chapter 4: The Resource-Based Low-Income Countries

Introduction

The 10 poorest countries in the world today derive an average of 18 percent of their incomes from natural resources rents, compared with 10 percent among low-income countries, 8.7 percent among middle-income countries, and 3.3 percent among high-income countries) (Figure 4.1).[29] Of these 10 countries, four derive over 20 percent and two derive over 30 percent. Many of these countries show the same dependency on natural resources rents today as they did 30 years ago, suggesting the presence of a resource curse creating a dependency cycle on these sources of rent (Sachs and Warner 2001).

29 Following research results pioneered by the World Bank (2011), natural resource rents are defined in this book as revenues above the cost of extracting the natural resources. Natural resources give rise to economic rents because they are not produced. Rents from nonrenewable resources represent the liquidation of a country's capital stock. If countries use these rents to support current consumption rather than to invest in new capital to replace what is being used, they are, in effect, borrowing against the future. For relevant data, see WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

Figure 4.1. Total Natural Resource Rents, by Country Income Category (% of GDP)



Source: 2015 data, WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

Behind these numbers lies a more troubling trend. First, the same poor countries, mostly in Africa, have been resource dependent over the past three or four decades. The economic policies adopted by these countries have not resulted in production or export diversification. The policy prescriptions recommended to these countries by experts at research centers and international institutions have had disappointing results. Moreover, after 40 years of reform, still more countries appear to have become resource dependent, which means the design of fresh policies is now more urgent than ever.

Table 4.1 shows the least developed countries in the world in 1970 and in 2012, along with their natural resource rents (as a share of GDP) and per capita incomes. The table highlights two disturbing trends. First, over the course of four decades, the vast majority of the countries have been in Africa; indeed, many are the same countries. Second, the 10 least developed countries are heavily dependent on natural resources, a trend that has widened over the years.

Table 4.1. Natural Resource Dependency, Least Developed Countries, 1970 and 2012

Country	Natural resource rent (% of GDP)	GNI per capita (US$)	Country	Natural resource rent (% of GDP)	GNI per capita (US$)
	1970	1970		2012	2012
Malawi	5.7	60	Burundi	23.4	240
Rwanda	7.3	60	Malawi	9.8	320
Burundi	5.8	70	Liberia	26.2	370
Mali	3.5	70	Niger	9.1	390
Nepal	7.0	80	Congo, Dem. Rep.	33.4	400
Burkina Faso	5.8	90	Ethiopia	13.8	420
Indonesia	9.9	90	Madagascar	8.9	430
Lesotho	8.0	90	Guinea	30.1	440
Somalia	4.1	90	Eritrea	15.5	450
Central African Republic	7.0	110	Uganda	12.2	480
Gambia, The	2.0	110	Central African Republic	8.5	490
Benin	5.8	120	Togo	9.0	490
India	2.3	120	Gambia, The	5.2	520
China	1.7	120	Sierra Leone	8.6	520
Togo	5.5	130	Mozambique	12.1	540
Kenya	2.8	130	Tanzania	11.6	570
Chad	3.4	140	Guinea-Bissau	17.8	590
Niger	1.8	150	Rwanda	5.5	610
Sudan	0.0	150	Mali	16.1	660
Botswana	2.7	150	Burkina Faso	22.1	670

Source: 2015 data, WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

Van der Ploeg (2011) notes that many countries, including Bolivia, Columbia, South Africa, and countries in the Organization of the Petroleum Exporting Countries, all exhibited poor growth associated with the commodity boom. Indeed, Botswana, a country often touted as a poster child of the developing world in terms of managing natural resources, is suffering from high structural unemployment, high income inequality (a Gini coefficient over 0.60), and a high poverty rate (19 percent) (IMF 2014a). Moreover, driven by the decline in total factor productivity growth, trend growth has slowed amid a persistently high rate of structural unemployment. The skill mismatch in the labor market remains a perennial challenge despite significant resources invested by the government in education (IMF 2014a).

Gylfason (2001) notes that, of the 65 resource-rich developing countries, only four managed to achieve long-term investment exceeding 25 percent of GDP and an average GDP growth exceeding 4 percent, namely, Botswana, Indonesia, Malaysia, and Thailand. The three resource-rich Asian countries have achieved this through economic diversification and industrialization. Still, they have not fared as well as their neighbors, Hong Kong, Korea, and Singapore, which have little raw material wealth.

Gilfason points out four channels through which an abundance of natural resources can transmit to poor economic growth:

- Resource effects caused by the Dutch Disease: oil revenues drive up domestic prices and real wages, making the agricultural and industrial sectors uncompetitive in the world (Corden 1984).
- Rent seeking: unlike other sources of government revenues, rent from the oil sector is prone to rent-seeking behaviors, leading to corruption.
- A false sense of security from resource abundance creates neglect toward policy development.
- Negligence affects human resource development.

Most countries at the bottom of the economic ladder start out highly dependent on natural capital (World Bank 2011). As they move up the economic rungs, they use these assets to build more wealth, especially in the form of produced and intangible capital. Transforming natural capital into other forms of wealth is the path to sustainable development. Higher-income countries also have higher per capita natural capital—about six times that of low-income countries. The potential for raising low-income countries' per capita natural capital lies in the discovery of subsoil assets and in better management of all types of natural capital.

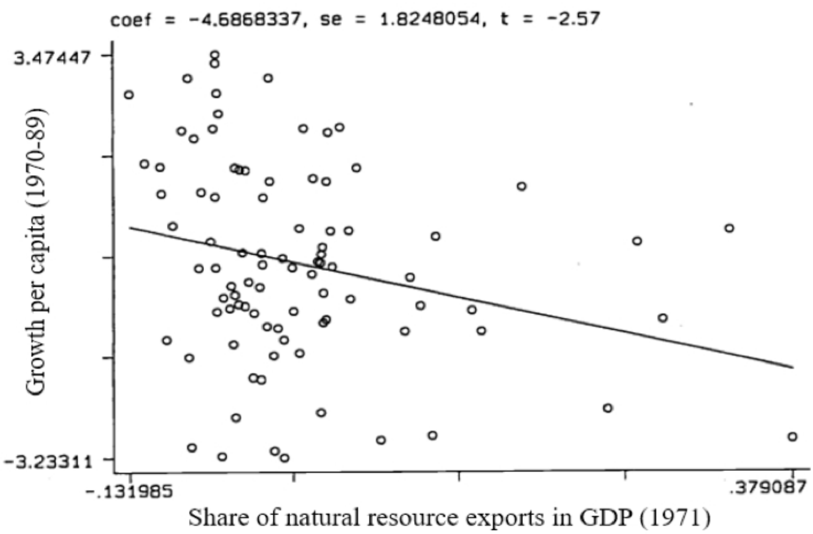
What are today's policy options available to a poor country that happens to have abundant resources? What are the possible policy differences between a poor country endowed with natural resources and one that is not? What do the theory and practice tell us and why is it that poor countries remain resource dependent after so many decades of development? These are the questions the chapter will attempt to shed lights on.

Resource dependency is defined in terms of natural resource rents, a concept used by the World Bank (for example, World Bank 2011), or by primary exports, following Sachs and Warner (1995). To keep these two concepts compatible, this chapter will solely focus on energy and mineral resources, and not include forestry and land. Because these nonrenewable resources are also considered point-source rather than diffused, this distinction will facilitate the discussion on the political economy later on.

While the effects of natural resources on an economy were long recognized by Seers (1964), Furtado (1957), and John Stuart Mills in his Principles of Political Economy (1848) where he addressed the adverse effects of natural resources on labor supply and institutional quality (cited by Boianovsky 2013), it was not until the 1980s that these effects were fully discussed (Corden and Neary 1982; Gelb 1988; van Wijnbergen 1984). The resource curse was described by Auty in 1994, and, a short time later, Sachs and Warner (1995) presented their breakthrough econometric analysis of the negative relationship between resource dependence and economic growth. Controlling for a number of factors such as geography, climate, government efficiency, economic growth, per capita income, trade policy, and investment rates, the authors systematically analyze evidence that resource-abundant countries fall short in the realm of export led growth when compared with resource-poor economies (Sachs and Warner 1995).

Sachs and Warner's classic study finds that, after controlling for initial income per capita, investments in physical and human capital, trade openness, and rule of law, natural resource dependence (measured by the ratio of natural resource exports to GDP) has a strong and significant negative effect on the growth of GDP per capita (Figure 4.2). Reestimation using institutional quality rather than rule of law confirms the presence of a resource curse. These results suggest that, all else corresponding, an increase in the ratio of resource exports to GDP of 10 percentage points depresses average growth in GDP per capita from 0.77 percent to 1.10 percent a year.

Figure 4.2. Growth per Capita vs Natural Resource Abundance



Source: Sachs and Warner 1995.

Over the past decade, dozens of studies have reiterated and expanded upon the surprising economic feature of abundant natural resources and slow economic growth.

Authors sought not only to econometrically verify the trend, but also explain its cause. Theories have been developed for decades including the rate of resource extraction given by Hotelling's rule, resources management to keep welfare constant by Hartwick's rule, and also the various effects of natural resources on the national economies (Barbier 2007; Corden 1984; Matsuyama 1992; van Wijnbergen 1984).

Most studies in the late 1990s and the early 2000s confirmed the pioneer work done by Sachs and Warner (1995, 1997, 2001), which shows a negative relationship between resource dependence and growth. Auty (2001) explains this oddity in terms of the political capture of rent, while Gylfason (2001) points to low investment in human resources, among other factors. Hausmann and Rigobón (2003) find that resource-rich countries are affected by economic shocks, while Collier and Hoeffler (2005) find that resource-rich countries are vulnerable to armed conflicts.

Boschini, Pettersson, and Roine (2007) and Mehlum, Moene, and Torvik (2006) offer empirical support for the hypothesis that countries with good institutions receive a modest growth effect from resource dependence, while those with bad institutions are adversely affected. Increasing the ratio of natural resource exports to GDP by 10 percentage points increases average growth by a mere 0.1 percent per annum in countries with good institutions (a weighted index of various indicators measured on a scale from zero to one) but decreases annual growth by 1.43 percent in countries with bad institutions. The effects of oil curse is not symmetrical across countries with varying quality of institutions.

Since the mid-2000s, a number of studies appear to run counter to previous beliefs on the resource curse. Many have isolated certain conditions and attempted to provide evidence that natural resources have a nonnegative effect on growth (Alexeev and Conrad 2009; Boschini, Pettersson, and Roine 2013; Ebeke and Ngouana 2015; James 2015; Lederman and Maloney 2007, Mehlum, Moene, and Torvik 2006; Stijns 2005, 2006; Torvik 2009; Williams 2011). For instance, Mehlum, Moene, and Torvik (2006) describe a discrepancy in quality of institution and impact of resource curse. A stronger government with monetary support and political stability is able to mitigate negative economic effects more easily. In particular, Lederman and Maloney (2008) argued that Sachs and Warner's use of natural resource indicator (exports as a share of GDP) does not capture a country's factor endowments. When they replicate Sachs and Warner results using a net measure of resource exports, the negative impact of natural resources on growth disappears. James (2015) went so far as to label the resource curse a statistical mirage. He reasoned that the resource curse phenomenon can be explained by the average sector growth heterogeneity of resource-abundant countries (James 2015). But this conclusion has been long discussed: commodity price volatility contributes to the negative impact of the resource curse.

Lederman and Maloney (2007) reject the resource curse claim because, they argue, resource abundance is neither a curse nor a blessing for a country. For them, the resource curse is a myth, much like Dracula. They list the transmission channels of the curse before proceeding to dismiss them, as follows: (1) the prices for natural resources tend to decline relative to the prices of manufactures; (2) the availability of natural resources tend to lead to lower human and physical capital accumulation and lower productivity; (3) they lead to large price volatility; and (4) they lead to institutional weaknesses. Lederman and Maloney dismiss the first channel on the basis that commodity prices follow random shocks and that future demand in emerging economies such as China and India will keep the prices high. On the second, they argue that a previous study found that productivity is greater in agriculture than in manufacturing (ignoring the fact that agriculture and exhaustible natural resources are not the same) and that it was the complementary policies dealing with human resources and so on that were deficient. On the third point, they argue that natural resources are no different than manufactures or services. On the last point, they claim that natural resources are no different than foreign aid or natural monopolies such as telecommunications.

Lederman and Maloney's counterpoints are not valid for a number of reasons. First, there is nothing in their arguments that denies that natural resources, as a rule, cause more adverse effects on economic management of an economy than services or manufacturing. For a low-income country with all the attendant development issues, this stretches the administrative capacity to the limit. Second, the confusion between agriculture and nonrenewable natural resources weakens the argument. Third, the two countries they cited as successful cases, Botswana and Chile, are more an exception among the developing countries blessed with natural resources. Advanced countries such as the Netherland, Norway, and the United Kingdom were already developed when oil and natural gas were discovered. Countries such as Australia and the United States developed on the back of natural resources thanks to their ability to channel natural resource abundance into first domestic industries, then domestic technologies, and subsequently human capital (Wright 1990). Finally, the long term (but finite) nature of natural resources makes their perception by policy makers and citizens different from other short-term sources such as foreign aid.

A more comprehensive review of this body of research has been documented by Frankel (2010) and van der Ploeg (2011). In all, the literature deeply analyzes the presence and ubiquity of the resource curse, but it falls short when discussing pragmatic policy options. Later in this chapter, we will lay out these policies and suggest an alternate set of solutions to not only mitigate the negative impacts of the resource curse but also to replace this ephemeral source of income with a sustained revenue stream.

This chapter seeks to make three contributions to this body of knowledge. First, we will focus the discussion on the policy options available to the low-income countries where capacity is weak to see if the theories developed so far have offered any concrete guidance for policy makers on a feasible course of actions. Second, the chapter will stress the role of economic growth and job creation in poor countries abundant in natural resources. This growth and employment aspect can offer a key link to why natural resources often do not lead to higher prosperity for poor countries. The sector that offers the most exports and revenues employs few workers, even at high wages. Third, we discuss a viable policy option aimed at directly addressing negative aspects of resource abundance. The specific case of South Sudan is used to illustrate the gap between theory and practice. Before concluding we discuss the case of new emerging resources and the steps needed to prepare for expected future windfalls.

Growth & Structural Transformation In A Natural Resource–Based Economy

This section analyzes the pattern of structural transformation in Nigeria in 1990–2010. Although Nigeria is an extreme case of natural resources based economy, with oil exports and income amount to over 90 percent of exports and GDP, this analysis is helpful to understand why it is difficult to achieve any degree of structural transformation. The methodology is that described by McMillan and Rodrik (2011) and Timmer, de Vries, and de Vries (2014) to measure the contribution of employment reallocation to productivity growth.

Table 4.2 shows the sector productivity per worker of Nigeria over five decades, expressed in thousands at 2005 domestic prices. As in other developing countries, there is large variation in productivity per worker across sectors. Even if highly capital-intensive sectors such as mining are excluded, the ratio of the productivity of a sector such as construction to the productivity of social services (the lowest productivity sector) would have exceeded a factor of 7 in 2010. In a way, this is good news because, even if sectoral productivity remains the same, Nigeria can achieve much higher and more sustainable growth by shifting activities from low-productivity to higher-productivity sectors. McMillan, Rodrik, and Verduzco-Gallo (2014) note that this feature seems to exist only in developing countries because there are less pronounced differentials in productivity across sectors in developed economies.

Table 4.2. Productivity per Worker, Nigeria, 1960–2010

	Thousands of local currency at 2005 prices						Annual employment growth	
Year	**1960**	**1970**	**1980**	**1990**	**2000**	**2010**	**1960-1990**	**1990-2010**
Agriculture	102.8	108.4	96.0	116.2	100.7	216.5	-0.17%	3.53%
Mining	3103.6	64908.8	30433.2	35925.7	164401.4	44710.5	8.18%	1.47%
Manufacturing	47.5	47.6	136.8	213.0	226.2	295.6	1.26%	2.18%
Utilities	40.6	74.1	52.6	69.3	105.0	222.5	9.22%	-0.55%
Construction	156.9	350.9	285.2	328.9	587.4	468.4	3.48%	4.43%
Trade, restaurants and hotels	131.3	136.3	116.2	107.2	143.9	415.5	5.11%	-0.07%
Transport, storage and communication	66.1	82.7	57.0	46.9	75.5	231.3	5.59%	2.41%
Finance, insurance, real estate and business services	134.8	298.5	488.0	603.2	576.6	282.8	6.51%	9.59%
Government services	74.9	21.5	39.9	48.1	66.9	91.1	9.16%	0.68%
Community, social and personal services	53.4	16.6	12.1	15.3	33.8	68.4	9.01%	3.47%
Total	111.7	196.4	256.9	250.9	230.0	348.6	2.00%	2.58%

Source: Author's calculations based on 2014 data in GGDC (database), Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen, Groningen, the Netherlands. http://www.rug.nl/ggdc/.

Second, in the early 2010s, over 60 percent of the labor force was in agriculture, and the sector contributed about 37 percent of GDP. Policy measures to improve productivity in agriculture are therefore essential in achieving structural transformation in Nigeria, and they should cover two areas simultaneously: measures to improve productivity within agriculture, such as improvements in yields, input distribution, and so on, and measures to improve opportunities outside agriculture (at higher productivity) so that surplus labor can seek out these opportunities.

To illustrate the second point, Figure 3.3 shows what happens to Nigeria and other African countries if resources are shifted to mirror the structure in developed countries, while holding African sectoral productivity constant (see above). Thus, even if within-sector productivity does not improve, Nigeria can gain tremendously by creating opportunities outside agriculture so resources can be moved there.

Recall equation (1) in Chapter 2:

$$\Delta Y_t = \sum_{i=1,n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=1,n} y_{i,t} \Delta \theta_{i,t} \qquad (1)$$

Table 4.3 shows the breakdown of the productivity growth over 1990–2010 in the two components on the right-hand side of equation 1. The first component is the within part of productivity growth, which arises if there is capital deepening or new technology (high-variety yield, better inputs, and so on) adopted in each of the sectors of the economy. The second term captures the productivity effect of labor reallocations across sectors. If the changes in employment shares are positively correlated with productivity, this term will be positive, and structural change will increase economy-wide productivity growth.

Table 4.3. Within and Between Decomposition of Productivity Change, Nigeria, 1990–2010

	Within	**Between**
Agriculture	0.9%	0.4%
Mining	0.6%	-1.2%
Manufacturing	0.1%	0.0%
Utilities	0.0%	0.0%
Construction	0.0%	0.0%
Trade. restaurants and hotels	1.4%	-0.7%
Transport. storage and communication	0.1%	0.0%
Finance. insurance. real estate and business services	0.0%	0.1%
Government services	0.0%	0.0%
Community. social and personal services	0.1%	0.0%
Summation of sector GDP	3.1%	-1.4%
Growth in productivity 1990-2010	1.7%	
Within	3.1%	
Between	-1.4%	

Source: Author’s calculations.

Table 4.3 shows that, while economy-wide productivity increased by 1.7 percent a year over the 20-year period, this increase could have almost doubled (3.1 percent) if the structural transformation effect had not been negative (–1.4 percent).

To examine the pattern of structural transformation in detail, the structural transformation effect is decomposed into two components, termed the static reallocation effect and the dynamic reallocation effect by Timmer, de Vries, and de Vries (2014) (see Chapter 2, equation 2). The static effect measures the change in output brought about by the sectoral gain or loss in employment share, assuming there is no change in productivity over the period. It thus measures the pure effect of the movement of labor on productivity change. For the economy as a whole, this term is negative if there are more labor losses than labor gains across sectors. In general, in an economy that is growing, this term is positive because more jobs tends to be created; so, the gains would more than offset the losses. The dynamic effect measures the right or wrong direction of change. This term is positive if the economy is advancing along the path of structural transformation, that is, if resources are being moved from low-productivity to high-productivity sectors. It is negative if the reverse occurs, that is, if resources are being moved from high- to low-productivity sectors. The results are presented in Table 4.4.

Table 4.4. Within and Static Between Decomposition of the Annual Change in Productivity, Nigeria, 1990–2010

	Within Effect	**Between Static**	**Between Dynamic**
Agriculture	0.9%	0.2%	0.2%
Mining	0.6%	-1.0%	-0.2%
Manufacturing	0.1%	0.0%	0.0%
Utilities	0.0%	0.0%	0.0%
Construction	0.0%	0.0%	0.0%
Trade. restaurants and hotels	1.4%	-0.2%	-0.5%
Transport. storage and communication	0.1%	0.0%	0.0%
Finance. insurance. real estate and business services	0.0%	0.2%	-0.1%
Government services	0.0%	0.0%	0.0%
Community. social and personal services	0.1%	0.0%	0.0%
GDP	3.1%	-0.7%	-0.7%
Annual Growth in productivity 1990-2010	1.7%		
Within	3.1%		
Static Between	-0.7%		
Dynamic Between	-0.7%		

Source: Author’s calculations.

The detailed decomposition of the between effect shows that half of this negative effect was caused by the movement of labor, and half of it by movement in the wrong direction. In the extreme, if the labor force distribution has retained the same pattern over the years (that is, if the dynamic effect has been zero), the growth in productivity would have increased from 2.1 percent a year to 3 percent a year, a significant rise, which, given the compound growth power over a 20-year period, would have made a major difference in per capita income today.

To analyze the more recent pattern of structural transformation, the decomposition of total productivity is reviewed over a shorter period (two periods of 10 years instead of the 20 years in Tables 4.3 and 4.4). Table 4.5 shows the results. The growth of productivity was significantly higher in 2000–2010 than in 1990–2010. Reverse structural transformation continued in 2000–2010, caused by labor moving in the wrong direction. The dynamic between effect cut substantially into the growth that could have been generated. Thus, had it not been for this effect, overall growth would have been higher. This rise would have been compounded over time and would have exerted a great impact on economic growth and poverty reduction.

Table 4.5. Within, Static Between, and Dynamic Between Decomposition of the Change in Productivity, Nigeria, 1990–2000 and 2000-2010

Nigeria Decomposition of Productivity Change		**1990-2000**			**2000-2010**	
(In % of total annual productivity change)	**Within**	**Static Between**	**Dynamic Between**	**Within**	**Static Between**	**Dynamic Between**
Agriculture	-0.3%	0.7%	-0.1%	2.6%	-0.1%	-0.1%
Mining	20.8%	-4.7%	-17.0%	-3.1%	9.5%	-6.9%
Manufacturing	0.0%	-0.1%	0.0%	0.1%	0.1%	0.0%
Utilities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Construction	0.1%	-0.1%	0.0%	0.0%	0.2%	0.0%
Trade, restaurants and hotels	0.4%	-0.4%	-0.1%	1.8%	-0.1%	-0.2%
Transport, storage and communication	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Finance, insurance, real estate and business services	0.0%	0.0%	0.0%	-0.1%	0.4%	-0.2%
Government services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Community, social and personal services	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Summation of sector GDP	21.1%	-4.7%	-17.3%	1.7%	10.0%	-7.4%
Growth in productivity 1990-2000	-0.9%				4.2%	
Within	21.1%				1.7%	
Static Between	-4.7%				10.0%	
Dynamic Between	-17.3%				-7.4%	

Source: Author's calculations.

An abundance of natural resources could worsen the reverse structural trans formation because resources are being applied in low-productivity sectors such as government (see Annex 4A on South Sudan).

Economic Effects Of Natural Resources

The economic effects of natural resources on an economy are well known and are not controversial. On the microeconomics side, Hotelling's (1931) work gives guidance on the sustainable rate of resource extraction to maximize the owner's welfare. With no extraction costs and constant elasticity of demand for resources, the Hotelling rule states that the capital gain on resources must equal the world interest rate. This is based on the arbitrage principle, that is, one should be indifferent about keeping the resource under the ground (in which case the return is the capital gain on reserves) or extracting, selling, and obtaining a market return. The rate of increase in marginal resource rents should thus equal the world interest rate. Because marginal extraction costs differ widely across countries, optimal depletion rates vary widely as well even if each country is a price taker.

Corden (1984) has neatly analyzed the various effects of resources on the tradable and nontradable sectors. Natural resource wealth makes countries susceptible to the Dutch Disease, a term that originated from a crisis in the Netherlands in the 1960s that resulted from discoveries of vast natural gas deposits. In the broadest sense, the Dutch Disease refers to an appreciation of the real exchange rate that arises from a natural resource boom, leading to a contraction in the tradable sector, usually manufacturing (Corden 1984; Corden and Neary 1982).[30]

During a resource boom, the rise in revenues from mineral exports is drastic, and, consequently, the demand for domestically produced, nontraded goods and services will expand. This is known as the spending effect (Corden 1984). Because the government is likely to take a large share of the mineral revenues, public spending often rises substantially. However, deindustrialization occurs not only through the usual appreciation of the real exchange rate (as a result of higher relative prices among nontraded goods), but also because resources, such as skilled labor, capital, public spending, and so on, are drawn from both tradable and nontradable sectors to the mineral sector. This phenomenon, whereby growth in nonmineral sectors is depressed, has been dubbed the resource movement effect (Corden and Neary 1982). The movement of resources away from the nonmineral sector indicates that the mineral sector has a crowding out effect on these sectors through its economic dominance over domestic resources. The impact seems more pronounced in small economies where the size of the investment in (government) projects is large.

The increased demand for nontradable goods and services will push up prices,

30 The Dutch Disease can also result from any large increase in foreign currency, including foreign aid, FDI, or a substantial increase in natural resource prices.

resulting in higher input costs in the rest of the economy, particularly exporting sectors. Also, because technological progress is more rapid in the tradable sectors than in the nontradable sectors, poor economic performance logically follows. Because the mineral sector uses fewer input goods and requires few domestically produced goods, the profits and competitiveness of other sectors, such as manufacturing and agriculture, will suffer in the confrontation over imports. This weakens the competitiveness of the nonmineral sectors, leading to declining diversity in the economy. There will also be an influx of skilled labor to the mineral sector from the sectors exposed to international competition, which cannot afford to pay higher wages. Ultimately, the nonmineral export sector will contract; the public sector will expand excessively; and inflation will rise.

The shift away from manufacturing can be detrimental to growth. If natural resources become exhausted or commodity prices fall, competitive manufacturing industries may not be able to return to previous levels of productivity quickly enough. This is because technology grows at a much slower pace in the mineral sector and the nontradable sector than in the nonmineral tradable sector. Also, the country's comparative advantage in nonmineral tradable goods will decline, and this will prevent firms from investing in the tradable sector.

Impact On Revenue Volatility And Uncertainty

Natural resource wealth exposes countries to volatility because of the extremely volatile nature of international commodity prices. Resource-rich countries are more vulnerable to commodity price volatility and exchange rate volatility. Such volatility acts as a tax on investments in tradable goods production, mainly in agriculture and manufacturing, and mineral income dependency could affect growth adversely.

Most mineral-rich countries follow passive fiscal policies. In general, public expenditure in resource-rich countries is highly associated with current mineral revenue. Consequently, the share of public expenditure in nonmineral GDP is also highly volatile. Linking public expenditure to current mineral revenue would also create an opening for wasteful spending and low returns on public investment. Most investments during a commodity boom, following the rise in current revenue, are associated with projects that are most likely beyond a country's capacity to absorb in terms of maintaining the new projects if commodity prices drop. Furthermore, if commodity prices suddenly fall, downsizing public expenditure is often difficult and costly. At the same time, the need to reduce expenditure could be greater than the actual fall in mineral revenue triggered by the fall in commodity prices. This is because most resource-rich countries have a unique problem in access to capital markets: their need to borrow depends on commodity prices. If prices are high, the countries tend to borrow less, but their borrowing capacity is inversely related to their borrowing needs, as the value of their collateral (mineral wealth) depends on the prices. Therefore, the access to capital markets will be more difficult when it is most needed.

Volatility of this nature can be considered as a tax on investment because volatile relative prices depress long-term irreversible commitments to specific sectors (van Wijnbergen 1984). There is empirical evidence that relates low productivity growth with high volatility, particularly in countries with a relatively underdeveloped financial sector (Aghion and Banerjee 2005). The evidence suggests that a 50 percent rise in volatility slows productivity growth by 33 percent on average. There is also ample empirical evidence indicating that mineral-rich countries are more volatile than mineral-poor countries (Hausmann and Rigobón 2003). Volatility is therefore one of the key factors in the poor performance of some mineral-rich countries.

Commodity price fluctuations can also affect the real exchange rate. The main channel through which price volatility affects the real exchange rate is procyclical government spending on the nontradable sector. Loss of revenue is also another factor that affects the real exchange rate. The impact on the real exchange rate means policy makers must take other measures to compensate for the loss in revenue. Such measures include import tariffs and other distorting taxes, which adversely affect the rest of the economy and capital formation (Serven and Solimano 1993). Furthermore, failure to address the fiscal deficit when commodity prices are favorable would cause the budget to be susceptible to adverse price shocks. If prices drop, governments tend to undertake swift and disruptive fiscal measures.

When commodity prices slump, most resource-rich countries tend to borrow excessively to cover their fiscal expenses. While resource windfalls—unexpected income gains—provide net wealth, it also creates additional spending room. This will complicate macroeconomic management and lead to high dependency on mineral resource, which is highly unstable source of income. A sudden reduction in net windfall revenue may well be associated with borrowing capacity, as lenders may reckon that a large share of project returns will be devoted to debt servicing of previous debt. Manzano and Rigobón (2001) have shown the potential link between debt and poor economic growth in resource-rich countries. While the average external debt as a share of GDP in mineral-rich countries is about 94 percent, the corresponding figure for nonmineral economies is 61 percent.

Weak Governance

Resource wealth can undermine governance and create a vicious cycle. Natural resources generate rents that lead to greedy rent seeking, the voracity effect. A variety of interest groups seek to overexploit windfall gains to offload adjustment costs at least partially to the rest of the economy, while receiving the gains from lobbying efforts (Lane and Tornell 1995). Corruption and lack of transparency, accompanied by ongoing conflicts, are also typical in resource-rich countries, and the adverse manifestation is felt through political economy effects (Leite and Weidmann 1999; Mauro 1995). Mineral wealth gives rise to governments that are less accountable to the people, have little concern to improve institutional capacity, and fail to implement policies conducive to sustainable growth.

Corruption remains epidemic in most resource-rich countries. For instance, Angola and Nigeria, the two largest oil producers in Africa, rank as the 5th and 15th most corrupt countries in the world, while other resource-rich countries such as Botswana and Canada are ranked 76th and 97th (Kaufmann, Kraay, and Mastruzzi 2009). These countries received huge amounts of money from the sale of crude oil, while public institutions and infrastructure weakened. Resource-rich developing countries are among the countries that scored poorly on governance indicators. Indeed, almost all the 10 most corrupt countries are resource-rich countries, such as Equatorial Guinea (first), the Democratic Republic of Congo (third), Chad (fourth), and Papua New Guinea (fourth). Although bad governance might not be new to resource-rich developing countries, a number of studies have shown the strong correlation between mineral wealth and corruption in these countries.[31]

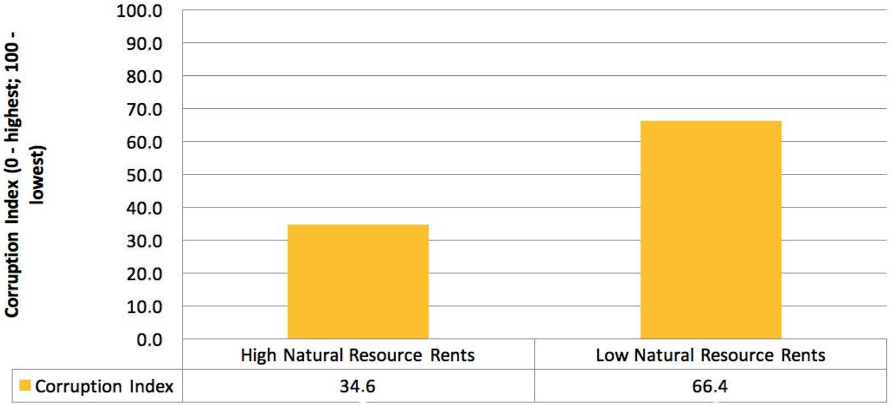
The corruption perceptions index is rated from high to low corruption (respectively, 0 to 100). The index was developed by Transparency International, an international nongovernmental group.[32] The average corruption perceptions index among countries with low natural resource rents is much better than the average corruption perceptions index of the countries with the highest natural resource rents among countries rated by Transparency International. (Average natural resource rents represented, respectively, 0.05 percent and 42.2 percent of GDP.)[33]

31 More recent studies provide a different approach in explaining Nigeria's poor economic performance among mineral-rich countries: the Nigerian Disease (Rosser 2006). Rosser argues that an abundance of natural resources leads to poorer governance and conflicts. Some of the outcomes associated with the Nigerian Disease are greater corruption, more rent-seeking activity, greater civil conflict, and a rapid decline in social capital.

32 See CPI (Corruption Perceptions Index) (database), Transparency International, London, http://www.transparency.org/research/cpi/overview.

33 2015 data, WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.

Figure 4.3. A Comparison of Corruption, Economies with High and Low Natural Resource Rents



Source: 2015 data, WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

Many of these countries have gone through continued political and governance turmoil, transferring large amounts of mineral wealth to undisclosed accounts. Sala-i-Martin and Subramanian (2013) assert that exchange rate policy appears to be determined by rent-seeking behavior of the authorities, and fiscal expenditures and relative price movements were more or less the results of mineral resources boom.

Politics And Natural Resources

The poor performance of resource-rich countries also can be attributed to two basic political features. First, rivalry to control the revenue tends to endanger extractive political states. Corrupt governments are more attracted to rent collection than wealth creation, since it satisfies their immediate economic and political gains at the expense of long term sustainable wealth creation that evades rent-seeking behavior (Auty 2001). Second, rent extraction is also used as a tool to solidify the ruling government's power. This incurs political trade-offs that are essential to please other interest groups and gain their support. Even if governments in resource-rich countries do have credible economic agenda, their political commitment accompanied with vulnerability of these economies to extraction and trade volatility will create disruption to the structure of the economy and quality of governance. This alone exposes these countries to sudden political changes associated with the trade-offs that the governments are obliged to

worldbank.org/products/wdi.

meet, leading to weak governance and abiding political competition, which in turn leads to conflicts. Many of resource-rich countries are among those with poor governance indicators, including freedom of the press, rule of law, property rights and restriction to civil liberties.

Failing Institutional Quality

Resource-rich countries with poor institutional capacity usually suffer from macroeconomic mismanagement and waste of resources. Many resource-rich countries do not have strong institutional capacity to manage natural wealth effectively and provide efficient investment incentives.[34] Lack of reliable policy and strong administrative structure make government institutions incapable of transforming resource wealth into economic development. This worsens public sector's inefficiency in managing the resource wealth, which in turn can lead to reckless and excessive spending. Such excessive expenditures, mainly spent on social services and infrastructure projects, create political pressures to maintain devoted recurrent expenditure (Bannon and Collier 2003). In addition, the high concentration of capital expenditure in the early stage of resource extraction projects, and ensuing revenue inflows to the government provides opportunity for corruption (Stevens 2003). Off budget accounts are typical tools that fuel such problems associated with resource wealth. Since such accounts are beyond the control of government auditors, they are more prone to corruption by elites. This affects the governing capacity of the administration and leads to social divisions and conflicts. Empirical studies have shown that rents from natural resources fuels civil conflicts by weakening the government's capacity and legitimacy or by financing rebels (Olsson and Fors 2004).

Policies Adopted Or Recommended To Manage Natural Resource Revenue

Traditional natural resource management policies can be grouped into four broad categories according to policy instruments, although the policies are typically interdependent and may contain common elements, making the distinction less clear-cut. Most policy recommendations focus on the macroeconomic effects, for example,

34 One cannot help but recall the words of Taylor and Rada (2006, 68):
"This line of thought seems to boil down to Blame the Victim. If Washington Consensus policies don't deliver favorable outcomes in some developing or transition country, the blame doesn't rest with the policies themselves, but with the country's own inadequate institutions."

how to deal with commodity price volatility through fiscal, monetary, and exchange rate policies, and less on structural or micro effects.

Fiscal Policy And Fiscal Institutions To Manage Natural Resource Revenue

Many natural resource-producing countries have found it difficult to smooth government expenditure and decouple it from the short-term volatility of natural resource revenues using standard budget processes. Against this background, a number of natural resource-rich countries have established special fiscal institutions aimed at enhancing fiscal management. Special fiscal institutions include sovereign wealth funds, fiscal rules, and fiscal responsibility legislation. A wide range of institutional mechanisms have been used to promote better fiscal management to tackle the impact of commodity price volatility on resource-rich countries. The majority of these institutions have failed to address the problem, while others have produced adverse effects.

Many resource-rich countries maintain commodity funds or sovereign wealth funds that are invested in global portfolios for future welfare (Box 4.1). The oldest and biggest commodity funds are in Kuwait and the United Arab Emirates, while, in recent years, China has created sovereign wealth funds. The establishment of such commodity funds does not guarantee that authorities will be free of corruption (Davis et al. 2001). Two standard recommendations are that the funds be transparent and be professionally managed, with clear rules and regulations that hinder politics from interfering with the objective of maximizing the financial well-being of the economy.[35] Other recommendations stress that spending should go through the regular budget so that funds do not become the private slush funds of politicians (Humphreys and Sandhu 2007).

35 The Norwegian Pension Fund is often cited as a good example.

Box 4.1. Petroleum Funds

Norway has a Special Petroleum Fund (SPF) that has a clear and specific rules and procedures, with publicly known stabilization and savings objectives. The SPF is professionally managed and it is fully integrated in the budget process. The fund has exceptional record of transparency and accountability. Venezuela has a similar stabilization fund, but since its establishment it faces serious difficulties in integrating in the budget process, and it is poorly managed and its rules and procedures have not been followed properly. Unlike Norway, its institutions are weak and the government is not fully supportive of the fund. Azerbaijan has an extrabudgetary savings fund. This fund is managed professionally, and it is accountable to the president and fairly transparent. Kazakhstan has also petroleum National Fund, but it is excessively controlled by the president and limited professionalism.

Rigid fund rules have sometimes been changed, bypassed, or suspended. In some extreme cases, funds have been eliminated altogether (for example, Chad and Ecuador) because of accumulation in arrears or cash management problems in the context of increased spending pressures. In Papua New Guinea's former Mineral Resource Stabilization Fund, which was established in 1974, relaxed operational rules and poor integration with budgets and fiscal policy led to large fiscal deficits and public debt. Rules on deposits and withdrawals were changed over time in the face of budgetary pressures. Moreover, the assets were used as collateral for new borrowing and to repay debt. The fund was closed in 2001.

The operational rules of sovereign wealth funds need to allow them to function effectively within an appropriate overall framework for economic management. Clear and stable rules need to allow for flexibility in operations. Flexibility would be harnessed if the fund's operational rules are linked explicitly and transparently with a broader fiscal policy framework, as with financing funds. All these requirements point to the great difficulty of using such funds in low-income countries. Moreover, there remains the most important question: what would happen in the country should the resources run out and how would the funds then help reach the desired goal.

Fiscal Rules

Since 2001, Chile follows a fiscal rule based on a medium term perspective instead of the current cash balance (OECD 2009). The rule targets a structural surplus at a specified level (such that certain public commitment such as pension fund can be kept). The surplus target is composed of a noncopper structural surplus and estimated long-term copper revenues which in turn, are based on a reference price. When actual copper prices are above the reference price, revenues are transferred to the copper fund and conversely. The reference price and the potential output used for the deficit rule are estimated by independent expert panels. Box 4.2 illustrates the usefulness of this approach.

Box 4.2. Fiscal Rules

In June 2008, the former President of Chile, Michele Bachelet, and her Finance Minister, Andres Velasco, had the lowest approval ratings of any President of Finance Minister, respectively, since the return of democracy. There were undoubtedly multiple reasons for this, but one was popular resentment that the two had resisted intense pressure to spend the soaring receipts from copper exports. A year later, in the summer of 2009, the pair had the highest approval ratings of any President and Finance Minister. Why the change? Not an improvement in overall economic circumstances: in the meantime the global recession had hit. Copper prices had fallen suddenly. But the government had increased spending sharply, using the assets that it had acquired during the copper boom, and thereby moderating the downturn. Saving for a rainy season made the officials heroes. Chile has achieved what few commodity producing developing countries have achieved: a truly countercyclical fiscal policy. Some credit should go to previous governments, who initiated an innovative fiscal institution.

Source: Excerpted from IMF 2005.

One of the main problems affecting resource-rich economies is that oil revenues tend to corrupt institutions and reduce long-term growth prospects. Based on this premise, the logical conclusion is to transform these countries into nonmineral economies. One way to do this is to prevent government officials from appropriating oil-resources directly. A number of policy measures have been suggested and tried to address this issue. Davis et al., (2003) and Sachs (2007) discuss the institutional arrangements and fiscal policy measures undertaken by resource-rich economies to cope with the commodity cycle.

- Distribution of the resource revenues automatically and instantaneously directly to the citizens of the country has been suggested to reduce corruption and accelerate savings and investment (Sala-i-Martin and Subramanian 2013). Although it might seem attractive, the option of per capita distribution of resource revenue hasn't been tried in developing countries. Certain proportion of resource revenue should be distributed among the citizens on a per capita basis, and this in turn help to decentralize decisions about the allocation of revenue between consumption and investment (Humphreys and Sandhu 2007). Per capita revenue distribution can improve income distribution, strengthen

> resource allocation efficiency, limits corruption and improve managing resource revenue volatility. The increase in household income leads to the increase in savings and investment which in turn spur long-run economic growth (Collier and Gunning 1999).

The per capita distribution option may also improve public expenditure efficiency because it creates a direct link between rents and public taxation that strengthens the scrutiny of public expenditure relative to government expenditure of export taxation. Government taxes can then follow the distribution. Tax revenue can be used to finance investment projects, reduce government debt, and transfer revenues to a fund. Citizens may not use their share of the resource revenue efficiently, but this scheme can help minimize wasted resources on corruption and rent seeking. This is because tax revenues are less vulnerable to mismanagement and corruption than natural resource revenue (Bräutigam 2008). Because citizenship is the basic eligibility criteria for receiving resource dividends, the scheme is open to leakage and fraud. The key issue here is perhaps practicality: how practical is the distribution of resource revenue dividends among citizens given the effort required to prevail over the resistance of vested interests. Imagining how this method could be accepted by the political elites of a poor developing country is difficult.

In resource-rich countries, mineral wealth and its role in economic growth remain vulnerable to institutional and management weaknesses and unsustainable practices. In many of these countries, the policy and legal framework for natural resource management is unclear and incomplete. Management agencies are under-resourced, and the data needed for effective planning and decision making are absent. Shortcomings in governance and accountability have led to overexploitation of resources and environmental pollution.

Strong, transparent institutions play a key role in fostering competition and the development of markets. Legal, administrative, and institutional obstacles weigh heavily on the private sector and tend to encourage rent seeking rather than entrepreneurship, thereby hampering competitiveness and dampening growth. Poor employment growth in resource-rich countries can arise from inadequate output growth or from a lack of pro–labor-intensive investment. In these countries, the sectors that produce the most output employ few workers, while government expenditure and policies often favor capital-intensive activities.

Institutions can fail in countries where politicians tend to ignore laws and spend the funds as they desire. When Chad received financial assistance from the World Bank, the agreement stipulated that the country would spend 72 percent of its oil revenue on poverty reduction and put aside 10 percent in a future generation's fund. If the government wished to spend some of the money, it was to be subject to oversight by an independent committee. However, once the money began flowing, the authorities reneged on the agreement. International institutions may therefore need to do more to ensure future agreements are respected. Humphreys and Sandhu (2007) recommend giving extra powers to a global clearing house or to a third-party bank in the country in which a natural resource fund is located to allow accounts to be frozen in the event of disputes, coups, or other problems.

Exchange Rate And Monetary Policies

During the commodity price boom, there will be an appreciation of the currency, and in such circumstances floating exchange rate help to moderate the adverse impact of high volume of capital inflows and overheating of the economy. A number of developing countries followed an intermediate exchange rate policy, such as managed floating exchange rate or target zone policies. The midpoint of the zone can be taken as a basket of major currencies, rather than a simple bilateral policy against the euro or the U.S. dollar.

Reserves accumulation by central banks is an option that allows resource-rich countries to save during commodity boom and dis-save in bust. However, if the objective is smooth spending over time, rather than stabilizing the exchange rate, holding foreign exchange reserves has some drawbacks. In the first place, the reserves which are typically put in the form of treasury bills do not yield high returns. Secondly, higher reserves can trigger monetary expansion and hence inflation.

A poor country can also reduce net private capital inflows during booms: If foreign exchange reserves are accruing to high levels, there are alternative ways to cut the surplus in the balance of payments and facilitate national savings. One way is to pay down government debt, particularly short-term debt. Another option is to avoid any restriction on domestic citizens to investing abroad. A third option is to impose controls on capital inflows, especially short-term inflows. However, the issue remains whether this is the best course of action to be self-sustained, once the resources are exhausted.

Similar to developing a sovereign wealth fund, sterilization policy involves bringing only a certain share of the revenues into the country at once, saving some of the revenues abroad in special funds, and bringing them in slowly. Sterilization is expected to reduce the spending effect. By bringing the revenue into the country slowly, the country can gain a stable revenue stream, instead of an unknown revenue stream year after year. Allocation of natural resource revenue can be improved by establishing a resource fund to sterilize the rent system and match domestic expenditure to absorptive capacity, thereby evading the impact of the Dutch Disease on the growth of labor-intensive nonmineral tradable sectors.

In general, resource revenue above a target resource commodity price is saved in the fund managed by the government's assigned institution such as the Central Bank that sterilizes them in offshore investments until the domestic economy can absorb them efficiently. When commodity prices fall the fund can be drawn down to ease adjustment by slowing public spending while addressing the potential impact of volatility in real exchange rate on competitive nonmineral sectors (Barnett and Ossowski 2002). This can also help strengthen the transparency of resource revenue flows and thus reduce rent seeking and corruption.

However, in developing countries it is usually difficult, at least politically, to save part of mineral revenues, as there is pressure to spend the mineral revenue right away to tackle poverty, while disregarding broader macroeconomic implications. One of Norway's successes in managing its resource revenue is usually associated with such a fund. On the other hand, in countries with weak institutional capacity and transparency and accountability are not guaranteed, such funds will be susceptible to corruption and waste (Davis 2001).

Despite their success in Norway, natural resource funds in general are not workable in countries with delicate institutional setup and rapacious rent-seeking interest groups. That is to say, sterilization policy is likely to fail in most cases. In a country such as South Sudan where in 2009, 51 percent of citizens were impoverished, it is difficult to justify pooling a sum of revenue in a fund instead of using it immediately to help the people.

Policies To Share Risks

A number of countries more advanced than the low-income countries discussed in this chapter create institutions focused on absorbing the shocks and limiting adverse impacts from volatility. For instance they set up price setting mechanism (through contractual agreement) between energy producers and foreign companies. Most often when the world price swings up, the government desires to break the agreement, preventing the company from taking all the profits. In such circumstances political pressure is inevitable. As this became a common practice, foreign companies were more reluctant to get involved. This affects the potential capital inflows to the country and possibly increases the price of the capital. Since this may lead to further renegotiation, there will be additional transaction costs incurred while exports are temporarily interrupted. Even if this has become frequent episode, particularly in developing countries, most of ongoing contracts still fail to address this problem.

Another way to share risks is through hedging in commodity futures market. Mineral producers commonly sell their commodities on international spot markets, and this makes them susceptible to price volatility risk. Generally, such risks can be hedged by selling the products on the future market. By hedging the risk, the producer does not need to renegotiate the contract in the event of high price swing in the international market. In that case, the adjustment takes place automatically.[36] One major setback with this method is that in the event when the world price falls, the hedging party may get some credit, but will be unfairly rebuked when the world price goes up. Such treatment will be more severe if it is the government authority doing the hedging.

Hedging is a technique used to reduce risk. But, in resource-abundant economies, implementing financial techniques is associated with additional risks because of corrupt government officials. By pooling money to purchase financial instruments, the risk of embezzlement and losses of productivity increase.

Indexing the mineral producing company or government's debt to the price of the commodity is another method suggested to share risks associated with prices volatility. This allows debt servicing to be automatically adjusted with the rise and fall of commodity price. Accordingly, this would insulate indebted developing countries from the kind of crises that occurred in Latin America in 1982 when prices for their exports plummeted because of U.S. dollar interest rates. Developing countries experienced deteriorated debt service ratios and dire balance of payment. Indexing their debt to commodity prices would protect such adverse consequences. However, given that financial markets require certain level of liquidity, policy makers in developing countries are reluctant from undertaking this option believing that there would be no adequate demand from the market.

The Permanent Income Approach

The survey on the Dutch Disease makes clear that resource-rich developing countries should save instead of consume these nonrenewable resources so that these they are depleted, the country can embark on a sustainable growth path (van der Ploeg and Venables 2011). Since natural resources are exhaustible and belong to both present and future generations, it is only fair to spread the benefits from the natural resource wealth across generations. This also helps the government to smooth out expenditure volatility arising from fluctuations in resource revenues.

The permanent income approach is an attempt to even out the fluctuations in savings and aims to address three issues simultaneously: (1) the maintenance of intergenerational equity between the current generation and future generations facing

36 Mexico has bought a US$1 billion insurance policy against a drop in world oil prices (Financial Times, December 9, 2009).

resource exhaustion; (2) the reduction of volatility in export receipts and in spending and, through the reduction, soften the impact on real and financial markets (see above); and (3) the reduction of the adverse effects of the Dutch Disease. In contrast, the first and third approaches discussed above only address the second issue, while the second approach (exchange rate and monetary policies) deals only with the third issue. Specifically, van Wijnbergen (2008) proposes to calculate the discounted value of the expected oil revenue stream and then compute the level of real income equivalent to that discounted value. The policy rule is then to limit the real spending from oil to that fictitious real income level. However, he stopped short of recommending what to spend the money on.

With some exception in recent years, the conventional view of the resource curse has focused on volatility aspects, which are more relevant to advanced economies (for example, see Collier et al. 2010). For low-income economies that are starting out in the development process, these theories neglected two important economic aspects: how to replace natural resources when they run out, and employment creation so that the economy's full potential can be achieved.

A Critique Of The Adopted Or Recommended Policies For Low-Income Countries

In a review of the Dutch Disease, Kojo (2014) notes that most reports offer a partial solution, focusing narrowly on fiscal measures, such as prudent fiscal management, countercyclical fiscal policies, or a rule-based strategy to prevent real appreciation or avoid the Dutch Disease. Others recommend stand-alone policy actions, such as the accumulation of international reserves to avoid nominal appreciation of the local currency, or sterilization of balance of payments surpluses to mitigate upward pressures on the real exchange rate.

But even the best practice policy package, as discussed above, misses a number of the fundamental issues in low-income nations. First, what happens to the sources of growth if the natural resources run out? Second, employment creation has not been considered a societal objective. Without job creation, the learning-by-doing factor needed for growth will have been lost (Lucas 1988). Third, the one-size-fits-all approach has been adopted, with no distinction between rich and poor countries.

Specifically, the existing policy framework to manage natural resources for low-income countries suffers from the following weaknesses:

Realism

While saving for the rainy day is a noble objective, it is not a realistic option if the country is confronted with pervasive poverty. Sending this money to where the highest return is also not a viable option. With the exception of a few countries, most low-income countries are ruled by dictators or undemocratically elected leaders. It is their vested interest to hold on to these windfalls rather than directly distribute to the population or to send them abroad for the country's future. The issue of governance and political institutions may lie at the root of the natural resource problem but is not likely to go away soon. Collier et al. (2010) show that even the permanent income approach is theoretically incorrect.

The One-Size-Fits-All Approach

There is no distinction between high-income countries in which the stock of physical and human capital is high, institutions are efficient, and access to information is widespread and low-income countries in which physical and human capital are scarce, institutions are undeveloped, and information access is limited. In the context of low-income countries, this results in unrealistic or impractical policy advice (for example, sovereign wealth funds in an environment where poverty is prevalent).

But is it really different to have natural resources when you are poor than when you are rich? Did countries such as Australia and the United States not build their industry on natural resources? First, as pointed out by scholars such as Wright (1990), while it is true that countries such as Australia and the United States developed in concomitant with natural resources, they relied on the domestic development of technology and knowledge to exploit these resources. This is different from the current situation. Poor countries are now importing the technology and human resources for the entire sector. This technology and knowledge could lead countries to develop because they foster the emergence of ancillary industries (thus, the technology associated with mining and processing iron ore leads to steel development). The U.S. experience suggests that economic growth can be complemented by technical progress in exploration, extraction and substitution, and the privatization of reserves. Many resource-rich economies may have performed badly not because they relied too much on resources, but because they failed in developing their mineral potential through appropriate policies. Investment in minerals-related knowledge seems a legitimate component of a forward-looking development program. This opportunity is no longer available to poor developing countries today.

Second, countries such as the Netherlands, Norway, and the United Kingdom that effectively absorbed the negative effects of the Dutch Disease were actually already developed before natural resources were discovered so that they could marshal the entire economy, including well-established institutions, to make full use of the resources.

Third, a few countries, such as Botswana, Chile, and Indonesia, that managed to escape the Dutch Disease have all possessed an open regime and highly efficient public administration and active public sector involvement.

Fourth, the recommended policies take no account of the poor financial, human, and institutional resources prevailing in low-income countries. If most economic and financial decisions are made by a few civil servants who are under the control of a few undemocratically elevated rulers, to believe these resources can be managed according to any of the tools outlined above may be wishful thinking.

Overriding Objective Of Natural Resources Use

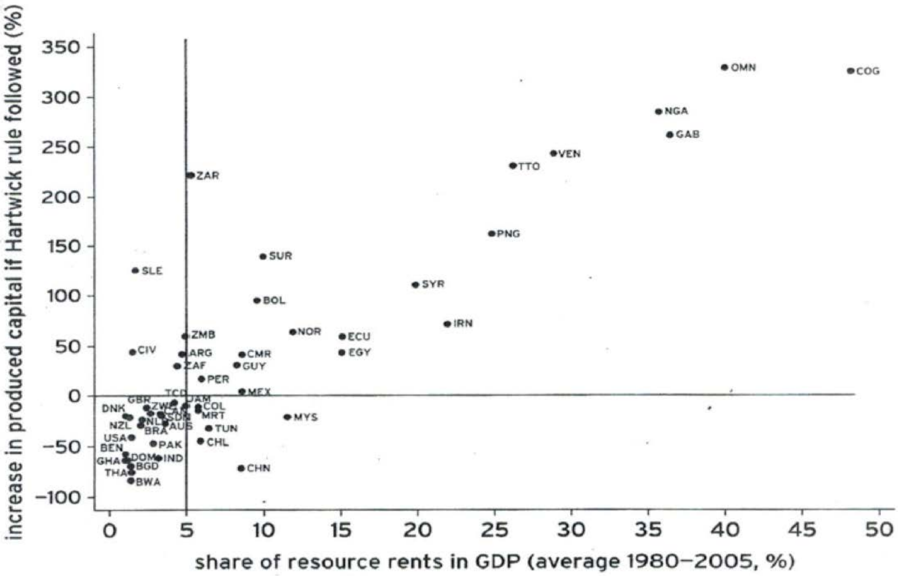
Most of the recommended or adopted policies tend to ignore the priority objective. Because the lifetime of the resources is finite, it is imperative to plan ahead for the time when the resources are exhausted. The priority objective should therefore be to use the proceeds from these resources to replace them when they run out. In many ways, a nation with natural resources is similar to a lucky person who has won a lottery that pays a large sum of money for a few years. The real issue is how she manages her finances during these years so that she remains well off when she stops receiving the winning proceeds. A nation must plan even further ahead, so the importance of this question is paramount.

More importantly, the recommended or adopted policies do not follow the Hartwick rule, perhaps the most important advice on how to utilize proceeds from natural resources. Hartwick (1977) show that if these proceeds are invested in reproducible capital, per capita consumption will remain constant across generations hence achieving intergenerational equity as defined by Solow (1974).

As a consequence of this missing link, resource-abundant countries, particularly the low-income ones, are falling far behind other nations in reproducible capital. The World Bank (2011) has estimated a counterfactual accumulation of capital stock if these countries had invested these resource rents in reproducible capital beginning in 1980 and compared this stock with the actual stock in 2005. The results are striking. Figure 4.4 plots, on the horizontal axis, the countries in which rents accounted for more than 1 percent of GDP (on average over 1980–2005), while the vertical axis shows the increase in produced capital if the Hartwick rule had been followed. Countries above the zero line are those that have underinvested. Sub-Saharan African countries are above the line. Indeed, the World Bank notes that all countries in which rents accounted for more than

15 percent of GDP (average 1980–2005) underinvested. It is worth noting that Norway, which is often cited as an example of how to manage oil resources and the rents of which accounted for about 13 percent of GDP, also substantially underinvested under this rule.

Figure 4.4. Resource Abundance and Capital Accumulation: Where Has the Hartwick Rule Been Applied?

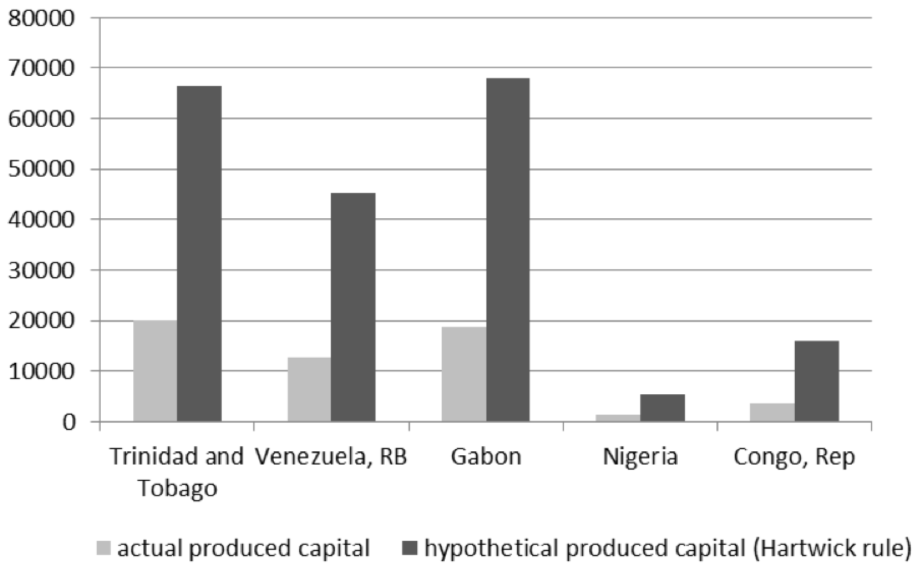


Source: World Bank 2011.

Note: Resource abundance is indicated by the share of resource rents in GDP. Capital accumulation shows the increase in produced capital a country could have achieved if it had reinvested all the rents. See World Bank (2006) for an explanation of the approach.

Figure 4.5 shows the results of the Hartwick rule counterfactual for five resource-rich countries. In 2005, the Republic of Congo had accumulated US$3,741 per capita in manufactured capital. If it had followed the Hartwick rule and reinvested all the resource rents from oil and gas, it would have accumulated more than five times as much manufactured capital: US$16,088 per capita. Similarly, if rents in the other four resource-rich countries shown in the figure had been reinvested, they would have reached a much higher level of per capita income.

Figure 4.5. Produced Capital per Capita, Actual and Hypothetical, Five Resource-Rich Countries, 2005



Source: World Bank 2011.

Note: Actual capital is the amount the country accumulated in 2005. Hypothetical produced capital is the amount the country could have accumulated if it had followed the Hartwick rule and reinvested all resource rents since 1980.

Along the same line, van der Ploeg and Venables (2011) argue that the permanent income hypothesis is not applicable to poor developing countries where capital is scarce. Instead they advocate for investment in domestic capital except when absorption capacity is an issue in which case money from natural resources can be parked in foreign fund, while waiting for the absorptive constraint to be relaxed. They also argue that the effects of the Dutch Disease can be reduced if there is unemployment in the economy so that the greater spending associated with the Dutch Disease actually draws unemployed resources into the traded sectors.

In a comprehensive review of managing natural resources in developing countries, Collier et al. (2010) call for a modification of the permanent income hypothesis, which, for them, is not only unduly restrictive, but is also wrong on theoretical grounds. While they recognize that consumption in natural resource–abundant countries should be smoothed out, the key issue is how to use resource revenue for faster growth. And this, they stress, can be done through raising the marginal product of capital, both private and public. Public capital efficiency can be enhanced through improved procedures, while private capital can be improved with the provision of public investment.

Hamilton and Ley (2013) recommend the strengthening of the public investment management system along the lines suggested by Rajaram et al. (2010), that is, to establish the must-have features of a well-functioning public investment management system such as investment guidance and preliminary screening, formal project appraisal, independent reviews of appraisals, project selection and budgeting, project changes, service delivery, and ex post project evaluation. Sachs (2007) also suggests that the effects of the Dutch Disease can be reduced if the resource boom is used to finance investment so developing public infrastructure can offset the adverse effects of exchange rate appreciation.

While the Collier et al. (2010) article represents a breakthrough in terms of policy prescription for resource-rich low-income countries, it stops short of giving them more concrete advice on what to do, other than calling for linking natural resource revenues to a clear vision of long-term development . In practice, to be useful as a guide for the developing countries, the modified permanent income approach as presented by Collier et al. needs to be accompanied by a development strategy rather than a vague reference to investment in productive sectors. Indeed, as shown in the next section and in the case study on South Sudan (Annex 4A), this chapter deepens their analysis through the presentation of a long-term development strategy for these countries. Furthermore, their approach does not address a major issue facing these countries: the high level of unemployment or underemployment. A special characteristic of poor, resource-rich developing countries is that the sector that brings the wealth also employs few people.

Job Creation

Seers (1964) was one of the first economists who understood the connection between natural resources and job creation. He noted the peculiar characteristic of a (poor) petroleum exporting economy: high unemployment coexists with high wages. In such an economy, petroleum usually dominates both exports and government revenues. Moreover, petroleum companies are foreign owned, as technology is beyond the reach of local industries, while in the private sector, wages are the determining factor price. In such economies, Seers contended, factors that will influence employment are taxes on exports and the public sector surplus, the enterprise profitability, and the propensity to imports. Seers recommends to use this surplus to create import substitutions industries right from the beginning and not immediately open imports.

In the Seers model, foreign-owned enterprises operating in natural resources can afford to pay high wages in part because wages represent a small share of their total cost and in part because wages are a tax-deductible expense. The perpetual impact arises from the fact that the increase in wages in the petroleum sector spreads to other sectors and applies to existing workers rather than new workers. Hence, a petroleum economy has minimum effects on new employment. Imports become cheap, and this sustains the propensity to import. Urban migration means disguised unemployment becomes open. This increases further the propensity to import. Income inequality becomes worse, and the pattern of consumption shifts in favor of the upper-income classes so that food imports intensify. In other countries, this would prompt policy makers to undertake drastic balance of payments measures such as import controls, tariffs, and so on, but, because of the comfortable balance of payments position, these petroleum economies do not impose these measures.

There are several reasons why it is important to address the unemployment and underemployment aspects of resource-rich low-income countries. First, from a political economy perspective, policy makers can create a self-interest group with which they can forge an alliance. Second, tax revenue rather than natural resource revenues can be a source of stable, less risky revenue. Third, this approach involves raising consumption among the current generation, but through work rather than through direct government transfers. Job creation fosters the learning-by-doing aspect of human capital development once natural resources become exhausted (Lucas 1988).

Why the focus on job creation, in addition to a growth-oriented strategy? Does a high-growth economy not generate jobs? Economists generally agree that growth is a necessary, but not sufficient condition for job creation. Economic development ultimately involves structural transformation, that is, a reallocation of resources from less productive to more productive sectors and activities. Both the Growth Commission Report and World Development Report 2013 stress that diversification and structural transformation represent an essential part of the process of catching up (Commission on Growth and Development 2008; World Bank 2012). A recent report of the International Monetary Fund (IMF 2013, 5) states as follows:

"The consensus among economists is that growth is an essential prerequisite (but not always sufficient) for job creation and social cohesion. In turn, jobs and increased labor force participation, including among women, are important to foster inclusive growth and reduce poverty and income inequality; and social cohesion and job creation can lead to more sustained growth."

The impact of growth on job creation is particularly weak in developing countries, judging from the empirical evidence. Basnett and Sen (2013, 9) reported insufficient evidence to draw conclusion on the impact of growth on employment in less developed countries and found "unequivocally that complementary policies are necessary to ensure economic growth has a positive impact on employment in LDCs [less developed countries]."

As noted in Chapter 2, while conventional economics recognizes the importance of work, it views work and leisure as complements. A person therefore only works to earn money and maximizes utility by minimizing work and maximizing leisure. However, the reality is that a job is much more than a means to earn income; it can be associated with social status, self-respect, and dignity among individuals and families. From the perspective of the individual, having work is better than being given a handout whether from a government or a charity.

Chapter 7 presents a practical approach for resource-rich low-income countries that takes into account the Hartwick rule and the unemployment aspect that Seers discussed. This approach is embedded in a proposed development strategy and represents a departure from the traditional, neoclassical approach. It is consistent with the modified permanent income approach proposed by Collier et al. (2010)

Conclusion

The literature on resource dependency in the last three decades is long on theoretical and empirical effects of natural resources on the economy, but short on practical policy prescriptions to deal with these effects. The recommended policies normally range from adjusting fiscal policy to deal with commodity volatility, adapting monetary policy to reduce the external shocks, and keeping the real exchange rate competitive. This chapter makes the argument that these policies are targeted toward the symptoms of natural resource dependency, and not the underlying cause of concern about this dependency, which is, how to replace these resources when they are gone. This point is all the more important considering that the poorest, resource dependent countries have negative genuine savings rate, that is, they are living off their natural resource assets (World Bank 2006). Traditional policies also miss another important feature of resource-rich countries: the need to create jobs because the sector that generates wealth does not employ many workers.

The conventional approach of leaving everything to market forces could lead a country to a vicious circle where the resource curse drags down economic growth leading to further dependency on natural resources. This chapter recommends that poor countries endowed with natural resources focus on structural and microeconomic policies aimed at boosting the competitiveness of the tradable sectors, including manufacturing and services. These policies should complement the building up of human resources over time and would have a long-lasting impact on economic development. More specifically, the approach calls for a diversification strategy focusing on job creation and leading to a learning-by-doing environment that would foster industries and services able to replace natural resources when these become exhausted.

Using the specific example of South Sudan, the chapter examines the conditions in poor developing countries such as political instability, limited financial and physical infrastructure, low human resources, and failing institutions. It discusses how these conditions limit policy options. The policy problem for these countries is particularly serious because in addition to the usual problem of dealing with growth and development issues typical of all developing countries, they have to deal with compounded issues caused by natural resource dependence. Because the resources available from natural resources are dwarfed by competing development needs, priorities have to be determined and trade-offs made. As expected, the additional (or intersectional) list of problems arising from natural resources is overwhelming, far beyond the capacity of any omnipotent government, let alone that of the least developed countries.

Annex 4A. Case Study on South Sudan[37]

- **Overview**

The case of South Sudan can typically illustrate the policy issues discussed above. South Sudan was established in 2011, following a long conflict with Sudan lasting over three decades. With a population of 11.3 million people and a per capita income of US$950 in 2013 (World Bank 2015), South Sudan is classified as a lower-middle-income country. However, this income level was artificially inflated by oil income: South Sudan poverty remains high, and its institutions are nascent. Over 80 percent of GDP and over 99 percent of exports are derived from oil. The country is landlocked in the midst of six other countries, including two fragile states (Democratic Republic of Congo and Central African Republic). Thus, transport costs are high and can only be reduced in the medium and long term. A ton of beans, for example, costs 60 percent more in Juba than in Kampala; transport and logistics contribute 40 percent of the difference (World Bank 2014b).

Social Indicators

Compared with social indicators in sub-Saharan Africa, social indicators in South Sudan are much worse (Table 4A.1), despite an abundance of natural resources. For example, the mortality rate among children under 5 is almost 100 deaths per 1,000 live births compared with 92 deaths, on average, in the region. Life expectancy at birth is a

37 For a more elaborate analysis of South Sudan and Sudan, see EGAT (2015), which was prepared for Concordis International.

mere 55 years; the primary school completion rate is 37 percent; and 45 percent of the urban population and over 70 percent of the rural population have no education (World Bank 2014a).

Table 4A.1. Social Indicators Compared, South Sudan and Sub-Saharan Africa, 2013

	South Sudan	Sub-Saharan Africa
GNI per capita, Atlas method (current US$)	950.0	1686.0
Life expectancy at birth, total (years)	55.2	57
Fertility rate, total (births per woman)	4.9	5
Adolescent fertility rate (births per 1,000 women ages 15–19)	72.0	106
Contraceptive prevalence (% of women ages 15–49)	..	24
Births attended by skilled health staff (% of total)	..	49
Mortality rate, under-5 (per 1,000 live births)	99.2	92
Malnutrition prevalence, weight for age (% of children under 5)	..	21
Immunization, measles (% of children ages 12–23 months)	30.0	74
Primary completion rate, total (% of relevant age-group)	37	70
School enrollment, primary (% gross)	..	100.4
School enrollment, secondary (% gross)	..	41
Ratio of girls to boys in primary and secondary education (%)	..	90
Prevalence of HIV, total (% of population ages 15–49)	2.2	4.5
Forest area (square kilometers)	..	5874.1
Terrestrial and marine protected areas (% of total territorial area)	..	16.3
Annual freshwater withdrawals, total (% of internal resources)	2.5	3
Improved water source (% of population with access)	..	64
Improved sanitation facilities (% of population with access)	..	30
Urban population growth (annual %)	5.2	4.1

Source: 2015 data, WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

Table 4A.2 shows recent economic developments in South Sudan. Economic growth has been volatile. The annual GDP growth rate swung from –26 percent to 31 percent in one year because of disruptions in the oil sector arising from conflicts. For the two years 2011/12 and 2012/13, oil production dropped sharply before recovering at the end of 2013 to about 235,000 barrels a day. Oil production dropped again to about 160,000 barrels a day in early 2014. Nonoil economic activity is estimated to have declined in the previous two years because of conflict. Inflation has accelerated recently to over 25 percent partly because of a large fiscal deficit (over 10 percent of GDP), while the current account has turned negative because of the drop in oil production.

Table 4A.2. Macroeconomic Indicators, South Sudan

	Percent				% of GDP
	2011/12	2012/13	2013/14	2014/15	2014/15
GDP (annual growth at constant prices)	–25.1	–26.7	30.7	–7.5	100.0
Oil	–49.3	–74.6	259.6	–12.2	92.0
Nonoil Industry	4.6	1.7	–3.2	–4.9	8.0
Inflation (end of period)	74.1	–11.1	.6	25.5	N/A
Fiscal deficit (% of GDP)	3.7	–15.4	–3.0	–10.7	–10.7
Current account balance (% of GDP)	9.5	–18.0	7.7	–4.9	–4.9

Source: IMF 2014b
Note: The fiscal years (shown) end in June.

Oil And Gas Sector

According to the U.S. Energy Information Administration, most of Sudan and South Sudan's proven reserves of oil and natural gas are located in the Muglad and Melut Basins, which extend into both countries. Natural gas associated with oil production is flared or reinjected into wells to improve oil output. Neither country currently produces or consumes dry natural gas. Estimates in the Oil & Gas Journal place proven oil reserves in South Sudan at 3.5 billion barrels as of January 1, 2014. At the country's pre–shut-in 2011 average production of 340,000 barrels a day, South Sudan will run out of oil in 28 years. Because of civil conflict, oil exploration prior to independence in 2011 was mostly limited to the central and south-central regions of unified Sudan. Oil and natural gas exploration in Sudan and South Sudan remains limited because of the lack of evidence of reserves. National oil companies from Asia dominate the oil sectors of Sudan and South Sudan. The China National Petroleum Corporation, India's Oil and Natural Gas Corporation, and Malaysia's Petronas hold large stakes in the leading consortia operating oil fields and pipelines. The national oil companies Sudapet (Sudan) and Nilepet (South Sudan) hold small stakes in operations.

South Sudan has experienced frequent disruptions in production over the past few years. In January 2012, the country voluntarily halted its production in a dispute over transit fees with Sudan. Production was partially shut down at the end of 2013 because of civil conflict. During the first half of 2014, South Sudan's production averaged 150,000 barrels per day. Disagreements over oil revenue sharing and armed conflict have curtailed oil production in both countries over the past few years. The oil fields in both countries are mature, and output has naturally declined. The U.S. Energy Information Administration assumes that, even if there are no production outages in South Sudan, the country's production cannot recover to the pre–shut-in 2011 average level of 340,000 barrels a day at least in the near term because of permanent damage and natural decline, particularly at mature fields in Unity State.

The Oil Effects

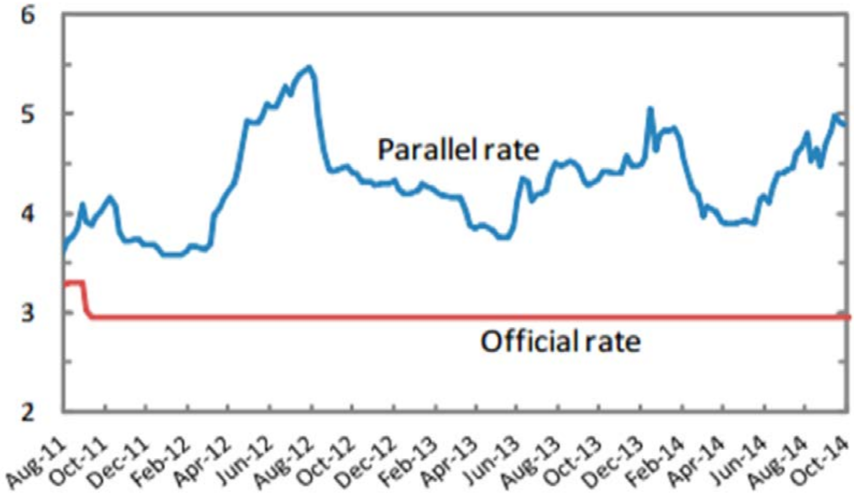
Like other low-income countries that are oil rich, South Sudan must cope with problems that arise from managing oil resources discussed in earlier sections. These problems include the long-term decline in terms of trade for commodities vis-à-vis manufactured goods; the dependence on oil rents, which creates revenue volatility because of unstable world oil prices; the enclave nature of the oil industry, which has few linkages with the rest of the economy and provides little direct benefit to local communities; the adverse macroeconomic effects of foreign-exchange inflows (the Dutch Disease effect) on competitiveness, balance-of-payments, and debt and the eventual crowding out investment effects in sectors with higher value added and skill requirements; the ever-increasing role of the state, which can produce further problems associated with government failure, bad decision making, corruption, rent seeking, protectionist policies, inefficiency and distortions; and the sociocultural and political impacts associated with the nature of regimes found in resource-rich countries (for example, rentier states, developmental versus predatory regimes). These problems are compounded by South Sudan's struggles as a new nation, such as weak or nonexistent institutional capacity and a lack of qualified bureaucrats. These problems are overwhelming, far beyond the capacity of any omnipotent government. More importantly, oil production is expected to decline beginning in 2016, and, at full capacity production, 90 percent of reserves will be exhausted in about 28 years.

The most important effects in the context of the present analysis are the overvalued exchange rate and high wages, which tend to discourage labor-intensive, tradable sectors.

Exchange Rate Overvaluation

In the decade prior to 2011, the real exchange rate of the formerly unified Sudan was overvalued by about 60 percent as a result of the spending effect noted above. The new currency, the South Sudanese Pound (SSP), inherited this overvaluation when it was pegged at the same rate to the U.S. dollar in 2011 (2.9). In addition, in September 2011, the Bank of South Sudan decided to peg the currency at an overvalued level and ration foreign exchange. Consequently, a dual exchange rate system emerged whereby an official rate was artificially maintained, while a market rate generated rent and led to the formation of rent-seeking groups. Between 2011 and 2013, the real exchange rate based on the official exchange rate is estimated to have appreciated a further 50 percent. In the meantime, the government was forced to ration the supply of foreign exchange at the official rate in a bid to maintain adequate foreign exchange reserves. This led to the emergence of a gap between the official rate and the market rate, the latter fluctuating mostly between SSP 4 and SSP 5 per U.S. dollar (Figure 4A.1). The nominal devaluation of the market rate meant that the real exchange rate based on the market rate remained broadly stable.

Figure 4A.1. Official and Parallel Market Exchange Rates, South Sudan (South Sudanese pounds per U.S. dollar)



Sources: Estimates and projections of South Sudanese authorities and IMF staff; IMF 2014b.

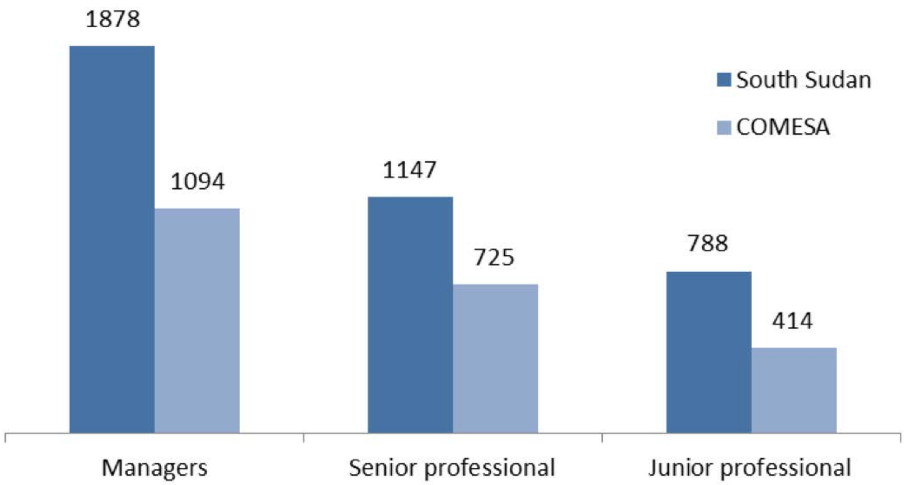
The dual exchange rate system creates uncertainty. A large majority of private sector transactions are currently carried out at the market exchange rate, which provides a better incentive for domestic producers. However, some importers have access to the official rate, which creates a high level of uncertainty among local producers wanting to invest and hire in South Sudan. Also, the dual system signals the intentions of the government to return the market rate back to the official rate, which may prevent domestic firms from hiring and investing based on the competiveness level provided by the market exchange rate. A policy of reestablishing a single, sustainable market rate at a level that offsets previous real appreciation should be a priority for the government.

Another important policy step will be to adopt an exchange rate regime that can contribute to the competiveness of South Sudan's nonoil sector. The current pegged system, contained in the Central Bank Law, does not ensure that exchange rate levels are compatible with the competitiveness of key nonoil sectors. In particular, adjustments in the level of the exchange rate in a pegged system can only be made through large and sudden devaluations, which, because of adverse political consequences, are not favored by policy makers.

Level Of Wages

Critical to the competitiveness of a nation is the level of wages. It is often reported that the average wages in South Sudan are higher than neighboring countries and those in sub-Saharan Africa. For example, the World Bank (2014a) notes that, for professional services such as engineering or accountancy, South Sudan's average wages are almost 80 percent above the average in the Common Market for Eastern and Southern Africa. This is driven in large part by a lack of labor skills, which has led firms to employ a higher proportion of expatriates. Figure 4A.2 shows the average monthly salary in selected countries of the common market.

Figure 4A.2. Average Gross Monthly Salary of Professionals, Selected Countries, Common Market for Eastern and Southern Africa (US$)



Source: World Bank 2014a.

Higher nominal wages relative to neighboring countries are also found among unskilled workers in rural areas. The same World Bank report notes that, in 2011, rural labor costs in South Sudan were three to seven times higher than in Uganda and Tanzania (Table 4A.3). The higher cost of rural labor is typically explained by the high costs of food, fuel, and transport (which necessitate higher nominal wages) and an exchange rate valuation that is solely determined by South Sudan's oil export sector.

Table 4A.3. Average Rural Wage Labor Costs, South Sudan and Other Countries

Countries	Labor cost (US$ per person per day)
South Sudan	7.50
Uganda	1.0
Tanzania	2.31

Source: World Bank 2014a.

However, the Economic Growth and Transformation (EGAT) survey shows that, if the market exchange rate is used, wages in South Sudan could be competitive with those in other countries (EGAT 2015). Even taken at a midpoint between the official rate of SSP 2.95 and the market rate of SSP 9 per U.S. dollar, Table 4A.4 shows that South Sudanese wages for skilled and unskilled workers are competitive with those in five other countries, especially considering that the data are from 2010 and, most likely, would show higher wages in 2015.

Table 4A.4. Monthly Wages in the Light Manufacturing Sectors, Six Economies, circa 2010

Product	Labor Type	China, 2010 (US$)	Vietnam, 2010 (US$)	Ethiopia, 2010 (US$)	Tanzania, 2010 (US$)	Zambia, 2010 (US$)	South Sudan, 2015a (US$)
Polo shirts	Skilled	311–370	119–181	37–185	107–213	na	
Dairy milk	Skilled	177–206	na	30–63	150–300	106–340	34–425
Wood chairs	Skilled	383–442	181–259	81–119	150–200	200–265	85–255
Crown cork	Skilled	265–369	168–233	181–na	na	na–510	34–340
Leather loafers	Skilled	296–562	119–140	41–96	160–200	na	
Milled wheat	Skilled	398–442	181–363	89–141	200–250	320–340	34–425
Average	Skilled	305–399	154–235	77–131	153–233	284–364	171–212
Polo shirts	Unskilled	237–296	78–130	26–48	93–173	na	
Dairy milk	Unskilled	118–133	31–78	13–41	50–80	54–181	10–306
Wood chairs	Unskilled	206–251	85–135	37–52	75–125	100–160	17–255
Crown cork	Unskilled	192–265	117–142	89–na	na	na–342	3–102
Leather loafers	Unskilled	237–488	78–93	16–33	80–140	na	
Milled wheat	Unskilled	192–236	78–207	26–52	100–133	131–149	10–306
Average	Unskilled	197–278	78–131	35–53	80–130	157–208	91–110

Sources: Dinh and al. 2012; EGAT 2015.
Note: na = not available.
a. The 2015 exchange rate used was SSP 5.9 per U.S. dollar. The value for South Sudan dairy milk and milled wheat is the average of agribusiness.

A more detailed account of South Sudanese wages among skilled and unskilled workers is given in Table 4A.5. It is clear that, as of mid 2015, the black market rate of SSP 9.5 per U.S. dollar, South Sudan can be competitive. Indeed, at that exchange rate, the average monthly skilled wages in South Sudan range from US$106 to US$132, while unskilled wages range from US$57 to US$68, the lowest wage range of the six countries (even without consideration of the five-year lag). The development of labor-intensive sectors in South Sudan depends to a large extent on whether a market-based exchange rate can be established. This problem is not unique to South Sudan. In all resource-dependent countries, the exchange rate, even if it is determined by true demand and supply, cannot reflect the real scarcity of nonrenewable resources.

Table 4A.5. Wages (US$/Month), by Sector, at Different Exchange Rates

Agribusiness	**Edu lev**	**Wages in SSP**		**Exch=2.9**		**Exch=5.9**		**Exch=9.5**	
Average	3.9	653	1193	221	404	111	203	69	126
Largest		1800	2500	610	847	306	425	189	263
Smallest		60	200	20	68	10	34	6	21
Wood		0	0	0	0			0	0
Average	1.8	690	1000	234	339	117	170	73	105
Largest		1500	1500	508	508	255	255	158	158
Smallest		100	500	34	169	17	85	11	53
Metal		0	0	0	0			0	0
Average	4.8	389	1140	132	386	66	194	41	120
Largest		600	2000	203	678	102	340	63	211
Smallest		20	200	7	68	3	34	2	21

Source: EGAT 2015.
Note: 1. No education, 2. Incomplete primary education (primary four), 3. Completed primary education, 4. Incomplete secondary education, 5. Completed secondary education, 6. Vocational, technical school certificate, 8. College, university degree from a university in another country.

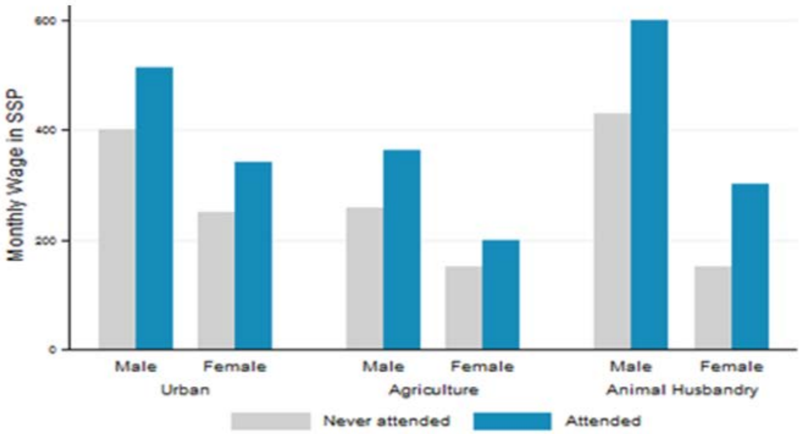
This low level of wages is confirmed by a World Bank report (World Bank 2014a) showing that in 2011 about 50 percent of the working population in Juba earns less than SSP 600 per month (US$102 at the SSP 5.9 per U.S. dollar exchange rate). Only 5 percent earn more than SSP 3,000. Women earn significantly less than men. Foreign laborers earn, on average, as much as South Sudanese laborers. In Juba, nationals earn SSP 934 a month, while foreigners earn SSP 853 a month.

Factors Affecting Job Creation

In addition to wages, three additional factors may affect South Sudan's ability to create jobs. First, the labor force generally lacks skills and sufficient levels of education. Second, the youth population holds an unreasonable expectation of high-paying government jobs in coming years. Third, the Labor Law and labor regulations currently in effect were designed in an earlier era when job creation was much less critical.

Education and Skill Level. South Sudan's education indicators are low even by the standards of other sub-Saharan African countries (see Table 4A.1). A lack of marketable skills and experience makes it more likely that a person is unemployed. In 2009, about 71 percent of the population in rural areas and 45 percent in urban areas had no education. In Juba, 25 percent of the population without a primary education is unemployed. Primary education decreases the risk of unemployment to 13 percent. Secondary education can be found almost exclusively in urban areas and is mostly obtained by men (Figure 4A.3). Secondary education increases the chances of labor force participation, from about 71 percent to 90 percent. Postsecondary education decreases the share of discouraged workers, but also slightly increases the unemployment rate, to 23 percent. Higher education does not necessarily raise employment in Juba, but other factors also influence employability (see below).

Figure 4A.3. Schools and Average Monthly Wages, South Sudan



Source: World Bank 2014b.

Literacy generally leads to higher wages. Primary education is associated with increased wages in the urban population by about 10 percent. Secondary education among the urban population has a similar association and, notably, is substantially higher among women. Postsecondary education is linked with a more than doubling in wages, especially among women, among whom wages associated with postsecondary education exceed the wages among men at the same level of education.

Expectations of High-Paying Government Jobs. Many South Sudanese expect a well-paid government job within six months and therefore raise their reservation wage beyond a realistic level. A World Bank report notes that 20 percent of men and almost 14 percent of women in South Sudan expect to hold government jobs within six months. Almost 40 percent expect to have jobs in the government after one year, and the rate increases to 50 percent for among men and women expecting this outcome within two years. A lower share of people expecting government jobs within the next three-six months can be explained by the oil crisis in South Sudan at the time of the survey (May 2013).

The expectation of a government job increases the reservation wage by SSP 193 (World Bank 2014a). A government job is expected to provide SSP 7,200 (about US$1,200) in earnings per month. The average government salary in 2011 was SSP 3,200 a month, about seven times monthly GNI per capita. Yet, the expected wage for respondents anticipating government jobs was even twice as high, at SSP 7,200. It is estimated that, if all expectations were to be fulfilled, the government would have to increase its 2011 salary expenditures fourfold. The World Bank report notes that two in three unemployed workers have a prohibitively high reservation wage.

It is not possible for the government to provide jobs to all job seekers. In 2014, there are about 150,000 civil servants in South Sudan (both central-level and state-level employees) and an equal number of military personnel. The number of new entrants into the labor market (with an increase in the cohort of 15–24-year-olds) over the next five years is estimated at around 1 million (World Bank 2014b). Assuming that the urban part of that labor force growth is around 20 percent, this suggests 200,000 new entrants in the urban labor force over the next five years, compared with around 150,000 existing civil service jobs. Even more importantly, the government jobs cannot help the country replace the oil resources that will run out in less than 28 years. At that time, government revenue will rely entirely on the private sector to generate taxes. It is true that new job seekers can be absorbed into the social sectors such as health care and education, but these needs will cater to qualified personnel. Public investment in labor-intensive infrastructure construction can create jobs among unskilled workers, while also creating the basis for additional private sector jobs.

To prevent widespread and unrealistic expectations of public sector jobs, the government should launch a campaign to clarify that government salaries are lower than people expect and that only a limited number of new public servants will be hired in coming years. Both messages would help lower expectations among the public and incentivize youth to look for jobs in the private sector by investing in marketable skills.

Two issues related to work expectation are the attitude toward work, especially among youth, and the dependency tendency. Traditionally, the South Sudanese are hardworking people, as seen in the industrial zones around Khartoum or in the construction industry in Khartoum. The current youth generation, however, was born into war and often became reliant on humanitarian aid. Given the issues associated with displacement from war and the issues of identify among many young people in South Sudan and the postwar conflicts over land among ethnic groups, young people are conditioned to living in an unstable environment and thus are conditioned to an insufferable state. Moreover, youth have not had an opportunity to invest in future skills and work experience.

"The wars have caused massive sociocultural shifts in work ethics, increasing the phenomenon of dependency of the majority of youth on the few employed relatives" (World Bank 2014a, 54). The report notes that respectable work meant office work and not menial labor, which appears to absorb migrant laborers from East Africa easily, and that there is the perception that women's work, most of which takes place outside the formal economy, is not really work worth considering.

This condition is perpetuated by dependency. In urban centers across South Sudan, people who have jobs, mainly people from the Greater Upper Nile and Greater Bahr el-Ghazal, are compelled by social obligations to sustain people without jobs. In large towns, the level of dependency on these social networks finds expression in the households of salaried government officials, which often host many relatives who rely on the salaried person for food, clothing, education fees, medical expenses, and so on. The level of commitment to this practice varies in degree, but can be found nearly uniformly in the homes of the Nilotic people, especially the Dinka and Nuer. Because a large proportion of central government positions are given to Dinka and Nuer, this dependency is abundant in the capital city. There are often additional responsibilities and obligations to relatives in rural villages, with the expectation that senior government officials supply urban goods to relatives in rural villages.

Labor Law and Labor Regulations. South Sudan's labor regulations are subject to frequent discretionary decisions. Between the signing of the peace agreement in 2005 and independence in 2011, the 1997 Labour Act remained the main legislative document for labor regulation in southern Sudan. Since independence, no new labor act has been ratified by the National Legislature. By the continuity of laws, the 1997 Labor Act is still valid. It is amended by circulars issued by the Ministry of Labour, Public Service, and Human Resource Development. Work permits, as an important tool to regulate labor, are issued exclusively by the ministry and are often discretionary. National workers are protected against termination of employment. According to a circular of the ministry, the ministry prohibits termination of employment for any business or organization without prior approval by the ministry. In practice, the ministry is reluctant to approve employment termination of South Sudanese nationals. The laborious and time-consuming process alone deters many employers from terminating contracts.

South Sudan's foreign work permit regulations are comparatively strict. Foreigners have to apply for a work permit, and application fees are high. Foreign companies are forced to hire South Sudanese nationals of similar qualifications and experience preferentially. Companies generally have to maintain an employment quota of 75 percent nationals at the nonmanagerial level. The ministry now requires detailed information regarding vacant positions and will only issue work permits to foreigners if it is convinced that a South Sudanese candidate is unavailable. Small companies can only be run by South Sudanese, while medium and large companies are required to have a South Sudanese partner holding at least 31 percent of shares.

Excessive labor protection has the perverse effect of making national labor less attractive among employers. Many companies seeking to terminate the employment of nationals are taken to court for labor disputes, which, because of the financial cost and the loss in reputation, companies try to avoid even if they would win. To avoid these costs, companies sometimes opt to employ foreigners from neighboring countries, such as Kenya and Uganda. Foreign workers are said to work more efficiently, to be less costly, and to accept criticism by their supervisors (World Bank 2014a).

The new Labor Act proposed by the ministry in 2012 and currently under discussion will be critical in defining the quality of the regulatory environment. While not yet ratified by the National Legislature, the act as drafted contains a regulatory framework that establishes labor institutions, defines conditions for employment, and stipulates the fundamental rights of workers. It requires work permits for foreigners, as is currently the case. A minimum legal wage would be introduced, the effective enforcement of which, in a largely informal economy, is likely to be difficult.

Toward A Sustained Growth Strategy

Given its landlocked situation and the finite limit of its oil wealth, South Sudan has no choice but to adopt a strategy to maximize its growth potential and create jobs, while developing its nonoil resources, mainly human resources, to replace oil. This strategy can only work if it is accompanied by policies to create jobs, especially light manufacturing jobs. The specific policies to address these problems are detailed in EGAT (2015).

South Sudan's nonoil economy could be competitive in regional markets in sectors in which South Sudan has a comparative advantage, such as agriculture and agribusiness. The domestic markets can also be developed in the beginning through import substitution because high transport costs create a natural advantage for domestic production. After a few years of experience, South Sudan could export to markets beyond the subregion.

While South Sudan is likely to carry out a mix of the two strategies, only a strategy focused on establishing competiveness in domestic and regional markets can guarantee strong employment generation. This means that, even though import substitution could work for 5 or 10 years (about the time frame to establish the presence of domestic producers, as shown in the case of Korea), a shift toward an export-oriented strategy must be enacted in a timely manner.

- **Light Manufacturing In South Sudan**

The above discussion highlights two structural features of the South Sudanese economy that adversely affect its competitiveness, namely, an overvalued exchange rate and high wages, especially in the formal sector. Another factor affecting competitiveness is the high cost of transport because of the country's landlocked position and the current state of infrastructure. Less than 5 percent of the existing 7,171 km of primary roads are in good condition, and, with the exception of newly constructed urban paved roads and the Juba Nimule road, the entire network is gravel, dilapidated, and mainly inaccessible during the rainy season (Tizikara and Lugor 2011). Freight tariffs in South Sudan are high, at least twice those found in the main African corridors and even in Sudan. Another factor is the relatively small population, which constrains the country's ability to consume goods and services. There is scope for niche opportunities in the processing of high-value products for the international market and in competing in some domestic or regional markets (for example, drinks and processed food). A rapid expansion of the formal modern service sector is also likely to be constrained by the low skill basis in South Sudan.

One of the potential problems is clearly electricity. Currently, South Sudan has the lowest per capita electricity consumption in Africa, according to the African Development Bank (AfDB 2013). Only 1 percent of South Sudan's population is connected to the electricity grid, and more than 96 percent of the population uses firewood and charcoal for household heating and cooking. Even those connected to the power network experience infrequent service because of aging equipment and limited maintenance. As a result, load shedding, or forced blackouts, are a regular part of South Sudan's power system. In December 2013, the African Development Bank announced that it would provide South Sudan with a US$26 million grant to expand the country's electricity distribution networks. The project will be undertaken by the state-owned utility, the South Sudan Electricity Corporation, but the project's progress is most likely stalled now because of the conflict.

All these obstacles are not insurmountable. To overcome them and compete effectively, South Sudan has to undertake a broadbased, carefully phased program of reforms to reduce its disadvantages. For example, a liberal and simple tariff system, well integrated into regional trading arrangements, would help reduce transit costs for imported inputs. The spatial structure and sequencing of investment in transport infrastructure would also have a critical effect on competiveness. Given the low level of transport connectivity, the sequence and spatial structure of the new investment would give a first-mover advantage to those areas connected first or more cheaply. Beyond infrastructure investment, the efficient management of the transport and transit systems is also an important element of competitiveness. Transport costs are affected by the efficiency of border points and custom clearance and by formal or informal checkpoints that result in longer travel times and extra costs. Finally, lack of competitiveness in the trucking industry has often been found to increase transport costs as much as poor infrastructure does.

Over the long term, the priority of South Sudan should be to develop other resources that could replace oil in three decades. But what activities can South Sudanese pursue? This chapter makes the case that, in the current situation, simple light manufacturing goods remain a viable option for urban dwellers. Urban-rural links mean that urban livelihoods are also important for the rural poor. Migration to urban centers, particularly secondary cities and rural towns, is an important livelihood strategy for rural people. This is illustrated by data from a rather unique panel study tracking more than 3,300 individuals in households in rural Kagera, Tanzania, during 1991/1994–2010 (World Bank 2014a, 61). The study shows that half the individuals interviewed in 1991/94 who had exited poverty by 2010 did so by transitioning out of agriculture into the rural nonfarm economy or secondary towns; one in three exited poverty, while continuing in farming; and only one in seven through migration to the capital or other big cities. The urban economy, in turn, provides crucial goods and services that can help increase the productivity of rural economies and agriculture.

Why not services? The skills level in South Sudan appears low for high–value added service development. Quality higher education has a role with respect to the public sector and modern service sector. The limited employment that will be available in the public sector will require qualified personnel. In the modern service sector, the demand will be for higher skills. According to the World Bank (2014a), there were 17,000 students in South Sudanese universities in 2012 (which does not account for South Sudanese students studying abroad). With such a low number, aiming for a rapid expansion of enrolment would only come at the reduction of quality, which is already a major concern among university graduates in South Sudan. Moreover, nongovernmental organizations and foreign employers are competing to hire educated South Sudanese, putting additional pressures on the supply shortage. A focus on the quality and relevance of tertiary education could potentially ensure that South Sudanese graduates would be well prepared to take the limited job opportunities that will be generated for them.

Identifying Light Manufacturing Subsectors And Products In South Sudan

This section identifies specific subsectors and products for light manufacturing in South Sudan using the latest techniques. It examines the revealed comparative advantage (RCA) approach, including Balassa's (1965) method and import inspection, as well as the Lin-Monga growth identification and facilitation framework (Lin and Monga 2011).

Table 4A.6 summarizes, for 2012 and 2013, RCAs for products that South Sudan could possibly produce.[38] The items in italics represent simple products that are labor intensive, exhibit limited economies of scale, and require small investments that a typical developing country such as South Sudan could produce.

Table 4A.6. Products with Nonoil Revealed Comparative Advantage, South Sudan

SITC	Description	Value (US$, 1.000s)	Share of exports	Share in nonoil exports	RCA	Light manufacturing group
			2012			
3330	Crude petroleum	643,471.0	99.56		Y	
6115	Sheep- or lambskin leather, w/o wool	1,566.9	0.24	55.56	Y	Leather goods
0542	Leguminous vegetables, dried, shell	660.6	0.10	23.42	Y	
2823	Other ferrous waste and scrap	148.6	0.02	5.27		
2112	Raw hides and skins of bovine	124.9	0.02	4.43		
2119	Hides and skins, n.e.s.; waste and used leather	63.8	0.01	2.26	Y	
6116	Goat- or kidskin leather, without hair	61.4	0.01	2.18	Y	Leather goods
2922	Lac; natural gums, resins, gum	33.9	0.01	1.20		
6956	Knives and cutting blades	24.9	0.00	0.88		Metal products
2116	Sheepskins and lambskins	17.4	0.00	0.62		
2475	Wood of nonconiferous species	10.2	0.00	0.36		

38 As discussed in the main text, the RCA is equal to the proportion of the country's exports that are of the class under consideration (Eij / Eit), divided by the proportion of world exports that are of that class (Enj / Ent). A comparative advantage is revealed if RCA > 1. If RCA is less than unity, the country is said to have a comparative disadvantage in the commodity or industry.

5513	Essential oils (terpeneless or not)	6.7	0.00	0.24		
2225	Sesame (Sesamum) seeds	3.6	0.00	0.13		
0751	Pepper of the genus Piper; pimento	2.4	0.00	0.08		
5799	Waste, parings and scrap of other plastics	2.3	0.00	0.08		
6342	Densified wood and particle board	2.1	0.00	0.07		Wood products
2923	Vegetable plaiting materials	1.8	0.00	0.07		
6117	Leather of other animals, without hair	1.8	0.00	0.06		Leather goods
8422	Suits and ensembles	1.7	0.00	0.06		Apparel
355	Flours, meals and pellets of fish	1.7	0.00	0.06	Y	Food processing
8982	Musical instruments (other than piano)	0.9	0.00	0.03		
			2013			
7933	Vessels and other floating structures	3,141.6	0.13	43.45	Y	
5429	Medicaments, n.e.s.	782.1	0.03	10.82		
6115	Sheep- or lambskin leather	754.6	0.03	10.44	Y	Leather goods
6114	Bovine and equine leather	485.4	0.02	6.71		Leather goods
2631	Cotton (other than linters), not carded	448.1	0.02	6.20		
2112	Raw hides and skins of bovine	372.8	0.02	5.16		
2221	Groundnuts, green	220.9	0.01	3.06		
8931	Articles for conveyance or packing	135.5	0.01	1.87		
6116	Goat- or kidskin leather, without hair	120.0	0.00	1.66		Leather goods
2922	Lac; natural gums, resins, gum resins	115.3	0.00	1.59	Y	
2823	Other ferrous waste and scrap	73.5	0.00	1.02		
7163	Motors and generators	57.0	0.00	0.79		
8412	Suits and ensembles	35.2	0.00	0.49		Apparel
2484	Wood of nonconiferous species	33.8	0.00	0.47		
7232	Mechanical shovels, excavators	28.8	0.00	0.40		
2475	Wood of nonconiferous species	27.3	0.00	0.38		
0711	Coffee, not roasted	25.7	0.00	0.36		
6631	Millstones, grindstones, grinding wheels	25.6	0.00	0.35		
2119	Hides and skins, n.e.s.; waste	16.9	0.00	0.23		
5534	Preparations for oral/dental hygiene	16.3	0.00	0.22		
8455	BrassiFres, girdles, corsets, brace	14.4	0.00	0.20		Apparel
8319	Binocular cases, camera cases, musical cases	13.0	0.00	0.18		
6954	Hand tools (including glaziers' diamonds)	10.0	0.00	0.14		Metal products
7414	Refrigerators, freezers	9.9	0.00	0.14		
8448	Slips, petticoats, briefs, panties	7.9	0.00	0.11		Apparel

8312	Trunks, suitcases, vanity cases	6.4	0.00	0.09	
7422	Fuel, lubricating/cooling medium	6.3	0.00	0.09	
5812	Tubes, pipes and hoses, rigid	5.2	0.00	0.07	
0571	Oranges, mandarins, clementines	4.5	0.00	0.06	
7246	Auxiliary machinery	2.8	0.00	0.04	
5817	Fittings for tubes, pipes and hoses	2.5	0.00	0.04	
2786	Slag, dross, scalings and similar	2.2	0.00	0.03	
2733	Natural sands of all kinds	2.2	0.00	0.03	
6423	Registers, account-books, notebooks	2.1	0.00	0.03	Wood products
2690	Worn clothing and other worn textiles	1.8	0.00	0.02	
453	Grain sorghum, unmilled	1.2	0.00	0.02	
2911	Bones, horns, ivory, hooves, claws	1.0	0.00	0.01	
7164	Electric rotary converters	0.9	0.00	0.01	

Source: EGAT calculations based on data in UN Comtrade (United Nations Commodity Trade Statistics Database), Statistics Division, Department of Economic and Social Affairs, United Nations, New York, http://comtrade.un.org/db/.
Note: w/o = without. n.e.s. = not elsewhere specified.

The three methods yield the following sectors for South Sudan: (1) footwear, including sports shoes; (2) textiles; (3) vegetable oil; (4) fertilizers; (5) meat and meat products; (6) petroleum products; (7) leather and hides; and (8) food and beverages. Specific products related to these sectors are highlighted in Table 4A.6.

In addition, South Sudan has potential in other products. The country is rich in natural resources, particularly oil and gas, but also in solid minerals. Industries associated with these natural resources, especially refined petroleum products, petrochemicals, cosmetics, and plastics are currently not particularly active in South Sudan.

Identifying The Binding Constraints On The Success Of Firms In South Sudan

The primary source of information used in the identification process is the EGAT Entrepreneur Survey (see EGAT 2015). World Bank Enterprise Surveys serve as a complementary piece to the Entrepreneur Survey.[39] The EGAT Entrepreneur Survey is a modified version of a highly tested product which has been successfully conducted in China, Ethiopia, Tanzania, Vietnam, and Zambia (Fafchamps and Quinn 2012). The Survey covers selected areas within the investment climate, productivity, and logistics. In contrast to the World Bank Enterprise Survey, which is concentrated on major cities

39 See Enterprise Surveys (database), International Finance Corporation and World Bank, Washington, DC, http://www.enterprisesurveys.org.

and integrated within the chapter, the Entrepreneur Survey data are focused on cities along the South Sudan–Sudan border. The EGAT Entrepreneur Survey results are more applicable to our understanding of South Sudan and it has a higher composition of manufacturing firms than the World Bank Enterprise Survey. It is therefore the primary data source. The Enterprise Survey is focused on a different geographical area in South Sudan and has a larger sample size. It enables information from the Entrepreneur Survey to be verified to a certain extent and to be supplemented where this is appropriate.

The World Bank Enterprise Survey is the secondary source of the analysis. The surveys are one of the World Bank's primary data sources on developing countries. They may be distinguished from other data sources in the scope and detail of the data collection. Business data are available on 130,000 firms in 135 countries, representing the world's most comprehensive source of company-level information on emerging markets and developing economies. The surveys are run by a hired group of professional economists and surveyors. The surveyors are private contractors who are equipped with a cultural understanding of the areas in which they work. The surveys rely on a comprehensive methodology that measures constraints across areas fundamental to firm profitability and growth. They provide quantitative and qualitative information received directly from firm owners and top managers. They allow respondents to rate obstacles on a Likert scale to capture the most binding constraints entrepreneurs believe they face. This perspective cannot be found in general macro analyses or desk studies. Enterprise Survey data are collected every few years in the field. The survey data were most recently updated in March 2015.

In this section, these surveys are further complemented by Doing Business reports.[40] These reports rely on interviews among local professionals such as accountants and lawyers. These professionals offer a different perspective relative to firm owners because their responses are based on laws and regulations, as opposed to the firm-specific constraints described in the Enterprise Surveys. A major limitation of the Doing Business reports is that they only cover the most populous business cities of countries and thus are not as representative as the Enterprise Surveys. Enterprise Surveys also provide actualized data, while the Doing Business reports illustrate a hypothetical of what a typical firm would experience. Doing Business assumes firms are abiding by regulations. In practice, many firms do not follow all regulations. Thus, the responses are better suited to understanding the impact of rules and regulations, while the Enterprise Surveys reflect a firm owner's pragmatic perspective.

In the previous section, using a variety of methods, specific light manufacturing

40 Doing Business (database), International Finance Corporation and World Bank, Washington, DC, http://www.doingbusiness.org/data.

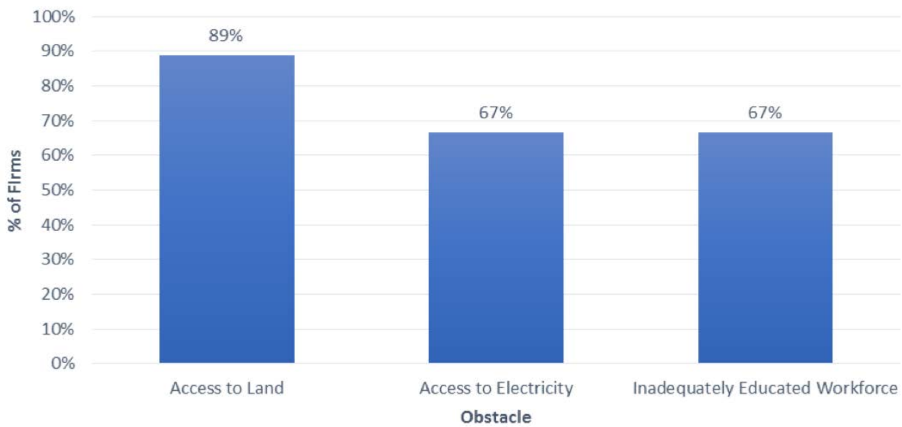
products were identified that have either a latent or an RCA in each country. The target subsectors with potential are food processing, leather goods, wood products, metal products, and textiles. Given these results, EGAT has been able to direct field consultants toward firms that produce these products. The EGAT survey has thus been used to target the obstacles that light manufacturing firms face in the production of goods with comparative advantages. This favors the quality of our recommendations to promote growth in light manufacturing. Although light manufacturing makes up less than 1 percent of total exports from South Sudan as a whole, the potential for a large manufacturing market already exists in South Sudan.

- **Constraints By Subsector**

Metal Subsector

The metal subsector faces obstacles in the ability to gain access to land. Almost 90 percent of respondents in the metal subsector claimed access to land is a major barrier to success (Figure 4A.4). Indeed, access to land was an even greater obstacle for firms than access to finance (see above). The metal subsector relies more heavily on land than other subsectors in light manufacturing. Metal products have a greater need for physical capital given the necessity to operate in a private space because of work at high temperatures. Metal work requires tools and can even demand heavy machinery. The burden is compounded by the competition for land with service firms.

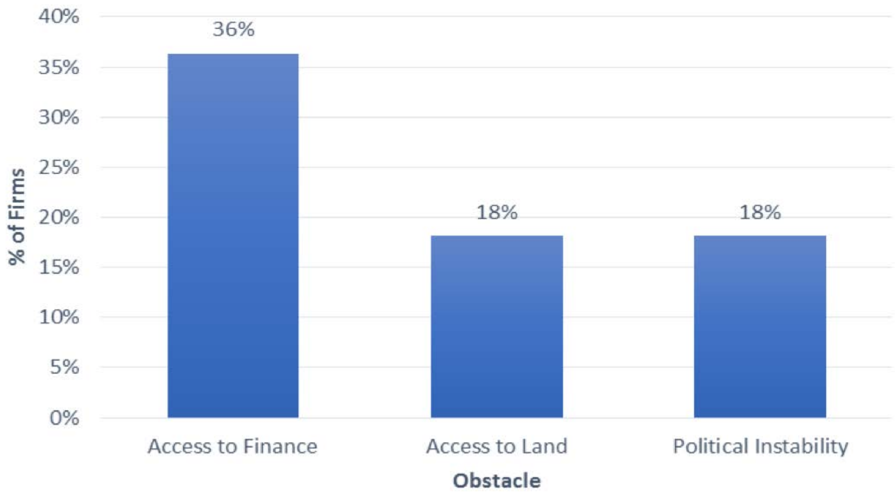
Figure 4A.4. Metal Subsector: Biggest Obstacles (EGAT Entrepreneur Survey)



Source: EGAT Entrepreneur Survey 2015.

The requirement of seven different inspections for the construction of a warehouse has likely burdened metal firms in their pursuit of establishing land capital. At a higher fee rate as well, metal firms are at a disadvantage relative to global competition. Additionally, access to electricity presents an obstacle for firms. Many firms are unable to access electricity at a rate that maintains their capacity to produce. Especially with metal work, electricity requirements are high because of the necessity of high temperatures. Moreover, metal work requires a high skill set. Without a skilled labor force, metal firms are unable to add employees and expand. The World Bank Enterprise Surveys confirm that access to land is a major obstacle for metal firms (Figure 4A.5). Access to land was the second-most binding constraint reported by metal firms reporting their most binding constraint.

Figure 4A.5. Metal Subsector: Biggest Obstacles (World Bank Enterprise Survey)

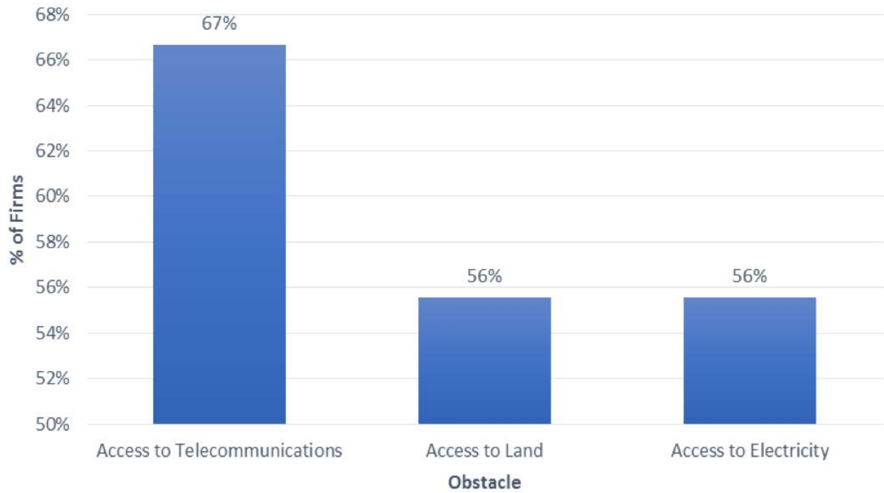


Source: EGAT calculations based on data in Enterprise Surveys (database), International Finance Corporation and World Bank, Washington, DC, http://www.enterprisesurveys.org.

Wood Subsector

The wood subsector faces unique challenges. Access to land and electricity are both major obstacles, as they are in the metal subsector, but access to telecommunications is the biggest obstacle among wood firms (Figure 4A.6). Given the wood subsector's lower capital constraints, the need for land is a higher priority for metal firms. Telecommunications are important to wood firms for communication to suppliers and customers. Expanding business largely depends on the ability to reach out to customers and supplying those customers with product.

Figure 4A.6. Wood Subsector: Biggest Obstacles (EGAT Entrepreneur Survey)

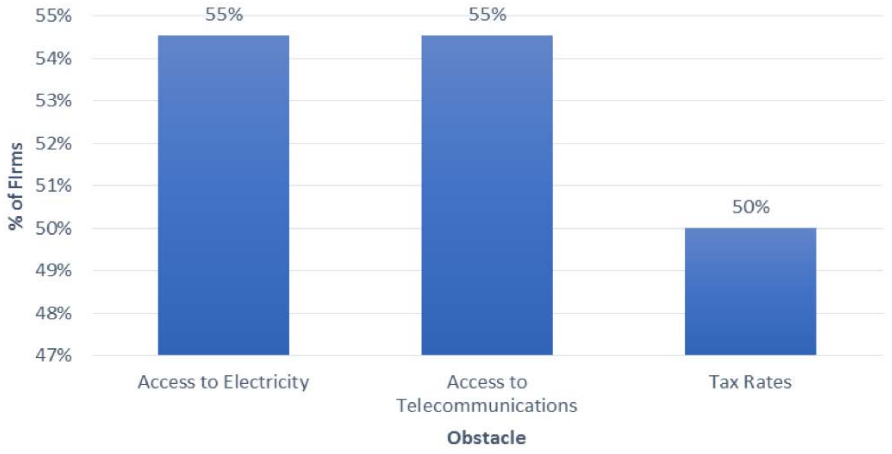


Source: EGAT Entrepreneur Survey 2015.

Food And Beverage Subsector

Without considering the obstacles affecting all manufacturing firms, the biggest obstacles facing the food and beverage subsector is access to electricity and access to telecommunications (Figure 4A.7). Food and beverage firms rely on electricity for cooking and refrigeration. Firms without electricity are unable to produce and store their products. Inconsistent access to electricity poses fundamentally prevents production. Developing a consistent power grid is an important step in promoting this subsector. Tax rates are an obstacle in the subsector largely because products travel more often and thus encounter import and export processes. Customs taxes and the overall formality of food production make taxing more accessible for the government in this subsector, which is thus a big source of revenue given the large informal sector in South Sudan.

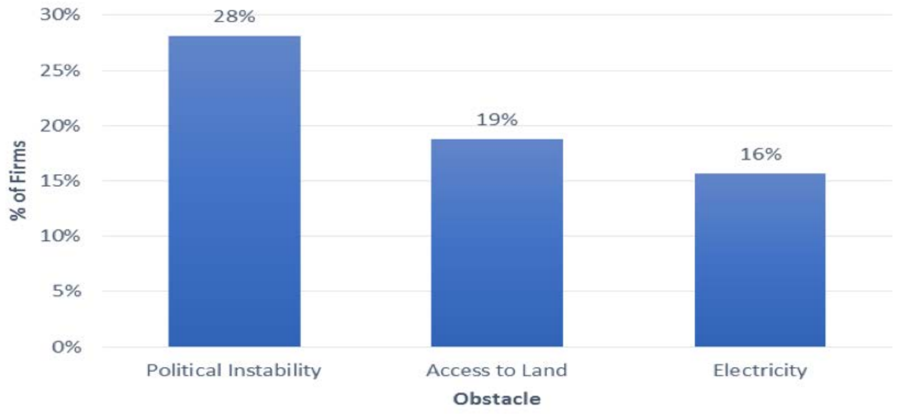
Figure 4A.7. Food and Beverage Subsector: Biggest Obstacles (EGAT Entrepreneur Survey)



Source: EGAT Entrepreneur Survey 2015.

The Enterprise Surveys confirm that electricity is one of the top obstacles in the food and beverage subsector (Figure 4A.8). Given the subsector's current presence in the South Sudan economy, priority should be assigned to this subsector during the policy implementation process.

Figure 4A.8. Food and Beverage Subsector: Biggest Obstacles



Source: EGAT calculations based on data in Enterprise Surveys (database), International Finance Corporation and World Bank, Washington, DC, http://www.enterprisesurveys.org.

Apparel

For the apparel firm EGAT was able to interview, access to telecommunications and an inadequately educated labor force were top constraints. For the garment firm the Enterprise Survey was able to interview, access to finance was the most binding constraint. Leather products were unable to be found in both EGAT's field survey and the World Bank's Enterprise Surveys.

- **Policy Recommendations**

The challenges confronting policy makers in South Sudan are tremendous. Pervasive poverty, low economic growth, poor human resources, and extreme dependency on natural resources are overwhelming problems. Our analysis makes clear that South Sudan has no choice but to develop human resources to replace oil when the oil reserves are exhausted.

But, as economic history has shown us, countries that develop human resources without complementary polices to develop private sector–led growth are likely to fail. This is the case not only of Eastern European countries, but of many Asian and African countries as well, where the drain of human resources has taken place because the demand for skilled workers cannot keep up with the abundant supply of workers. Moreover, industrialization can only emerge from learning by doing, and there is no way to bypass the first stage of economic growth whereby producers of simple goods gradually move up the value chain to produce more sophisticated goods.

The policy recommendations offered in this chapter apply these principles to South Sudan along the policy framework presented in the main text, drawing on extensive research on Africa. The following section outlines economy-wide policies that will affect the performance of manufacturing in South Sudan. This is followed by a discussion of specific policies in each of the light manufacturing subsectors.

The recommendations are partly based on the five lessons of East Asian countries in growing the light manufacturing sector to create jobs and prosperity. These include the following: (1) Fill knowledge and financial gaps through FDI and networks. (2) Use substitution policies and sequencing. As Gerschenkron (1962) and Hirschman (1984) long emphasized, human ingenuity can devise workable substitutes for the key missing requisites for rapid growth. (3) Start with simple goods and experiment with various policies to expand them, scaling up successful cases and cutting back failing ones. (4) Create islands of success. Reforms in specific industries or specific locations can create islands of success in an otherwise moribund economy. And, as success is built on success, the impact on the general economy can be significant. (5) Create a business environment that is conducive for manufacturing. This environment should involve active government support for private enterprises. Foremost among possible official actions should be forceful public endorsements issued by national leaders in favor of economic growth and private sector development.

Economy-Wide Policies

The industrial sector in South Sudan would also benefit from economy-wide policies that include peace and security, macroeconomic stability, building infrastructure (including resolving trade logistics issues), and developing human resources.

Peace and Security. The EGAT Entrepreneur Survey conducted in South Sudan shows that firms of all sizes consider security a top priority. While substitution policies such as clusters (below) can temporarily help industrial development, ultimately the success of any development strategy depends on whether long-lasting peace and security can prevail. This subject is beyond the scope of this chapter but it suffices to stress the importance of political stability and security.

Macroeconomic stability. Experience in other African economies clearly shows that governments can provide important support to facilitate robust private sector growth by maintaining macroeconomic stability and implementing sensible long-term policies for managing important natural resources. African governments have recorded marked improvements in macroeconomic policies during the past decade; results include lower inflation, reduced fiscal and trade deficits, and, partly as a result, higher GDP growth. For South Sudan, the most important policy among the macroeconomic stabilization policies is exchange rate unification to the market rate. An appropriate exchange rate would make South Sudan (as well as the rest of South Sudan) competitive with imports and other countries in the region. Similarly, keeping the Sudanese exchange rate competitive will help the tradable sectors in South Sudan of Sudan.

Infrastructure. Building roads, boosting electricity generation, and enhancing trade logistics are a top priority for South Sudan. However, one must be realistic about the time horizon of building a solid infrastructure. Addressing infrastructure needs in South Sudan is a time-intensive challenge and cannot be achieved in one or two decades. Part of the difficulty is that the infrastructure deficit has been caused by years of neglect associated with war and poverty, but also by Africa’s geographical characteristics, which include low population density, low rates of urbanization, landlocked locations, and relatively small economies.

Regulatory policy and foreign labor management. In South Sudan, the regulatory system is a burden, especially for employment termination. Among the main regulatory measures is the discretionary nature of circulars; lengthy and strict termination procedures, even in cases of fraud or misbehavior; and the establishment of a quota for foreign employees. Given the low level of worker skills and the government's weak enforcement capacity, South Sudan must create simple termination procedures and achieve uniform and market-compatible minimum wages, while protecting employees against labor exploitation.

Another key issue to address is the balance between the need to employ nationals and the need to bring foreign workers with scarce skills. This will become increasingly important in South Sudan as industrial development progresses. Given that skills are one of the critical binding constraints in light manufacturing, promoting incentives for on-the job training should be encouraged. Countries around the world have experimented with a number of different active labor market programs aiming to increase employment. Most common are programs such as job-search assistance, wage subsidies, training, and public works. Such labor market programs can match employers with job seekers. They can provide training, especially where employers, workers, and job seekers underinvest in training. They often buffer an economic downturn by creating temporary jobs or by creating additional incentives for the private sector to hire more workers. Wage subsidies that are linked with training can also increase employment. Experience around the world shows that linking wage subsidy programs, especially among youth and the low skilled, with training could raise employment among disadvantaged groups.

Skills upgrading. Addressing the low skill base of South Sudan is a priority and requires the urgent establishment of a quality universal primary education system that can feed into an expanding secondary and tertiary system. Other measures include finding ways to impart marketable skills to people who are beyond the schooling age. The role of government is critical in this area because of the nature of externalities. Given a scarcity of skills, employers are keen to provide on-the-job training. But they face a high risk that, once trained, workers will move to other jobs or competitors. Hence, this responsibility is bestowed on the government because society as a whole benefits from workers with higher skills. In both countries, the educational background is relatively better among the young urban male population than among other demographic groups, and a good share have completed primary education. Vocational training has been put forward as a key instrument to bridge the gap between basic education and marketable skills.

Overall Sector Policy

Industrial Clusters. In the context of South Sudan, industrial clusters are the best way to deal with a plethora of binding constraints. The agglomeration of enterprises and institutions that are involved in similar or related business within a limited geographical area has long been recognized as an important part of building an economy (Marshall 1920). However, only recently has this strategy been recognized as a solution to overcome obstacles in access to inputs, industrial land, finance, trade logistics, entrepreneurial skills, and worker skills that affect business and industrial development in low-income economies (Dinh et al. 2012). Once firms integrate into a cluster, the entry costs for following firms are lower because of positive external economies (Fujita, Krugman, and Mori 1999).[41] Still, because the solutions offered by a cluster strategy are unique to each country and because firms in particular industries may grow in different ways to break free of local constraints, a cluster strategy must be tailored to the specific features of an economy.

For each subsector, governments should first find out where enterprises are already clustered-- and should ease the most binding constraints within the clusters. Thus, for example, the above analysis has shown that that for wood products, the most binding constraints are access to telecommunications, land, and electricity. Obviously, South Sudan cannot provide access to these three services to everyone in the country, or even in a city, but national government and local government in South Sudan can help firms within the wood cluster have access to these services. The growth of these firms, in turn, will grow the tax base in the long run.

Industrial parks. Successful industrial parks provide enterprises with security, basic infrastructure (roads, energy, water, sewers), streamlined government regulations (through government service centers), and affordable industrial land. Industrial parks also provide technical training, low-cost standardized factory shells that allow entrepreneurs to plug and play, and housing for workers next to the plants. By helping small enterprises grow into medium and large enterprises, China, for example, has avoided a shortage of medium firms—the missing middle—faced by most sub-Saharan African countries. In China, plug-and-play industrial parks have greatly reduced the startup costs and risks for SMEs that have sufficient scale, capital, and growth prospects to take advantage of larger facilities at a phase in their development when they are unable to obtain bank loans. They have also facilitated industrial clusters, generating substantial spillovers as well as economies of scale and scope for Chinese industries. The clusters are promoted through government support for input and output markets.

The African experience with industrial parks over the past two decades—which has mostly involved traditional export processing zones and industrial parks—has not been successful. With the exception of Mauritius and the partial (initial) success of Kenya, Lesotho, and Madagascar, most African zones have failed to attract significant investment, promote exports, or create sustainable employment. Only Mauritius has

41 Externalities are factors whose effects are not reflected in the market price of goods and services.

used industrial parks as an effective vehicle to support economic transformation. Among the causes for this poor performance have been poor strategic planning and a mismatch of comparative advantages; poor locational choices; insufficient investment in infrastructure; and above all, a lack of high-level support and policy stability.

South Sudan should aim to develop such plug-and-play industrial parks next to main towns so as to maximize the scale of operation and eliminate high inland transport costs in the two countries. However, learning from the failure of industrial parks in other African countries, it should first let the private sector decide where they form organic clusters and then help guide and develop these clusters into industrial parks. China's experience in the development of clusters substantiates the argument that the government's role is to support existing cluster firms rather than try to create clusters from scratch. Once clusters expand, the public sector should then become more active in developing general infrastructure (roads, utilities, land) and facilities to meet the specific requirements of emerging clusters (market structures, financial institutions, training programs, quality control mechanisms, and so on). As in China, industrial parks bypass difficult land reform, which can take years to implement. The governments can test a variety of policies before applying them broadly. The demonstration effects overcome political economy constraints.

FDI. Many studies have documented the significant role of FDI in economic development around the world. The experience of numerous economies, including Australia, Canada, Singapore, Taiwan (China), the United States, and, most recently, China and Vietnam, shows how foreign investment has spurred the growth of output, investment, employment, productivity, and exports. FDI contributes to the structural transformation of host economies, technology adoption, and industrial upgrades among domestic firms. FDI enables host nations to gain access to world markets for goods, technology, and capital. FDI, however, is more pronounced in some industries than others. FDI made particularly large contributions to the recent expansion of both China's and Vietnam's apparel industries. China's open-door policy, which marked the beginning of a strong relationship between foreign and domestic investors, helped China become the number one host of foreign capital among developing nations and the biggest exporter of manufactured products, including apparel. Shenzhen's astonishing transformation from a sleepy village to a central component of China's industrial explosion epitomizes the potential of foreign investment.

South Sudan needs to open up and attract FDI on a mass scale, particularly in labor-intensive activities such as those that can develop in South Sudan. Wages will be competitive when the exchange rate is unified and other measures proposed in this report (see logistics below) are adopted. The importance of FDI needs to be stressed by the top policy makers in each country and progress in this area needs to be monitored on a regular basis. The success of Ireland's Industrial Development Authority in the 1960s illustrates this point. The FDI promotion agency was set up in the Office of the Prime Minister and played a critical role in the three phases of the foreign investment cycle: recruitment and screening, embedding, and aftercare.

Logistics. South Sudan should harmonize and improve customs procedures by simplifying procedures and leveraging information technology, particularly along their common border. Delays in customs procedures incur storage costs for containers waiting at the border to be cleared. And the delays and uncertainty for customs clearances damage the reputation of local firms and reduce the prices they can negotiate with global buyers. In the long run, South Sudan and Sudan should also develop hard infrastructure to support multimodal systems combining trucking, railways, airways, and shipping to improve connectivity and increase competition. Furthermore, governments need to increase competition among freight forwarders, shipping, and trucking companies by removing price controls and the restrictions on FDI.

There is a need to greatly simplify the streamlining of procedures and to avoid duplicative and repetitive checks. The process for obtaining all the necessary import and export approvals can be long and time-consuming, especially if laboratory testing is required. In addition, there is a need to adopt a risk-based compliance management approach instead of the existing 100 percent real time documentary and physical intervention in all transactions. In addition to improving levels of trade facilitation, adopting advanced risk management strategies would help improve border security outcomes by directing resources to interventions in high-risk transactions. Previous studies by the World Bank have demonstrated that a lower rate of inspection, as part of a risk-based targeting strategy, can actually result in increased detections by being more effective.

The limited opening hours of the South Sudanese customs also cause significant fluctuations in the daily volume of traffic, hence the volume of customs work, with high concentrations on Mondays. Poor customs infrastructure and staff capacity are serious binding constraints at South Sudanese customs. The lack of modern data management and communication systems makes customs administration inefficient, particularly in terms of interoffice data verification and communication across customs offices.

Reducing input costs. To help enterprises in South Sudan deal with input costs and availability, the authorities should also adopt a two-pronged strategy: they should facilitate access to inputs for light manufacturing by working to improve trade logistics and push to deepen regional integration; at the same time, they should promote efforts to develop the potentially competitive industries that supply key inputs for light manufacturing. Among important policies in this regard are (1) remove import tariffs on all inputs for light manufacturing, even for products destined for national and regional markets; (2) remove restrictions on the exports of key light manufacturing inputs. Export bans are well intentioned, but self-defeating. The objective is to secure a sufficient and cheap supply of raw materials to encourage the domestic processing of goods such as cotton and leather. But prohibiting exports eliminates an important component of demand for these products. This may cause an unintended chain of damaging consequences: reduced output of the targeted materials, increases in their domestic prices, erosion of potential cost advantages for manufactures, and a reduction (rather than the intended increase) in domestic processing of these materials.

Here, we discuss input industry issues in general and propose general solutions. But further in-depth technical analysis of these input industries will be needed on each individual State in or area of South Sudan to solve industry-specific problems such as how to facilitate the entry of competitive producers in livestock (leather and milk), food staples (wheat), industrial crops (cotton), and sustainable forestry (wood) in a way that benefits local communities and preserves the environment. From a political economy perspective, existing distortions and restrictions in input industries inevitably provide benefits to stakeholders even while they impose much larger costs on the economy by impeding manufacturing growth, the expansion of employment, productivity, and exports. In proposing and implementing reforms, an analysis will need to identify the trivial consequences of reform and demonstrate that the private sector losses arising from reforms will be dwarfed by large-scale, economy-wide benefits following successful implementation of the reforms.

Public-private cooperation. In many African countries, the government views the private sector with suspicion, adopting a naïve zero-sum perspective that considers private profit as a consequence of the exploitation or victimization of workers or customers and concludes that the state should capture and redistribute business profits. Such a view consequently pits the private sector against the government, creating the perception that the government undercuts hard-earned profits from entrepreneurs. This relationship cannot and should not exist in South Sudan.

To help grow the light manufacturing sector, policy makers in South Sudan have to cooperate with their respective private sectors and work to overcome the obstacles that hold back private enterprise. Ideally a council with representatives from both the public and private sectors would be an appropriate step toward reform such as the Joint Border Commission. Measures to encourage the establishment of trade associations to help promote the interests of the private sector should be implemented. Moreover, government officials could be tied into an incentives framework that bases their promotions on private sector development.

Subsector Potential And Policy Reforms

Textiles and apparel. As discussed above, the main constraints in textiles and apparel, at an aggregate level, are logistics, security, and access to finance. Experience with other African countries and developing countries in general indicates that resolving these three constraints is time consuming, especially in an environment with inadequate resources. This report recommends that policy makers in South Sudan and nationally undertake interim measures to help produce low-value and niche products, such as uniforms and ethnic clothing, for the domestic and regional markets, areas which face low levels of competition from Asian exporters. Given a shortage in domestic financing and skilled manpower, South Sudan must seek FDI.

Policy makers should actively promote clusters, by designating specific areas for light manufacturing activities and by prioritizing the provision of electricity and roads connecting to major consumer markets (see above). Over time, these areas will become industrial zones and direct policies to promote them can de designed.

Several constraints could be eased simultaneously if a plug-and-play industrial park were available. China has shown that such parks can assist firms by providing affordable access to industrial land, standardized factory shell buildings, and worker housing, as well as training facilities and one-stop shops for complying with business regulations. Industrial parks lower the financing costs and risks for well-performing small firms, allowing them to grow larger even if banks consider them too risky for loans.

The competitiveness of the textiles and apparel sector in South Sudan can be enhanced by reducing the time required to prepare import and export documents. This calls for strong regional cooperation and coordination among agencies. Regional cooperation is even more critical for improving the efficiency of border crossings that affect South Sudan's trade, but are not under the control of the governments of South Sudan and Sudan, such as the intermediate border crossings with third countries.

Labor efficiency in South Sudan is at low levels because of poor worker skills and motivation, outdated equipment (resulting from a long period of industrial decline and lack of investment), small-scale operations, and captive customers. Interviews conducted for this study identify worker skills as a major concern among managers at apparel firms. The governments should encourage workers and managers with the training, incentives, and equipment necessary to improve productivity and product quality, and international donors should support this. Engaging foreign investors in initiatives to upgrade technology and providing technical assistance to train local workers and managers could help Border Region apparel firms boost their productivity and the quality of their products. Chinese firms are much more likely than South Sudanese firms to rely on external experts when introducing new products, changing technologies, or modifying distribution systems, which gives them a strong advantage.

Leather products. South Sudan has the potential to increase its supply of leather products to domestic and regional markets, as well as its exportation of wet-blue and finished leather. The sector benefits from some advantages that could support greater competitiveness over time. Currently, South Sudan and Sudan together have the largest cattle industry in Africa. There is potential to expand the cattle industry by utilizing South Sudan's extensive grazing land (currently exhibiting low cattle density) to meet the domestic and regional demand for beef and dairy products. The leather industry—largely undervalued by-products of the beef and dairy industries—could be expanded in conjunction with these industries. Among the problems faced by this subsector is a failure by farmers to appreciate the potential value of hides and skins. When combined with a lack of knowledge and training, this leads to poor branding, slaughter, and preservation techniques that damage hides and skins. High transport costs and high import tariffs on inputs contribute to the high cost of imported materials.

Among the most immediate measures policy makers can enact is to attract foreign investors. Particularly in tanning, additional foreign investment can boost productivity and quality and strengthen the links between South Sudan's leather products sector and the regional and international market. Another measure is to facilitate knowledge sharing. South Sudan's leather products sector could benefit from better management and design skills, especially if facilitated by external experts. Donors can play an important role in helping to locate and even finance these experts. The survey of SMEs in Africa conducted by the World Bank (Fafchamps and Quinn 2012) finds that one of the main reasons China rapidly industrialized was that Chinese firms rely on external experts at start-up and at subsequent stages (the introduction of new products, changes in technology, modifications in distribution systems). In addition to standard managerial and technical training, South Sudans leather goods sector could benefit from foreign involvement in up-to-date design skills, which would allow firms to manufacture more fashionable products that would appeal to high-end, regional, and international markets. Another way to foster the skills needed to manufacture leather shoes competitively for domestic and regional markets is through collaboration between trade schools and small and medium producers of simple leather products in developing countries. South Sudanese firms should also seek to learn from their regional peers to share lessons related to the leather sector. Better trade logistics would reduce production costs and the shipping process. Efforts to improve trade logistics should be undertaken in collaboration with neighboring countries.

Over the longer term, South Sudan can increase the availability of high-quality leather by promoting the development of the livestock industry. Targeted actions can be taken to encourage the leather, beef, and dairy industries. Efforts to expand the beef and dairy industries will also benefit the leather products sector by increasing the quantity and quality of hides. Benefits include (1) improved disease control, (2) improved breeding and feeding practices, and (3) educated traditional farmers. In particular, educating traditional farmers and improving their animal husbandry skills and market awareness could greatly increase cattle numbers, productivity, and hide quality.

Wood products. The main opportunity for South Sudan's wood products is in the domestic market. Greater international competitiveness might be achievable over the long run with improvements in transport, technology, supply chains, and access to reasonably priced wood. South Sudan exports mostly raw wood and reimports processed wood from other countries, such as standardized low-cost furniture. For example, in 2013, South Sudan imported wood and wood products worth approximately US$1.3 million. South Sudan exported wood products worth less than US$1 million, creating a negative trade balance. The domestic market, mainly the construction industry, consumes most of the processed wood products, including sawn wood. The sector does have a lot of potential as South Sudan has a comparative advantage in growing trees for wood. Over the medium term, the sector could focus primarily on the domestic market to support the construction industry and to meet the demand for products that are currently being imported, but that are relatively simple to make.

Several factors prevent South Sudan's wood products from achieving international competitiveness. These factors include low labor productivity, low capacity utilization, poor managerial and worker skills, old technology, weak supply chains, and market segmentation. Transportation costs for lumber in South Sudan can be high. Importing wood from abroad is also expensive because of international transportation costs. For this reason, wood products have substantial potential for import substitution, contingent upon improvements to managerial and worker skills.

The poor management of the production process and inadequately trained workers are reflected in low-quality products, low labor productivity, and the wasteful use of expensive consumables. In South Sudan workers lack basic education, as well as more specific technical and managerial expertise. Most of the activities take place in the informal sector, which is able to produce at lower costs than the formal sector, to as little as one-third of the costs. This is because informal enterprises benefit from lower overhead, the possibility of tax and fee evasion, the use of manual tools (hence, lower capital and electricity costs), and, in many cases, access to illegally obtained wood. The outcome is a lower-quality product, but one that nonetheless appeals to a large segment of the domestic market (where price is the key consideration).

Policy recommendations in this subsector include (1) improve competition and efficiency in the supply of wood, (2) encourage investment in private wood plantations (which China, Tanzania, and Vietnam have all done successfully) that are close to the main production and demand centers in South Sudan to minimize transport costs; (3) encourage foreign investment in furniture manufacturing; and (4) develop plug-and-play industrial parks and facilitate clustering. Establishing industrial parks could improve the access of smaller firms to utilities, land, finance (using land and machines as collateral), and skills (technical assistance programs, particularly targeted at managers). To improve the efficiency of the supply chain, the parks could incorporate a hardwood drying plant supported through a public-private partnership so that individual producers would not need to invest in expensive subscale drying facilities. A major policy challenge for the government is to find ways to enable informal sector firms, which make up most of the sector, to adopt modern technology and access better information (for example, by helping clusters of informal sector firms specialize, invest, and link up with formal sector firms and markets).

Metal products. EGAT survey indicates that there are a lot of economic activities in this subsector. Many of these firms are small and are operating in the informal sector. The potential for this sector is large over the long term because growth in the domestic and regional manufacturing sectors could boost the demand for fabricated metal products.

Many of the constraints affecting the metal products industry are similar to those affecting light industry in general: poor managerial and technical skills and a lack of modern equipment. These constraints especially affect SMEs. The solutions to these problems include developing plug-and-play industrial parks, which would facilitate the access of small and medium metal product fabricators to utilities, land, finance (using land and machines as collateral), and skills. The governments may also want to establish a business incubator[42] in South Sudan for informal, indigenous firms: international experience has demonstrated the utility of incubator programs, while a survey of micro, small, and medium firms in neighboring countries has found that training and the development of business networks could increase efficiency and competitiveness. In conjunction with an industrial park, a business incubator could meet several of the following needs:

- Information: A relatively low-cost information package might include details on product specifications and prices, as well as sources of the steel and machinery required and the distribution outlets that sell the products.
- Training: If a critical mass of technical capabilities can be developed in the metals industry, spillovers in the form of a well-trained cadre of workers and firm owners could motivate formal sector metal firms to outsource and diversify products with possibilities for export. Options include technical assistance

42 A business incubator is a company that helps new and startup companies to develop by providing essential services such as management training or office space.

programs, particularly among firm managers, and kaizen training; firm financed, machine-specific training provided by equipment suppliers; the use of extension workers to conduct regular on-site visits to assess the evolving needs of smaller firms and provide hands-on assistance; and trade schools to provide subsidized technical training, perhaps established and operated through collaboration among developing countries, but requiring public investment.[43]

- Access to raw materials and equipment: Access to inputs and equipment could be improved through government-facilitated imports of metals and machinery. The government could also provide marketing support by subsidizing advertising for the new products produced in the incubators. Certification that South Sudan metal products meet international quality standards could also improve marketing, and the government may be able to assist firms with certifications.

Agribusiness. Most production costs in agribusiness are associated with raw materials. Consequently, the actions that are most critical to improve South Sudan's competitiveness in agribusiness are on the agricultural production side of the supply chain, reducing the cost of growing crops and rearing livestock, while enhancing agricultural productivity.

South Sudan has great potential for agricultural production. It has a large area (approximately the size of France, with a population of 11 million). At present, less than 5 percent of the land is cultivated, mostly in the greenbelt zone in the southern part of the country and along the Nile River and its tributaries. The Food and Agriculture Organization of the United Nations and the World Food Programme estimate that South Sudanese farmers produce, on average, 0.95 metric tons per hectare, about 60 percent of the output of Ugandan farmers. However, there is potential for commercial farming. For example, Upper Nile State, which has historically had much commercial farming because of its proximity to Sudan, is starting a local effort to survey and demarcate land on a county-by-county level. Most commercial farms still rely on traditional labor-intensive farming methods because machinery remains difficult and expensive to acquire. Virtually all existing projects are self-financed because bank loans are unavailable.

43 Kaizen is a self-help approach to efficiency improvements in organizations, also called lean manufacturing, which includes performance-based human resource management, continual analysis and refinement of quality control procedures, inventory management, and planning. Developed in the manufacturing sector in Japan, the kaizen approach has evolved into what is now a standard set of modern management practices in Europe and the United States.

Among Measures To Improve The Performance Of This Subsector

- Raise agricultural productivity by increasing the adoption of improved technologies through improved access to agricultural extensions and farm demonstration services.
- Improve seed production and distribution. This is often the most important critical first step in developing a competitive agriculture sector. Indeed, there is little point in investing in fertilizers, skills, and irrigation if high-yielding seeds are not available.
- Facilitate access to finance to smallholders in agriculture, livestock, and forestry. Smallholders should be able to use land, livestock, and agricultural outputs as collateral.
- Facilitate access to land by strategic investors in the agriculture, livestock and sustainable forestry sectors.
- Provide technical assistance to smallholders. This can help smallholders connect with strategic investors in agriculture, livestock, and forestry through contract farming around nucleus farms and plantations and also encourage them to respond to new market opportunities. For example, if veterinary extension services can teach smallholders to protect cattle from pests, this would enable them to supply hides of acceptable quality to tanneries serving emergent manufacturers of leather goods.
- Provide public goods in agriculture, livestock, and forestry. Impose disease controls, promote standards, fight illegal logging, and reduce taxes on legal wood.

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Chapter 5: Jobs & Industrialization In Middle-Income Countries

A key channel by which manufacturing contributes to economic development is through learning by doing. This occurs, first, through knowledge externalities derived from imitation activities and later through innovation activities. This is how the industrial revolution spread over time from the United Kingdom to countries in Western Europe, the United States, Russia, and Japan (Chandra, Lin, and Yang 2013). By providing an ever greater variety of inputs, some in the form of new capital goods, and an ever greater degree of technological sophistication, knowledge creation fuels the development and expansion of the manufacturing sector. Initially, technological knowledge can be acquired through the mere imitation of foreign processes, but, while imitation entails decreasing returns, whereas innovation occurs under constant or increasing returns to scale at least for a while, the expansion of the manufacturing sector eventually requires a shift from imitation activities to true innovation (Agénor and Dinh 2013a).

However, this transition may require access to highly skilled labor and other inputs, such as advanced communication and information technologies. These can be critical in the shift from light manufacturing activities (which tend to be associated with an imitation regime) to higher–value added manufacturing (which requires broader and more sophisticated inputs). In this context, after an economy has reached the stage where assembly-type light manufacturing creates jobs, the appropriate development policy should not only emphasize innovation and the knowledge and learning externalities associated with imitation, it must also increasingly foster local absorption capacity and technological innovation for the development of manufacturing. These are the key issues addressed in a theoretical model and in a subsequent study on light manufacturing in Vietnam by Agénor and Dinh (2013b) and Dinh (2013).

Manufacturing may help speed up structural transformation because, unlike agriculture or commodities, manufacturing facilitates the process of upgrading through knowledge. Similar to the predictions of endogenous growth theory, knowledge from spillovers in one manufacturing firm is transmitted to other firms in the economy (Romer 1986). If the process of economic development may be represented as structural transformation through an expansion in the variety of production and an improvement in economic quality, then manufacturing, especially light manufacturing, can serve an economy as a stepping-stone to higher–value added activities.[44]

Many middle-income countries have, however, been unable to make the switch to higher–value added activities and have ended up in a middle-income growth trap, with a substantial slowdown in growth and total factor productivity. With the exception of a few countries in East Asia, most countries that were classified as low income in 1950 have remained so in the first 15 years of the 21st century (Chapter 2). Between 1950 and 2015, only four economies in the world, all East Asian, reached the high-income group after transiting both the lower- and upper-middle-income cycles: Hong Kong, Korea, Singapore, and Taiwan.

The threshold for classifying countries into income groups is an absolute value, which means that, in relative terms, these countries are further from the income level of the developed world, confirming the widening of global inequality. Chapter 2 also shows that the lower-middle-income group does not fare any better. Most of these countries have stayed in the same group since 1950.

In the discussion on industrialization in middle-income countries, it is important to distinguish two groups: the lower-middle-income group and the upper-middle-income group. This distinction is important for two reasons. First, the income ranges are much wider for the middle-income group than for either the low-income group or the high-income group, and, without such a distinction, countries as different as Brazil and Vietnam would be classified into the same income group. Second, it turns out that the transition from the lower-middle-income group to the high-income group is not an easy one, as is clear in this chapter. Of the nine economies that became lower-middle-income after 1950, only two, Korea and Taiwan, graduated to the high-income group, the former in 1994, and the latter in 1995. The rest of the countries that have graduated to high-income status since 1950 were already in the upper-middle-income group to begin with. Both Korea and Taiwan followed an industrialization strategy that emphasized export-oriented development.

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44 Hummels and Klenow (2005) examine the intensive margin (higher volumes of each good), the extensive margin (a wider set of goods), and higher-quality goods over a single year, unlike the process of variety expansion and quality upgrading over time described here.

Middle-Income Traps Or The Slowdown In Growth

A review of the record of global economic growth shows that, before the industrial revolution, the world's per capita income had stagnated at less than US$1,400 (in 1990 PPP U.S. dollars) over the previous 1,600 years (Maddison 2007). The Netherlands was the first economy to reach lower-middle-income status, in 1700. After the industrial revolution, which began in the United Kingdom in the late 1700s, Western countries grew more quickly from low- to middle- and high-income status.[45] Nonetheless, Western countries that had been in the low-income group prior to 1950 took a rather long time to reach upper-middle-income status. For example, in their analysis, Felipe, Abdon, and Kumar (2012) show that it took the European countries in the lower-middle-income group before 1950 an average of 71 years to transition to upper-middle-income status. The median was 67 years. In particular, the Netherlands spent 128 years in the lower-middle-income group, even though it was the first country to reach the category. By contrast, economies that reached lower-middle-income status after 1950 took less time to reach the next higher income group. Hong Kong and Japan took 26 and 35 years, respectively, to transition to the upper-middle-income group. It took the nine economies in this category an average of 34 years to reach the upper-middle-income group, with a median of 28 years. However, this experience is influenced by the East Asian countries. Without the Asian countries, the mean and median number of years in this category would have been 48 and 52 years, respectively. In particular, China took 17 years, while Korea and Taiwan took 19 years. Bulgaria, Costa Rica, and Turkey spent over 50 years in this category.

The transition is more rapid from upper-middle-income status to the high-income group than from lower-middle-income status to the upper-middle-income group. The five economies that were in the upper-middle-income category by 1950 took an average of 19 years to reach high-income status, with a median of 20 years. Switzerland took only 14 years, while New Zealand took 23 years. The United States took 21 years.

The 25 countries that became upper-middle-income economies after 1950 and graduated to high-income status took an average of 15 years and a median of 14 years to make the transition. Both Korea and Taiwan spent only seven years in this category

45 Prior to the industrial revolution, manufacturing was carried out with hand tools in households. Industrialization involves manufacturing in factories, mass production, and urbanization. The development of the steam engine played a central role in the industrial revolution, which was accompanied by improved transportation and communication systems. Felipe, Kumar, and Galope (2017) use the following thresholds for income classification: low-income: less than US$2,000 (1990 PPP U.S. dollars); lower-middle-income: US$2,000–US$7,250; upper-middle-income: US$7,250--US$11,750; high-income: US$11,750 and above.

before moving up, while Japan spent nine.[46]

In the last 65 years, from 1950 to 2015, only four economies, all East Asian, have reached the high-income group after transitioning through both the lower- and upper-middle-income cycles: Hong Kong, Korea, Singapore, and Taiwan. It took these economies an average of 32 years and a median of 31 years to transition through the lower-middle-income group and graduate to the high-income group. Of the four economies, Hong Kong and Singapore are city states; so their development experience may be too specialized as a model for most developing countries. The analysis of this book focuses on Korea and Taiwan.

A number of factors may account for the acceleration in the growth rates of upper-middle-income countries in the last half century. Two factors stand out. They are related to the topic of this book: manufacturing exports and global trade, especially global value chains. This chapter shows that both these factors have led some East Asian countries to grow out of the low-income category quickly, but these factors are also likely to hold countries in the middle-income trap unless specific policies can be designed to break out of the trap.

Is the middle-income trap a recent phenomenon or has it existed throughout economic history? The term middle-income trap was coined by Gill and Kharas (2007), and the literature on why middle-income countries become stuck in this income group and are unable to graduate to high-income status is fairly recent. Nonetheless, as the above review of the world's experience shows, the trap appears to be the norm rather than the exception in the transition from low- to high- income status.

In a comprehensive survey on the middle-income trap, Agénor (2016) notes that the trap is often an imitation trap and can be best viewed as a low, but stable equilibrium into which a country may move. A thorough review of the empirical evidence on the middle-income trap by Agénor (2016) and Im and Rosenblatt (2013) shows that, while there is a host of technical issues, such as selection bias, measurement, and specification error, in identifying the turning points of the slowdowns, the concept of a middle-income trap is useful for an understanding of the experience and policy challenges facing middle-income countries.

Agénor (2016) points out that the causes of the middle-income trap include diminishing marginal returns to capital, exhaustion of cheap labor and imitation gains, insufficient quality of human capital, inadequate contract endorsement and intellectual property protection, and other issues frequently associated with development, such as

46 The longest is Argentina (41 years), but it is not clear that Argentina has graduated to the high-income group. The World Bank has reported delays in the reporting of national income accounts from Argentina. In the World Bank classification, Argentina is still an upper-middle-income country.

distortive incentives and lack of access to both finance and advanced infrastructure. Agénor reviews the cross-country econometric evidence and finds that the slowdown in economic growth associated with a middle-income trap is essentially a productivity slowdown rather than decreasing returns to physical capital accumulation. He argues that, because of the threshold effects in the policies adopted to evade the trap and the fact that these traps are stable equilibria, policy reforms must be bold.

This book distinguishes two types of countries in the middle-income trap. First are the old-timers, countries such as Argentina and Brazil that have been lingering in the middle-income status for a century (whether by relative or absolute measurement). Argentina had much higher per capita income than Australia or Italy in 1920. The factors responsible for this sort of performance include the lack of decisive policy reform (policies not reaching the thresholds, according to Agénor) and the inertia that sets in after numerous policy responses have been tried. These countries have also implemented a less aggressive industrialization strategy. Second are the newcomers, such as Thailand and Malaysia since the late 1990s; among these countries, GDP per capita has slowed after a long period of catching up with upper-middle-income countries (Hill, Yean, and Zin 2012).

The causes for the middle-income traps are different for these two groups of countries, hence the policy prescription would also differ. For the first group, there is evidence that they experienced premature deindustrialization before reaching the high-income status. Both Argentina and Brazil, for example, can be shown in the analysis below to have missed out on both variety and quality of production (approximated by exports). These two characteristics seem to favor manufacturing goods over others. After all, a pound of beef produced 100 years ago is hardly different from a pound of beef produced today, while a television produced five years ago is practically a different product relative to a television today, which requires more human capital, skills, and organization.

For the newcomers, among which the transition to middle-income status has coincided with a second wave of globalization, there is an additional factor: the changing landscape of global trade. Globalization and the intensification of vertically specialized industrialization and associated global value chains have fundamentally changed the industrialization process of these middle-income countries as well as the domestic and trade policies of developed nations (see Chapter 6).

First, the growth pattern that led these countries out of low-income status into middle-income status was based on labor-intensive assembly, whereby domestic producers are confined to low-value activities (such as cut, make, and trim in apparel) for which foreign buyers supply the intermediate goods. The benefits of foreign technology and foreign expertise have therefore not permeated into the domestic sector. In this environment, exports are not equal to value added, which is what counts in economic growth and development. Growth and structural transformation means growth of the domestic industries through moving into higher–value added tasks, either within the same industry or to other industries. In this context, maximization of output (objective of the firm) is different from the objective of the country (maximization of value added).

The approach to upgrading that aims at moving up the value added chain—such as shifting to original design manufacturing or original brand manufacturing—by embarking on more integrated values and creating more products is harder for developing countries to achieve under the vertically specialized industrialization regime. The approach is not merely a national policy at government discretion, but involves lead firms that are often located in developed countries. There is a potential conflict between national policies and policies conducted by lead firms. The conflict arises from the principal-agent problem.

So, unless there are government policies to address this issue, the market will not generate an optimal solution or will only generate a low equilibrium.

Table 5.1 shows the share of foreign value added in gross exports or the extent to which a country's exports is actually accounted for by foreign share. It is clear that the gross exports of newcomer middle-income countries (Malaysia, Thailand, and Vietnam) all have a larger share of foreign value added compared with old-timer middle-income countries such as Argentina and Brazil. China also has a high share (32.2 percent); however, because of the size of its domestic market, the ability to negotiate with foreign companies and to overcome the constraints discussed below is greater in China than in other countries.

Table 5.1. Share of Foreign Value Added in Gross Exports (%) of Selected Economies, 1995–2011

	1995	2000	2005	2008	2009	2010	2011
Country							
Korea	22.3	29.8	33.0	41.8	37.5	39.2	41.7
Argentina	5.7	6.3	13.3	14.9	12.0	13.0	14.1
Brazil	7.8	11.5	11.7	12.5	10.0	10.3	10.8
Malaysia	30.5	47.7	46.0	41.2	40.0	41.7	40.6
Taiwan	30.7	32.3	37.5	44.2	37.9	41.8	43.6
Thailand	24.3	31.9	36.8	39.3	34.6	36.6	39.0
For memorandum							
Japan	5.6	7.4	11.1	15.8	11.2	12.7	14.7
United States	11.5	12.6	13.1	15.6	11.6	13.4	15.0
China	33.4	37.3	37.4	31.8	30.8	32.0	32.2

Viet Nam	21.3	26.9	30.8	35.4	32.9	34.7	36.3

Source: Data extracted on 30 Dec 2016 00:14 UTC (GMT) from OECD.Stat

Second, because of globalization and global value chains, the world is becoming a large pool of cheap labor. Footloose industries can close shop in one country and move to the next if wages begin rising more rapidly than productivity in the first country. This efficient pattern of production and economies of scale mean breaking into the chain to produce new components of the chain, a necessary condition for moving up the value added scale is difficult without a high entry cost (see Annex 2B on the big push). Private enterprises cannot afford to pay this entry cost. There is thus a rationale for government intervention.

Third, the capability to undertake the production of other components in global value chains is critical for a country to move up in value added. In the traditional economic development literature, this is consistent with the development strategy of a country, although there may be a debate on which industries should receive priority. Hirschman (1988), for example, would stress the importance of industries with the highest forward and backward linkages, while Rosenstein-Rodan (1943) would call for a big push investment strategy in a large number of complementary industries. Given that such a decision no longer resides within a country, but is now within the purview of multinational (mostly foreign) corporations, the objectives of which are quite different, the market alone will not automatically lead a country in the desired direction.

In all three cases discussed above, the markets alone will not lead to a high equilibrium where domestic capabilities in the higher value chain, either within the same industry, or in others, will be developed. This calls for a deliberate policy of the government to encourage the market to move to the higher equilibrium.

Higher productivity may also mean fewer jobs, so that there is every incentive at the level of the (foreign owned) firm as well as at the government level to stay at the low equilibrium. When Korea was at the stage where Malaysia and Thailand are now (1965–1975), it pioneered a set of measures to integrate domestic firms into the value chain involving foreign firms thus facilitating the process of technology and knowledge transfer. This is no longer the case today: Thailand has been assembling automobiles for years now but the parts keep coming from Korea and Japan. Yet, the nature and extent of public policy support in areas such as institutional support, skills upgrading, coordination between lead firms and firms in other regional and developing countries, vary by the value chains so that it is becoming harder for governments to forge an effective, across-the-board approach to industrial policy.

The slowdown in productivity among middle-income countries results from premature deindustrialization, which causes a reverse structural transformation akin to that experienced by developed economies and which emphasizes the need for stable equilibria. Premature deindustrialization arises from two factors: (1) the exhaustion of low-cost labor and the imitation of foreign technology and (2) the inability to transition to innovative activities along the lines suggested by Agénor and Dinh (2013b), perhaps because of the lack of decisive policy reform.

The above points may carry additional policy implications over and above the policies normally recommended. For old-timers such as Argentina and Brazil, a total reappraisal of the government incentive system maybe warranted to make sure the incentives for manufacturing and the industrial sector are properly aligned with the objective of rapid industrialization.

In the case of newcomers (Thailand, Malaysia), there is a need for a comprehensive policy to integrate the domestic industries with the foreign owned ones (see Chapter 7).

In his comprehensive review of the middle-income trap, Agénor (2016) notes that the growth slowdown associated with this trap was caused by productivity growth slowdown rather than by input quantity. Following this line and using the tools presented in Chapter 2, we review in detail the production structure of four countries considered to be caught in the middle-income trap (Argentina, Brazil, Malaysia, and Thailand) and compare it with two economies that have escaped these traps, Korea and Taiwan. Table 5.2 summarizes the evolution in per capita GDP of these six economies over 1950–2015.

Table 5.2. GDP per Capita, Six Economies, 1950–2015
(1990 International Geary-Khamis dollars)

Year	**Argentina**	**Brazil**	**Malaysia**	**Thailand**	**Korea, Rep.**	**Taiwan**
1950	4987	1672	1559	817	770	924
1960	5559	2335	1530	1078	1105	1492
1970	7302	3057	2079	1694	1954	2980
1980	8206	5198	3657	2554	4114	5869
1990	6436	4923	5132	4629	8704	9886
2000	8544	5556	7872	6336	14343	16642
2010	10759	7078	10288	9327	21034	n.a.
2015	10950	7102	12341	10537	23761	n.a.

Sources: Maddison 2007; WDI (World Development Indicators) (database), World Bank, Washington, DC (accessed December 28, 2016), http://data.worldbank.org/products/wdi.
Note: World Bank data, in constant 2011 PPP, were converted to 1990 PPP.

What has caused the income of Korea and Taiwan to jump from a fraction of the income of Argentina and Brazil and overtake them? Taiwan overtook Brazil in 1976 and Argentina in 1984; Korea in 1983 and 1988, respectively. It seems that it is not the growth rates of GDP per capita, but the sustainability of the growth rates that matters.

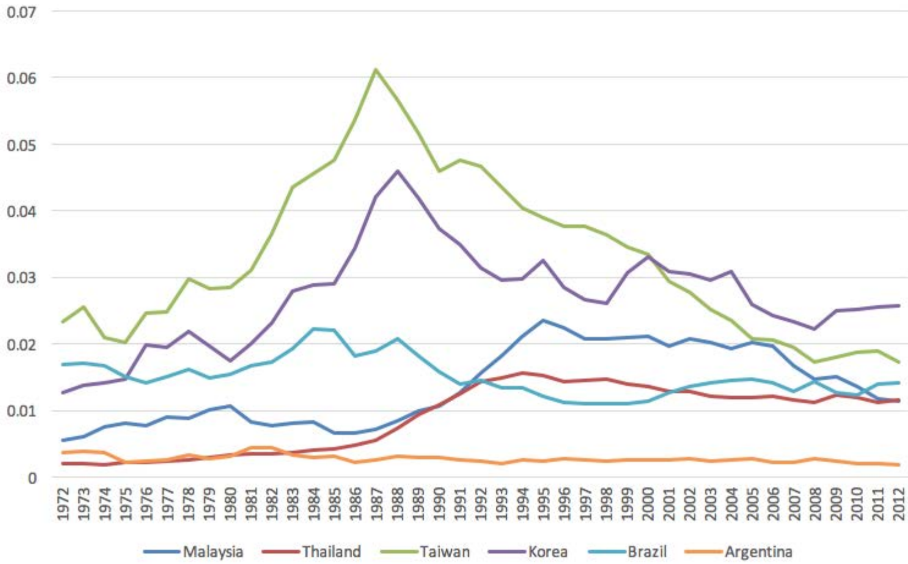
Eichengreen (2013) shows that GDP growth for middle-income countries tends to undergo a bimodal slowdown near US$10,000 and US$16,000, when the economy has absorbed the surplus labor from agriculture and is in a position closer to the technology frontier and where innovation has become much more important.

The growth patterns of Korea and Taiwan show that these two economies transitioned from an imitation stage to an innovation stage in their production and export structure. The result is a diversification in output and a rise in product differentiation and product quality.

To examine in detail the trend in export diversification and export quality of the six economies (Argentina, Brazil, Korea, Malaysia, Taiwan, and Thailand), in the remainder of this chapter we will make use of a detailed U.S. import database (see Chapter 2). Specifically, the remainder of this chapter relies on the National Bureau of Economic Research trade dataset that has been updated using trade data purchased from the U.S. Census Bureau for 2006–2012. The trade dataset provides U.S. import and export values disaggregated according to the Harmonized System, the SITC, and the U.S. Standard Industrial Classification categories.[47] In addition, U.S. tariff Harmonized System data have been added. The database on the years 1972–2006 has been constructed by Feenstra (1996) and Feenstra, Romalis, and Schott (2002). The import data have been extended to 2012. In particular, U.S imports are classified under the 7-digit Tariff Schedule of the U.S. Annotated classification for 1972–1988, while, after 1989, the 10-digit Harmonized System classification is used. This approach has several advantages over using country data. First, detailed data are consistently defined and classified across the economies using the same methodology (U.S. import classification). Second, commodity classification is sufficiently deep for an examination of the common patterns across the exports of these countries. Third, by using U.S. imports instead of world imports, control is possible over exogenous factors affecting the exports of these countries in specific markets, for example, recessions and inflation. Figure 5.1 shows trends in the share of the six economies in U.S. imports over the 40 years from 1972 to 2012.

47 See Instruments and Tools (database), Harmonized Commodity Description and Coding System, World Customs Organization, Brussels, http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools.aspx; SIC (Standard Industrial Classification) (database), Occupational Safety and Health Administration, United States Department of Labor, Washington, DC, https://www.osha.gov/pls/imis/sicsearch.html; SITC (Standard International Trade Classification) (database), Statistics Division, United Nations, New York, https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=14.

Figure 5.1. Share in U.S. Imports, Six Economies, 1972–2012



Source: Author's calculations based on updated NBER trade dataset.

Table 5.3 illustrates the diversity of exports for each economy calculated as the number of products exported, divided by the total number of products imported by the United States in that year and the trends in these data (4-digit SITC rev.2). There are 784 4-digit subgroups under SITC rev.2 and U.S. imports somewhere around 760 of them each year. The table shows that all these economies have experienced some diversification in terms of the number of different products exported, but to various degrees. Both Argentina and Brazil have continuously diversified exports during the period. In Korea and Taiwan, the variety of exports increased markedly in the 1970s and 1980s, while the trend slowed in the 1990s and 2000s; meanwhile, the growth of exports of Korea and Taiwan slowed (see Figure 5.1). More detailed economy-specific analyses are examined in the following sections.

Table 5.3. Share of 4-Digit Products in Total Exports to the United States, Selected Economies, 1972–2012

	1972-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10	2011-12
Argentina	38.5%	41.1%	46.1%	53.8%	53.0%	61.0%	66.5%	63.7%	61.1%
Brazil	55.0%	59.9%	72.7%	76.1%	76.1%	76.9%	81.7%	81.9%	79.3%
Korea	44.2%	55.6%	66.4%	73.2%	72.3%	76.5%	78.6%	79.8%	79.0%
Taiwan, China	57.4%	64.9%	73.3%	76.7%	75.4%	77.4%	77.9%	78.4%	80.2%
Malaysia	21.5%	30.1%	36.4%	41.7%	49.9%	56.6%	61.2%	61.7%	62.4%
Thailand	26.1%	33.7%	43.7%	51.8%	58.2%	64.6%	68.2%	69.4%	70.0%

Source: Author's calculations

The structure of exports is analyzed both qualitatively and quantitatively. The qualitative analysis uses three classifications: (1) the product group, namely, food, agricultural raw materials, fuels, ores and minerals, and manufacturing goods; (2) end use, that is, raw materials, intermediate goods, consumer goods, and capital goods; and (3) technology classification, namely, primary, resource-based, low- technology, medium-technology, and high-technology products.The quantitative analysis uses the export variety and export quality indices presented in Chapter 2.

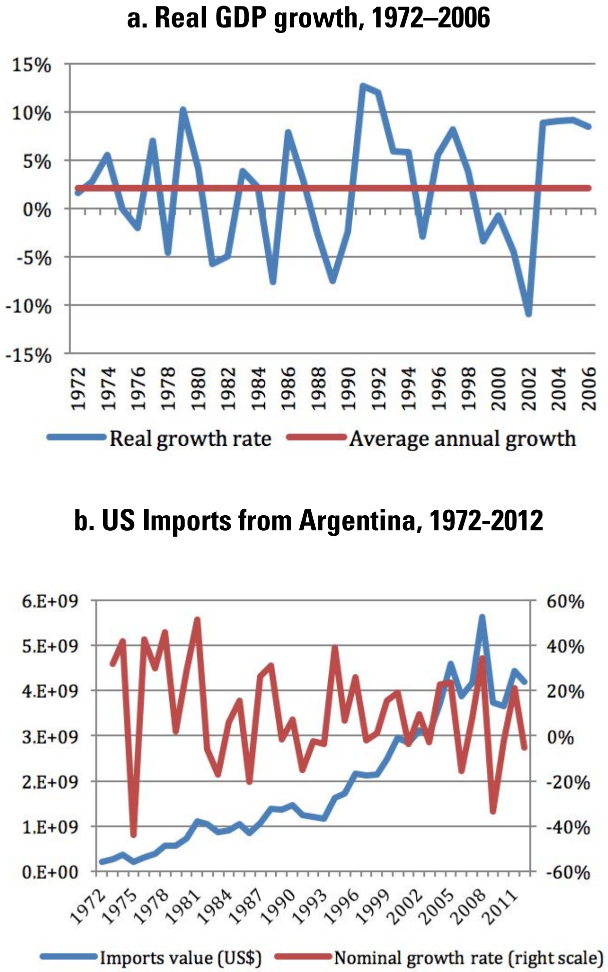
The Old-Timers In The Middle-Income Trap

Argentina

The economic growth of Argentina since the 1970s has been volatile (Figure 5.2, panel a).[48] Each growth spurt or recovery was followed by a deep dip, while the average annual growth rate during the period was at 2.1 percent.

48 Real growth statistics are only available for Argentina to 2006 in WDI (World Development Indicators) (database), World Bank, Washington, DC, http://data.worldbank.org/products/wdi.

Figure 5.2. Real GDP Growth of Argentina and U.S. Imports from Argentina, 1972–2012



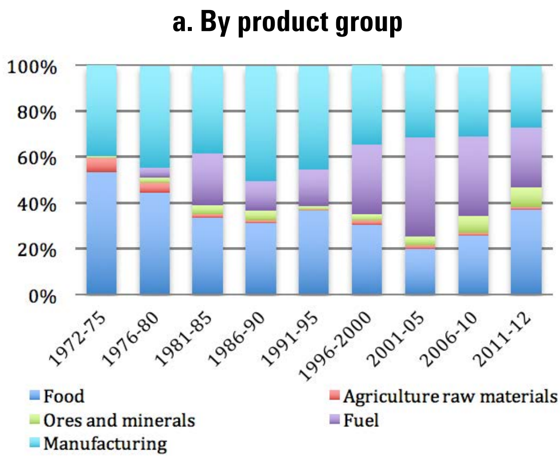
Source: Author's calculations

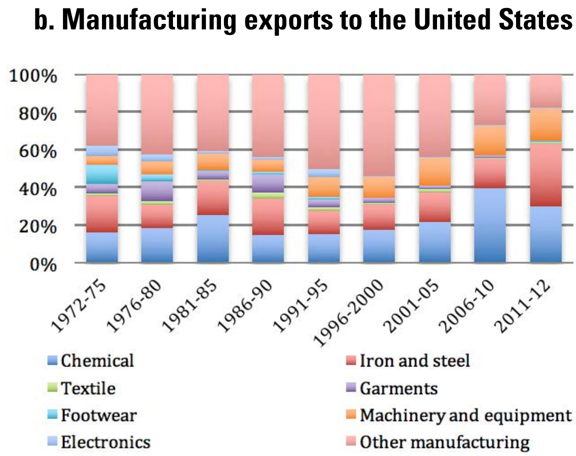
From 1972 to 2012, U.S. imports from Argentina grew 21 times, from a value of US$198 million to US$29.8 billion. The average growth rate was 7.9 percent, lower than the growth rate of total U.S. imports, which was 9.7 percent (Figure 5.2, panel b). In addition, the average annual growth rate of the imports from Argentina was lower than the growth rate of total imports in the United States across all subperiods. As a result, the share of the exports of Argentina in total U.S. imports declined from 0.4 percent in the 1970s to 0.2 percent more recently (see Figure 5.1).

- **Structure Of Exports**

Despite the long-term expanding demands for manufactured goods in the United States, manufacturing exports from Argentina have shrunk, from 45 percent in the late 1980s to less than 30 percent in the last few years (Figure 5.3, panel a). Most exports consist of primary products, particularly food items, fuels and increasingly ores and minerals in the last decade (Figure 5.3, panel a). The main manufacturing exports are chemical, iron and steel, and machinery and equipment (Figure 5.3,panel b).

Figure 5.3. U.S. Imports from Argentina, 1972–2012

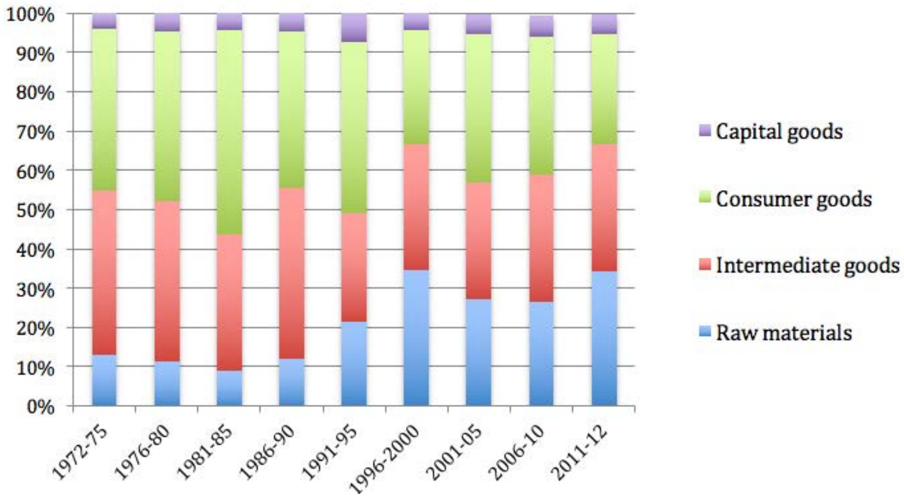




Source: Author's calculations

Figure 5.4 shows the U.S. imports from Argentina by end use, that is, by raw materials, intermediate goods, consumer goods, and capital goods. A shift in exports away from consumer goods toward raw materials took place in the early 1990s. Consumer goods was the largest category during the first two decades under study, accounting for 40 percent to 50 percent of exports, while the share has fallen to around 30 percent recently, and the share of raw materials has grown from around 10 percent to 30 percent. The share of intermediate goods decreased by about 10 percent relative to two to three decades ago. Exports of capital goods remained stable during the whole period, at around 5 percent of total exports to the United States.

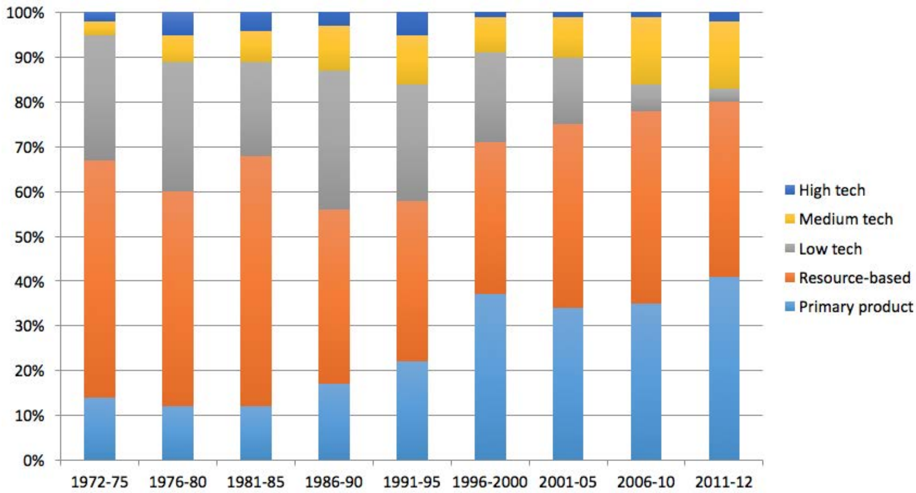
Figure 5.4. U.S. Imports from Argentina, by End Use, 1972–2012



Source: Author's calculations.

Argentina failed to upgrade exports in technological sophistication. The share of primary products rose over time at the cost of low technology manufacturing and resource-based products (Figure 5.5). Medium-technology products exports widened to about 15 percent of total exports. The leading medium-technology products in the category are tubes and pipes of iron or steel (STIC 2: 6782), parts and accessories for motor vehicles (SITC rev.2: 7849), and acyclic alcohols and derivatives (SITC rev.2: 5121).

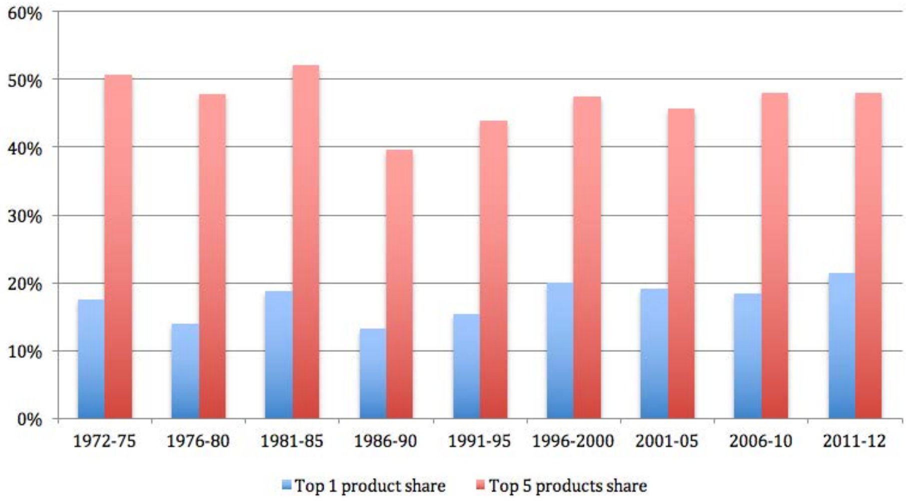
Figure 5.5. Exports to the United States, by Technology Classification, Argentina, 1972–2012



Source: Author's calculations.

Though some diversification took place, the exports of Argentina to the US have been much less diversified compared with the exports of Korea, Taiwan, and even Brazil, its upper-middle-income peer. Argentina exported fewer than 500 different SITC rev.2 4-digit products, while Brazil exported 600 such products. The five leading products among Argentina's exports to the US accounted for 40 to 50 percent of the country's total exports (Figure 5.6; Table 5.4). The leading products were dominated by resource-based items such as prepared meat, refined sugar, fuel oil, fruit and vegetable juices, and primary products, mainly crude oil. Low-technology products such as leather had been traditional among the major exports.

Figure 5.6. Share of Top Export Products in Total Argentina Exports to the US, 1972–2012



Source: Author's calculations.

Table 5.4. The Top 5 Export Products of Argentina to the US, 1980–2012

SITC	Description	Share, %	Tech*	SITC	Description	Share, %	Tech
	1980				**1990**		
0149	Other prepared or preserved meat	16.9	RB1	0149	Other prepared or preserved meat	10.4	RB1
0612	Refined sugars and other prod.	12.2	RB1	6114	Leather of other bovine cattle	10.0	LT1
6114	Leather of other bovine cattle	8.8	LT1	3344	Fuel oils	7.0	RB2
3344	Fuel oils	8.1	RB2	3341	Motor spirit and other light oils	7.0	RB2
9710	Gold	6.5		0585	Juices; fruit and vegetable	5.5	RB1
	2000				**2012**		
3330	Petrol. oils and crude oils	19.3	PP	3330	Petrol. oils and crude oils	21.3	PP
3341	Motor spirit and other light oils	9.8	RB2	1121	Wine of fresh grapes	9.6	RB1
6114	Leather of other bovine cattle	8.7	LT1	7239	Parts of the machinery of 723.41	6.4	MT3

8211	Chairs and other seats and parts	5.9	LT2	0585	Juices; fruit and vegetable	5.4	RB1
0585	Juices; fruit and vegetable	4.1	RB1	6841	Aluminum and aluminum alloys	4.0	PP

Source: Author's calculations

*Note to Table 5.4: The abbreviations in this column, based on Lall's technological classification, refer to the following exports at SITC re. II 3-digit level: PP (primary products) such as fruit; RB1 (agro/forest based products) such as prepared meat; RB2 (other resource based products); LT1 (textile/fashion cluster) such as clothing; LT2 (other low technology) such as pottery; MT1 (medium technology-automative products) such as passenger vehicles; MT2 (medium technology process industries) such as synthetic fibers; MT3 (medium technology engineering industries) such as engines; HT1 (high technology-electronics and electrical products) such as TVs; HT2(other high technology) such as pharmaceuticals. See Lall (2000).

- **Pattern Of Structural Transformation**

This section analyzes the pattern of structural transformation in Argentina based on the University of Groningen database, which contains consistent data on employment, value added, and productivity in a group of developed and developing countries. The methodology was described in Chapter 2 and follows McMillan and Rodrik (2011) and Timmer, de Vries, and de Vries (2014) in measuring the contribution of employment reallocation to productivity growth.

Table 5.5 shows the sector productivity per worker in Argentina from 1999–2010, expressed in thousands of local currency at 2005 prices. The first finding one may notice in the table is that there is a steady improvement in productivity per worker in agriculture and industry, but not in services. Second, compared with the least developed countries discussed in Chapter 4, there seems to be less variation in productivity across sectors. This implies that there is less scope to achieve higher economic growth by shifting activities from low-productivity sectors to higher-productivity sectors. As noted in previous chapters, the scope for transformation seems to vary inversely with the development stage of a country, that is, it is large in the least developed countries, smaller in middle-income countries, and smallest in developed economies.

Table 5.5. Productivity per Worker, by Sector, Constant 2005 Prices, Argentina, 1950–2010

	Thousands of local currency at 2005 prices							Annual Employment growth	
Year	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**	**2010**	**1950–1990, %**	**1990–2010, %**
Agriculture	9	12	17	21	23	34	47	–1.1	–0.9
Mining	61	92	200	320	347	670	263	0.7	4.3
Manufacturing	25	22	38	45	36	61	73	0.4	–0.1
Utilities	15	7	13	26	35	58	83	1.7	0.5
Construction	29	18	23	22	13	26	25	3.0	3.1
Trade, restaurants and hotels	27	31	28	32	19	24	28	2.7	2.2
Transport, storage and communication	18	17	24	36	31	38	72	0.3	2.2
Finance, insurance, real estate and business services	31	30	31	33	20	25	21	3.0	5.1
Government services	29	27	28	25	18	18	18	2.9	3.1
Community, social and personal services	17	17	16	15	11	12	13	2.8	2.5
GDP	21	21	27	31	23	30	34	1.4	2.1

Source: Author's calculation based on 2014 data in GGDC (database), Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen, Groningen, the Netherlands. http://www.rug.nl/ggdc/.

Second, until 1990, productivity in agriculture was lower than economy-wide productivity (see Table 5.5), and there was a steady decline in the share of agriculture in employment during this period, consistent with the needed structural transformation. The problem is that the labor surplus released from the agricultural sector was not being absorbed in manufacturing, where productivity was higher than the average economy-wide productivity. Thus, between 1950 and 1990, employment in agriculture declined by about 1.1 percent a year, while employment in manufacturing remained roughly the same.[49] The sectors that gained the most employment during this period

49 Ordinary least square growth rates were used to avoid end-point arbitrariness.

were government (2.9 percent a year) and community services, both of which showed productivity that was lower than average economy-wide productivity (see Table 5.5). Between 1990 and 2010, this pattern of employment and productivity continued, with a substantial growth in mining and a slight decline in manufacturing. Services continued to absorb most of the growth in the labor force, especially in government and in trade and restaurants. These two sectors accounted for 45 percent of the labor force in 2010, while manufacturing accounted for about 12 percent. Argentina clearly shows the situation of a country where industrialization took place before the country reached high-income status. This is certainly a lesson for other rising middle-income countries.

To investigate the structural transformation issue, the productivity equation is decomposed as explained in Chapter 2, as follows:

$$(1) \qquad \Delta Y_t = \sum_{i=1,n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=1,n} y_{i,t} \Delta \theta_{i,t}$$

The first term in the decomposition is the weighted sum of productivity growth within individual sectors, where the weights are the employment share of each sector at the beginning of the period. This is the within component of productivity growth, which occurs if there is capital deepening or new technology (high variety yield, better inputs, and so on) adopted in the sector. The second term captures the productivity effect of labor reallocations across sectors. It represents sectoral productivity (at the end of the period), multiplied by the change in employment shares across sectors. This second term is the structural change term. If the changes in employment shares are positively correlated with productivity, this term will be positive, and structural change will increase economy-wide productivity growth.

To examine the structural transformation pattern in more detail, the second term in equation 1 is broken down into two effects:

$$(2) \qquad \Delta Y_t = \sum_{i=1,n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=1,n} y_{i,t\text{-}k} \Delta \theta_{i,t} + \sum_{i=1,n} \Delta y_{i,t} * \Delta \theta_{i,t}$$

The structural term—the second term in equation (1)—is broken down into two components, the static and the dynamic reallocation effects (see Chapter 2). The first term of equation (2) is the same as the first term of equation 1. It measures the within effect, that is, the change in sectoral productivity caused by capital, technology, and so on, assuming there is no change in sectoral employment. For example, in agriculture, an improvement in yields derived from a new type of seed or enhanced irrigation infrastructure would lead to a positive change in this within effect even if there is no change in the labor share in the sector. Conversely, a drought or war could cause a drop in agricultural output, leading to a negative within effect.

The second term in equation (2) refers to the between effect, or static structural change, and reflects the change in productivity brought about by the sectoral gain or loss in employment, assuming there is no change in productivity over the period. It thus measures the pure effect of the movement of labor on productivity change.

The third term refers to the dynamic structural change. It is a product of the change in sectoral employment and the change in productivity and therefore indicates the appropriate direction of productivity change. The term is thus positive if the economy is advancing along the path of structural transformation, that is, if resources are being moved from low-productivity to high-productivity sectors. It is negative if the reverse is occurring, that is, if resources are being moved from high- to low-productivity sectors.

Table 5.6 provides the breakdown of these effects over the 60 years from 1950 to 2010. Throughout this period, the dynamic between effect in Argentina was negative, and, during four decades out of six, it was the primary reason growth in overall productivity was less than it should have been. For instance, in the decade from 2000 to 2010, both the within effect and the static between effect were positive, amounting to 1.3 percent and 0.5 percent, respectively. If there had been no adverse structural transformation term, overall productivity growth in the economy would have been 1.8 percent a year. As it turns out, the actual productivity growth was only 1.2 percent a year because of the negative 0.7 percent dynamic between effect, or reverse structural transformation. This effect was large: more than half the productivity growth arising from technological or reorganizational changes in the economy (the within effect). Except for the two decades of the 1980s and 1990s, the second term, which measures the impact on productivity of the movement of workers, was positive.

Table 5.6. The Decomposition of Annual Productivity Growth, Argentina, 1950–2010

					(percentage of annual total productivity change)						
1950-1960	Agriculture	Mining	Manufacturing	Utilities	Construction	Trade, restaurants and hotels	Transport, storage and communication	Finance, insurance, real estate and business services	Government services	Community, social and personal services	GDP
First Term	0.4%	0.1%	-0.4%	0.0%	-0.2%	0.2%	0.0%	0.0%	-0.1%	0.0%	-0.1%
Second Term	-0.2%	0.0%	0.3%	0.0%	0.2%	-0.1%	0.1%	0.0%	0.0%	0.0%	0.4%
Third Term	-0.1%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%
Growth in productivity	0.1%										
First term	-0.1%										
Second Term	0.4%										
Third Term	-0.2%										
1960-1970											
First Term	0.4%	0.3%	1.8%	0.0%	0.1%	-0.1%	0.2%	0.0%	0.0%	0.0%	2.7%

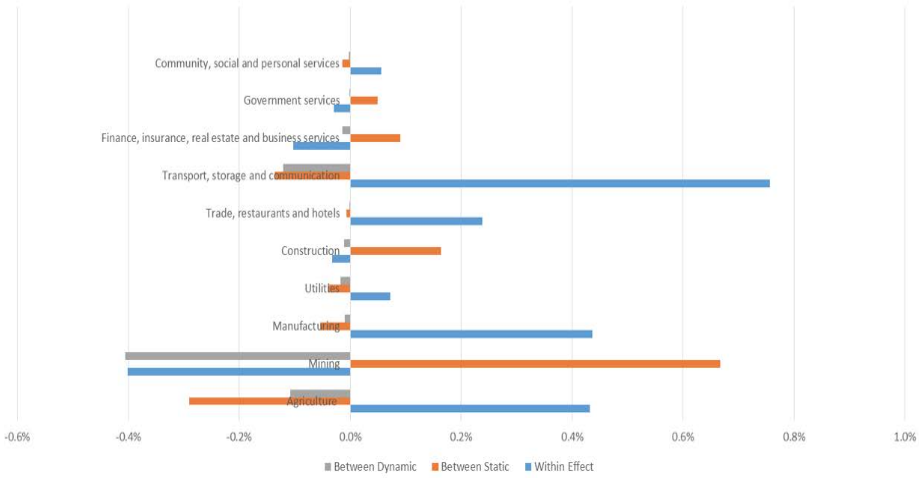
Second Term	-0.2%	0.0%	-0.3%	0.0%	0.2%	0.6%	0.0%	0.0%	0.1%	0.0%	0.3%
Third Term	-0.1%	0.0%	-0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.4%
Growth in productivity	2.6%										
First term	2.7%										
Second Term	0.3%										
Third Term	-0.4%										
1970-1980											
First Term	0.3%	0.2%	0.6%	0.1%	0.0%	0.2%	0.3%	0.0%	-0.1%	0.0%	1.5%
Second Term	-0.3%	0.0%	-0.3%	0.0%	0.2%	0.1%	-0.2%	0.1%	0.4%	0.1%	0.1%
Third Term	-0.1%	0.0%	-0.1%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	-0.3%
Growth in productivity	1.3%										
First term	1.5%										
Second Term	0.1%										
Third Term	-0.3%										
1980-1990											
First Term	0.1%	0.1%	-0.7%	0.0%	-0.3%	-0.9%	-0.1%	-0.2%	-0.4%	-0.1%	-2.6%
Second Term	-0.1%	-0.1%	-0.6%	0.0%	-0.3%	0.3%	0.0%	0.1%	0.3%	0.1%	-0.3%
Third Term	0.0%	0.0%	0.1%	0.0%	0.1%	-0.1%	0.0%	0.0%	-0.1%	0.0%	-0.1%
Growth in productivity	-2.9%										
First term	-2.6%										
Second Term	-0.3%										
Third Term	-0.1%										
1990-2000											
First Term	0.5%	0.5%	1.7%	0.1%	0.4%	0.4%	0.1%	0.1%	0.0%	0.0%	3.8%
Second Term	-0.2%	-0.1%	-0.8%	0.0%	-0.1%	0.0%	0.2%	0.3%	0.2%	0.1%	-0.4%
Third Term	-0.1%	-0.1%	-0.5%	0.0%	-0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	-0.7%
Growth in productivity	2.7%										
First term	3.8%										
Second Term	-0.4%										
Third Term	-0.7%										
2000-2010											
First Term	0.4%	-0.4%	0.4%	0.1%	0.0%	0.2%	0.8%	-0.1%	0.0%	0.1%	1.3%
Second Term	-0.3%	0.7%	-0.1%	0.0%	0.2%	0.0%	-0.1%	0.1%	0.0%	0.0%	0.5%
Third Term	-0.1%	-0.4%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	-0.7%
Growth in productivity	1.2%										
First term	1.3%										
Second Term	0.5%										
Third Term	-0.7%										

Source: Author's calculations

The detailed decomposition of the between effect clearly shows the root cause of Argentina's problem: labor actually moved from high-productivity capital-intensive sectors such as utilities to lower-productivity sectors such as domestic trade and restaurants. In Table 5.5, one may see that the sectors in which employment grew at a higher rate than the average growth rate of the economy (the last row) are the ones in which productivity was lower than average and vice versa. The next chapter shows that this could occur in developed economies such as the United States if the labor force in manufacturing were reduced because of robotization or rising competition from abroad. Figure 5.7 presents the results shown in Table 5.5 for 2000–2010 in graphic terms.

Ideally, in each sector in which productivity is rising (because of technology, efficient reorganization, and so on), the second effect (labor movement to the sector) should be positive, and, conversely, in each sector in which productivity is declining, labor should be moving out. The third effect measures the extent to which this occurs. The fact that this third effect has been negative in all sectors shown in Figure 5.7 indicates that progress has been hampered by a lack of progress in structural transformation. By nature, this structural transformation can only take place in certain sectors. Thus, sectors such as transport and communication exhibit rising productivity, but they do not absorb many workers; so their rising productivity means fewer and fewer workers will be employed as the economy progresses.

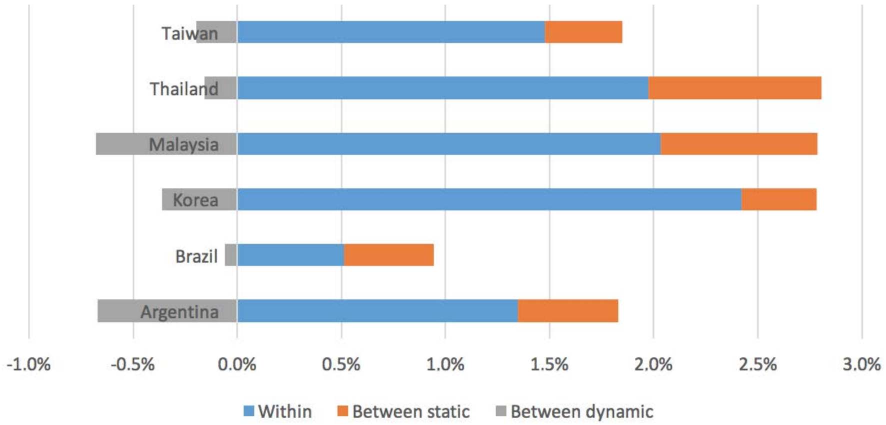
Figure 5.7. Contribution to Productivity Growth, by Type of Effect and Sector, Argentina, 2000–2010



Source: Author's calculations.

Figure 5.8 shows how Argentina performed in terms of structural transformation compared with other countries in Latin America and Asia.

Figure 5.8. The Decomposition of Productivity Growth, Selected Countries, 2000–2010



Source: Author's calculations.

The dispersion in sectoral productivity is also measured in the sample. The productivity gap is expected to shrink as an economy develops so that productivity in agriculture is comparable with productivity in other sectors of the economy. This dispersion indicator refers to the coefficient of variation. Argentina's dispersion remained the same over the years studied.

McMillan, Rodrik, and Verduzco-Gallo (2014) note that, in Latin American and African countries, there was a shift in the labor factor to lower than average productivity, indicating negative structural transformation. Latin America and Africa are the only two regions in the world where this occurs (McMillan and Rodrik 2011). They note that the exchange rate played a role in this process:

"We find that countries that maintain competitive or undervalued currencies tend to experience more growth-enhancing structural change. This is in line with other work that documents the positive effects of undervaluation on modern, tradable industries (Rodrik 2008). Undervaluation acts as a subsidy on those industries and facilitates their expansion." (McMillan, Rodrik, and Verduzco-Gallo 2014, 12)

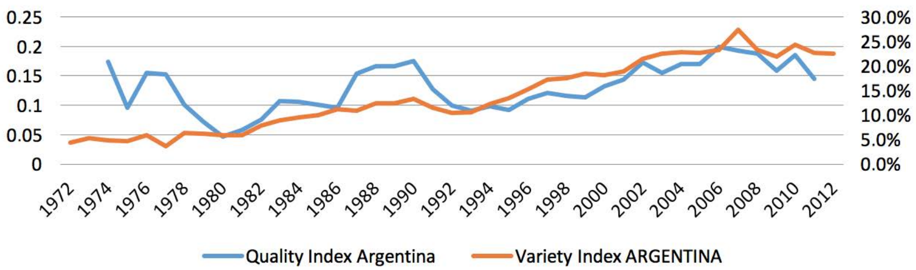
It may be possible that, indeed, the reverse transformation in Argentina may be caused by an overvalued exchange rate.

• Export Variety and Quality

This section computes two indexes that could be used to measure the structural transformation by looking at the variety and quality of manufacturing exports in detail (see Chapter 2). Horizontal diversification (variety expansion) and quality upgrading are two important facets that relate to the transformation of a country's economic structure. The ability to transition from simple low-quality products to sophisticated high-quality products is viewed as a necessary condition for export success and, eventually, economic development (Khandelwal 2010). Our analysis is confined to manufacturing. Quality upgrading tends to be greater in manufactures than in agriculture and natural resources (Henn, Papageorgiou, and Spatafora 2013). Meanwhile, manufacturing exports account for a large proportion of the total exports even in Latin America.

Chapter 2, Annex 2C shows the methodology and detailed calculation of these two indexes. Figure 5.9 shows the performance of these two indexes in Argentina in 1974–2010. Overall, there was hardly any noticeable change in the movement of the quality index, while the export variety index shows improvement between 1974 and 1988 and 2002–2006 and declines or stagnates otherwise. Both indexes are important to Argentina because, to raise value added, the country needs to expand horizontal production and exports, something usually more appropriate to countries at a lower stage of economic development. The rise in value added through higher quality (via innovation activities) is more appropriate for countries at the middle-income stage such as Argentina. Policy makers should pay close attention to this issue.

Figure 5.9. Quality and Variety Indexes in Manufacturing, Argentina, 1974–2010



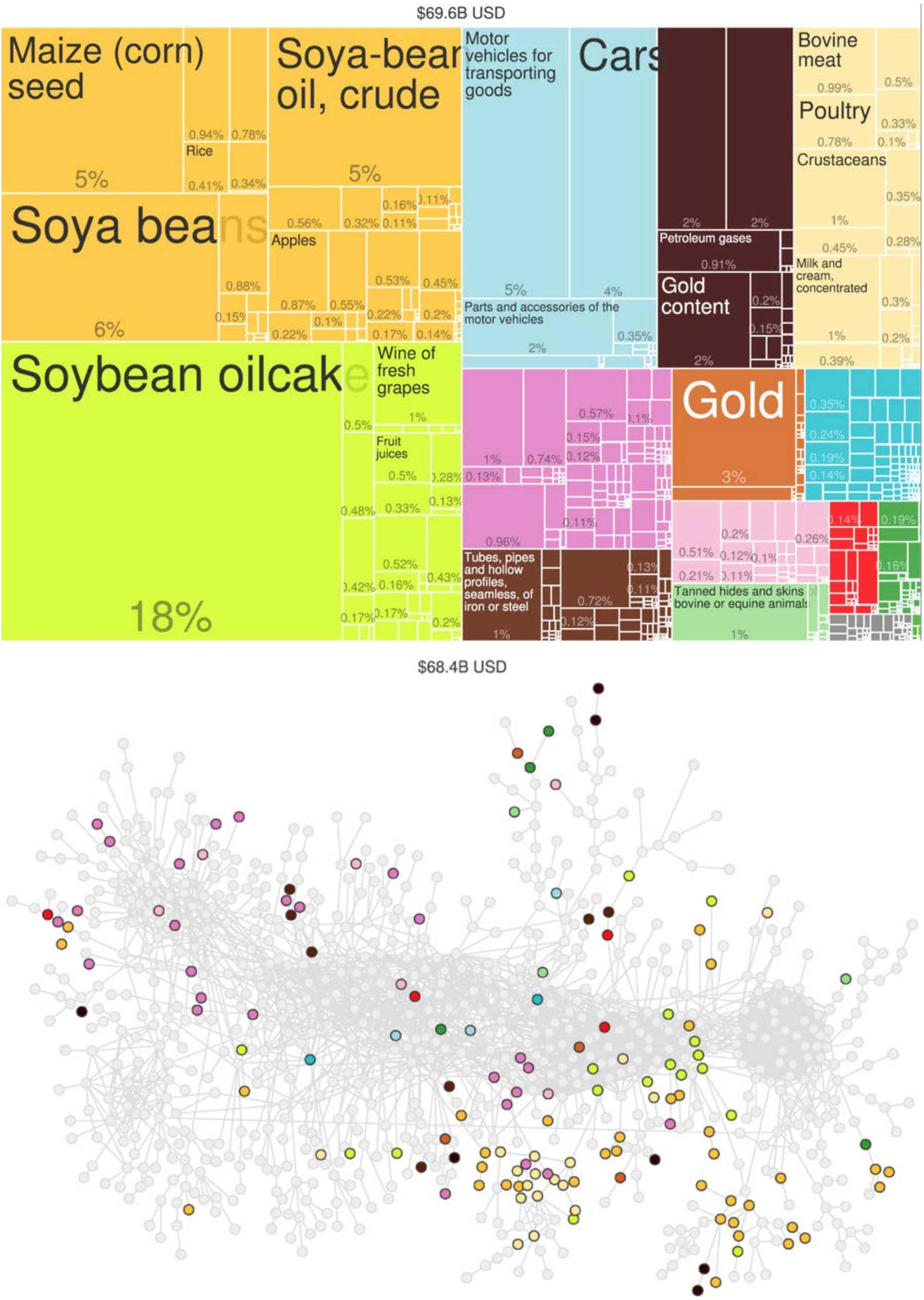
Source: Author's calculations.

• Export Complexity

This pattern can also be seen in terms of economic complexity as proposed by

Hausmann et al. (2014). Figure 5.10 shows the relevant composition of Argentina in 2010.

Figure 5.10. Export Tree Map and Product Space, Argentina, 2010



Source: Hausmann et al. 2014.

Most of Argentina's exports that year consisted of agricultural and commodity products; in fact, despite its higher per capita income relative to Brazil, Argentina ranks far below the latter in terms of economic complexity (60 versus 46), complexity outlook (37 versus 10), expected GDP per capita growth (63 versus 48), and change in economic complexity over 1964–2010 (34 versus 3). The product map in Figure 5.10 shows that the network of products is sparse, indicating that there is room for improvement in productive capabilities.

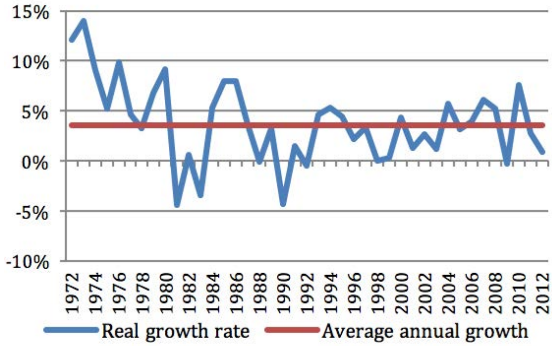
The above analysis on Argentina highlights several features. First, compared with countries that escaped the middle-income trap such as Korea and Taiwan, Argentine exports to the U.S. market were lackluster, and their share of this market was diminishing. Second, the structure of exports was dominated less by manufacturing and more by commodities and raw materials, while manufacturing exports did not perform well. Third, Argentina was experiencing reverse structural transformation. This was because, rather than following the Korea or Taiwan model, labor was moving from agriculture to sectors in which productivity was below the economy-wide average instead of to manufacturing. This was hampering the effort to raise the growth of the economy by boosting overall productivity. Even if capital deepening or new technology did not play a role (that is, even if there were no within effect), creating jobs in the higher-productivity sectors such as manufacturing would have accelerated growth, generated higher income, and created jobs for a growing workforce. Fourth, there is also a lot of room to improve the quality and variety of exports so that Argentina could move up the value added scale. If Argentina is to join the high-income group, greater performance in these areas is needed. In particular, the quality of exports and production would need to be addressed urgently, and this is ultimately related to the country's ability to innovate (Chapter 7).

Brazil

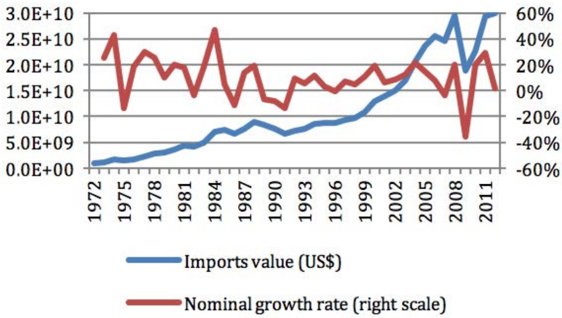
The Brazilian economy recorded an average annual growth rate of 3.8 percent over the 40 years from 1972 to 2012 (Figure 5.11, panel a). After experiencing rapid growth in the 1970s and large volatile growth in the 1980s, Brazil has been on a slow growth path (annual growth rates less than 5 percent) for the most part of the last two decades.

Figure 5.11. Real GDP Growth of Brazil and US Imports from Brazil, 1972–2012

a. Real GDP growth



b. U.S. imports from Brazil, 1972-2012



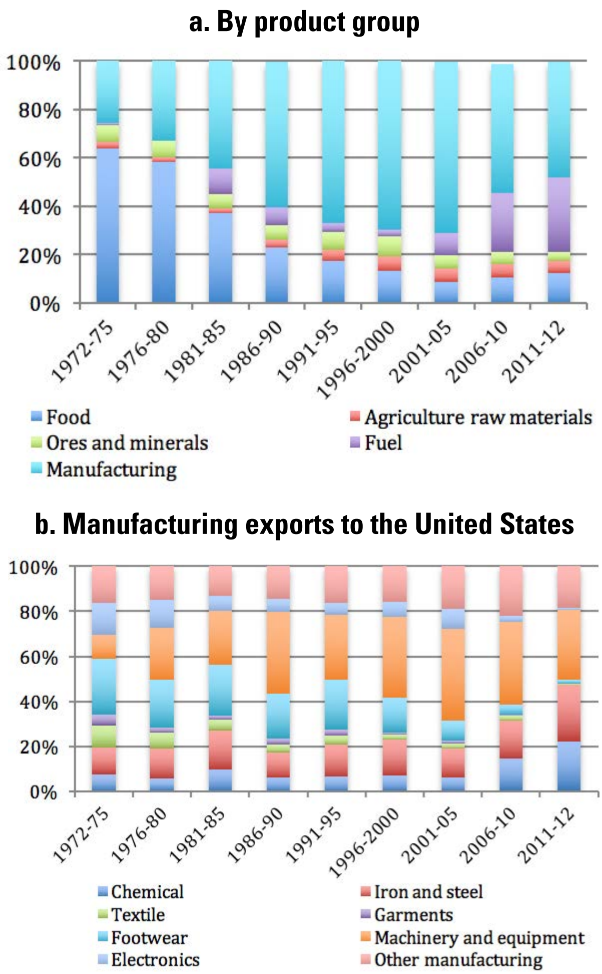
Source: Author's calculations

From 1972 to 2012, Brazilian exports to the United States grew 32 times, from US$924 million to US$30 billion. The average annual growth rate was 9.1 percent, still less than the growth rate of U.S. imports, at 9.7 percent. Exports from Brazil made up 1–2 percent of total U.S. imports.

• Structure Of Brazil's Exports To The United States

Until 2005, the share of Brazilian primary exports to the United States, particularly in food, shrunk rapidly, accompanied by an increasing share of manufacturing exports (Figure 5.12). Manufacturing exports have been the leading export sector, representing more than two thirds of total exports in the early 2000s before its share was reduced to less than half of exports in recent years. The export share of fuels grew sharply after 2008 and reached 30 percent by 2012. Crude oil was the single most significant export of Brazil, making up more than two thirds of fuel exports and 20 percent of total exports to the United States from 2008 to 2012.

Figure 5.12. U.S. Imports from Brazil, 1972–2012



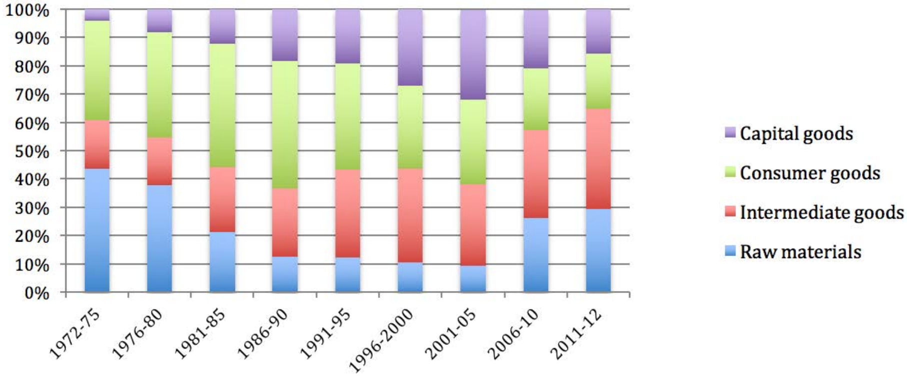
Source: Author's calculations

Machinery and equipment was the main manufacturing export sector, representing around one third of the manufacturing exports since the late 1980s, which has been followed by iron and steel and increasingly chemicals in the last few years. Footwear, one of the leading exports until 1990s, gradually diminished.

Exports of raw material from Brazil to the United States declined from more than

40 percent in the early 1970s to 10 percent of total in the early 2000s, and then rose to 30 percent again recently, driven by crude oil exports. Meanwhile exports of capital goods peaked in the early 2000s at around 30 percent before declining to 15 percent in 2011–2012 (Figure 5.13). The share of intermediate goods has remained stable since the 1990s at around 30 percent, while that of consumer goods declined gradually to 20 percent from more than 40 percent in the 1980s.

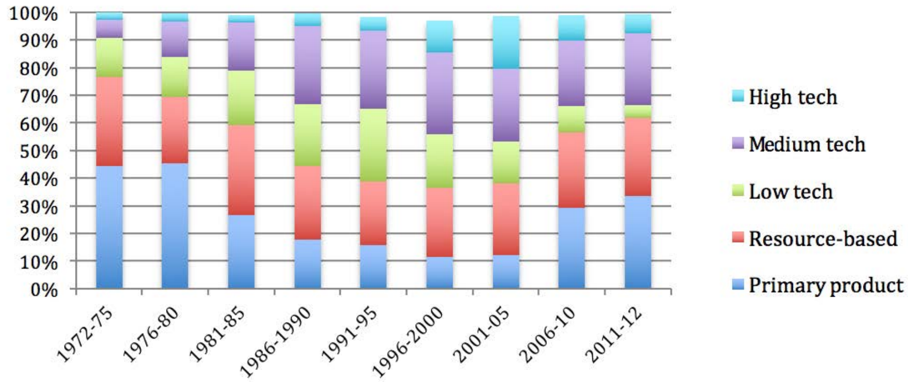
Figure 5.13. Exports to the United States, by End Use, Brazil, 1972–2012



Source: Author's calculations.

The share of Brazil's high-technology exports to the United States has increased over the years. It reached close to 20 percent of the country's total exports to the United States in 2000–2005, but, since then, has declined to less than 5 percent (Figure 5.14). Driven by crude oil exports, the share of primary products in exports rose sharply in the late 2000s. The share of medium technology has remained about the same, about 25 percent since 1990. Footwear had been the leading low-technology exported product of Brazil for the last 40 years. However, after 20 years of sustained growth, its share in exports declined from 18 percent to 2 percent from 1993–2012. The share of resource-based exports had been stable, at 25 to 30 percent of the total. Major products in this category are refined sugar in the 1970s, fruit and vegetable juice in the 1970s and 1980s, petroleum products from the 1980s to the recent period, and chemical wood pulp from the 1990s to the present.

Figure 5.14. Exports to the United States, by Technology Classification, Brazil, 1972–2012

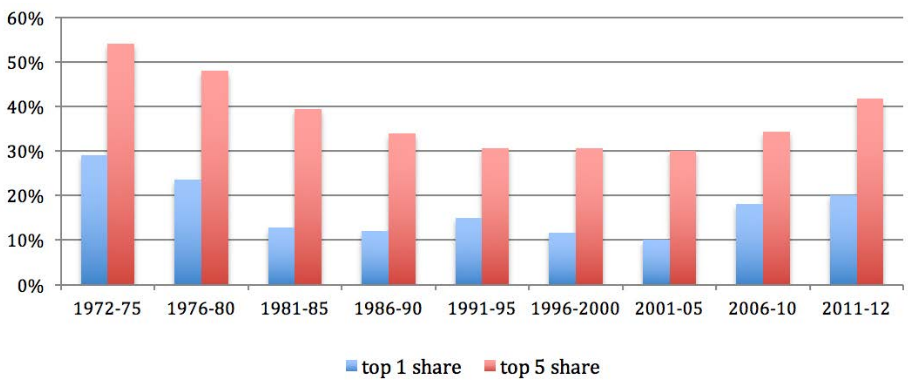


Source: Author's calculations.

At the beginning of the 2000s, crude oil exports accounted for less than 1 percent of total exports to the United States then grew to 10 percent in 2006–2007 and to more than 20 percent after 2008. Crude oil became the leading primary product export, replacing coffee in 2002, and was the leading export also in 2005.

The concentration of exports measured by the share of the top products decreased over the first 30 years. Because of the effect of crude oil exports, the exports of Brazil grew more concentrated after the mid-2000s (Figure 5.15).

Figure 5.15. The Share of the Top 1 and Top 5 Export Products in Brazil Exports to the US, 1972–2012



Source: Author's calculations

Table 5.7 lists the top 5 exports among the country's total exports from 1980 to 2012. Consistent with the findings discussed above, exports shifted from primary products (mainly coffee) toward manufactured and technology-based products in the first 30 years. But, in the last 10 years, the trend has been partially reversed, mainly because of a sharp rise in exports of crude oil.

Table 5.7. The Top 5 Exports to the United States, Brazil, 1980–2012

SITC	Description	Share, %	Tech*	SITC	Description	Share, %	Tech
	1980				**1990**		
0711	Coffee	23.8	PP	8510	Footwear	13.1	LT1
0612	Refined sugars and other prod.	11.2	RB1	0585	Juices; fruit and vegetable	7.0	RB1
8510	Footwear	6.6	LT1	7923	Aircraft, mechanically propelled	4.5	HT2
0712	Extracts of coffee	5.1	PP	3341	Motor spirit and other light oils	3.9	RB2
6744	Sheets and plates	2.8	LT2	0711	Coffee	3.9	PP
	2000				**2012**		
7923	Aircraft, mechanically propelled	11.0	HT2	3330	Petrol. oils and crude oils	18.0	PP
8510	Footwear	8.8	LT1	6725	Blooms, billets, slab and sheet bars	6.5	MT2
6725	Blooms, billets, slab and sheet bars	4.7	MT2	3344	Fuel oils	6.3	RB2
2517	Chemical wood pulp	3.6	RB1	5121	Acyclic alcohols and their halogenate	5.1	MT2
7849	Other parts and accessories of motor	3.2	MT1	0711	Coffee	4.5	PP

Source: Author's calculations.
* See Note to Table 5.4 on technology classification

- **Structural Transformation**

Table 5.8 shows productivity per worker in thousands of local currency at constant 2005 prices by sector. The number of workers in agriculture remained fairly constant from 1950–1980 (in absolute terms) and declined slightly in 1980–2010. Of significance is the growth of labor in the nontradable sectors, such as government, community services, and trade and restaurants, which far exceeds the growth of labor in agriculture and manufacturing. The productivity level in the last two sectors has been below the economy average for the last 30 years.

Table 5.8. Productivity per Worker, by Sector and Employment Growth, 2005 Prices, Brazil, 1950–2010

	Thousands of local currency at 2005 prices							Annual Emp. Growth	
Productivity	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**	**2010**	**1950-1980**	**1980-2010**
Agriculture	1.2	1.5	1.9	2.6	3.4	4.9	7.5	0.1%	-0.3%
Mining	9.1	21.1	47.7	57.1	82.3	141.3	181.6	1.4%	-0.4%
Manufacturing	9.3	16.3	21.9	36.4	21.7	30.6	30.2	2.0%	1.4%
Utilities	24.7	34.5	22.0	64.9	96.8	183.6	216.5	4.0%	-0.7%
Construction	9.4	13.9	13.5	20.6	16.0	16.8	15.6	4.4%	1.5%
Trade, restaurants and hotels	18.1	20.4	23.6	30.7	14.5	13.7	15.1	6.5%	4.0%
Transport, storage and communication	8.3	12.2	20.0	44.7	33.2	38.5	30.9	5.4%	3.7%
Finance, insurance, real estate and business services	31.2	38.0	45.0	54.8	45.9	29.3	32.1	3.0%	2.5%
Government services	27.7	30.8	41.4	43.4	29.9	30.6	31.1	8.2%	3.2%
Community, social and personal services	5.7	6.3	8.4	8.8	6.1	6.3	6.4	6.5%	3.7%
GDP	5.8	8.8	13.3	21.9	17.8	18.6	20.3	6.5%	2.0%

Source: Author's calculations.

From 1950–2010, growth in productivity in Brazil due to structural transformation was uneven. In the 1950s and 1960s, between 5 percent and 7 percent of productivity growth was caused by the dynamic between effect, while, in the 1970s, this effect was only about 2 percent (Table 5.9). In the 1980s, over 42 percent of the decline in productivity was linked to this effect. In the 1990s, the effect actually reduced productivity growth by 60 percent and, in the 2000s, by 11 percent. Thus, by and large, Brazil's growth pattern since the 1980s was based more on technology than on structural transformation. As a result, overall productivity growth slowed considerably, from 4–5 percent a year in 1950–1980 to less than 1 percent a year thereafter.

Table 5.9. The Decomposition of Productivity Growth, Brazil, 1950–2010

	Brazil Productivity Growth Decomposition (percentage of total productivity change)										
	Agriculture	Mining	Manufacturing	Utilities	Construction	Trade, restaurants and hotels	Transport, storage and communication	Finance, insurance, real estate and business services	Government services	Community, social and personal services	GDP
1950-1960											
First Term	0.3%	0.1%	1.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.1%	0.0%	2.7%
Second Term	-0.1%	0.0%	0.0%	0.0%	0.0%	0.3%	0.1%	0.4%	0.5%	0.1%	1.3%
Third Term	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.2%
Growth in productivity	4.2%										
First term	2.7%										
Second Term	1.3%										
Third Term	0.2%										
1960-1970											
First Term	0.2%	0.1%	0.6%	-0.1%	0.0%	0.2%	0.3%	0.2%	0.5%	0.1%	2.1%
Second Term	-0.1%	0.0%	0.2%	0.1%	0.3%	0.3%	0.0%	0.7%	0.3%	0.1%	1.9%
Third Term	0.0%	0.0%	0.1%	-0.1%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.3%
Growth in productivity	4.3%										
First term	2.1%										
Second Term	1.9%										
Third Term	0.3%										
1970-1980											
First Term	0.2%	0.0%	1.1%	0.3%	0.3%	0.4%	0.5%	0.3%	0.1%	0.0%	3.2%
Second Term	-0.1%	0.0%	-0.1%	-0.1%	0.2%	0.2%	0.0%	0.8%	0.6%	0.1%	1.7%
Third Term	0.0%	0.0%	-0.1%	-0.1%	0.1%	0.1%	0.0%	0.2%	0.0%	0.0%	0.1%
Growth in productivity	5.1%										
First term	3.2%										
Second Term	1.7%										
Third Term	0.1%										

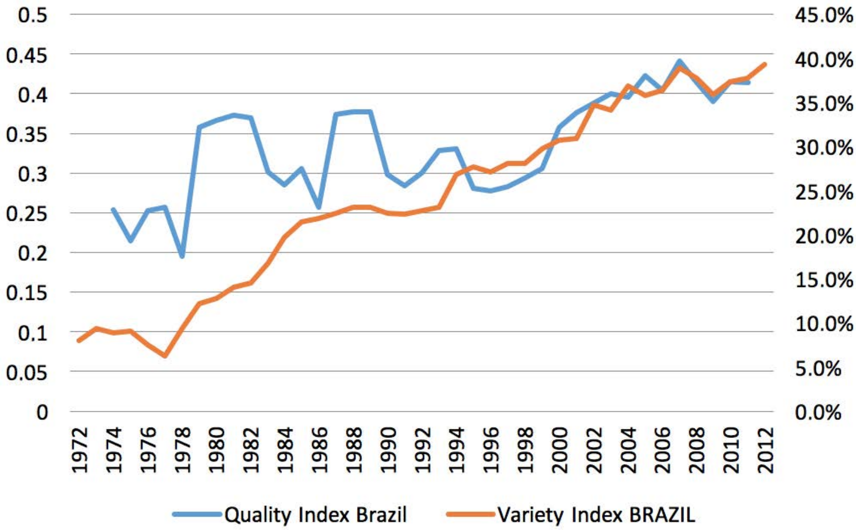
1980-1990											
First Term	0.1%	0.1%	-0.9%	0.1%	-0.2%	-0.9%	-0.2%	-0.4%	-0.6%	-0.1%	-2.9%
Second Term	-0.2%	0.0%	0.4%	0.0%	-0.2%	0.9%	0.2%	0.1%	0.5%	0.1%	1.8%
Third Term	0.0%	0.0%	-0.1%	0.0%	0.0%	-0.5%	0.0%	0.0%	-0.2%	0.0%	-0.9%
Growth in productivity	-2.1%										
First term	-2.9%										
Second Term	1.8%										
Third Term	-0.9%										
1990-2000											
First Term	0.2%	0.2%	0.7%	0.3%	0.0%	-0.1%	0.1%	-0.8%	0.0%	0.0%	0.7%
Second Term	-0.1%	-0.1%	-0.3%	-0.1%	0.0%	0.3%	0.1%	0.1%	0.2%	0.1%	0.1%
Third Term	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.3%
Growth in productivity	0.5%										
First term	0.7%										
Second Term	0.1%										
Third Term	-0.3%										
2000-2010											
First Term	0.3%	0.1%	0.0%	0.1%	0.0%	0.1%	-0.2%	0.1%	0.0%	0.0%	0.5%
Second Term	-0.1%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.3%	0.0%	0.0%	0.4%
Third Term	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%
Growth in productivity	0.9%										
First term	0.5%										
Second Term	0.4%										
Third Term	-0.1%										

Source: Author's calculations.

- **Export Variety and Quality**

Figure 5.16 shows Brazil's performance on the export variety index and the export quality index from 1974–2010. Export variety improved until the late 1980s. This was followed by a long period of decline and stagnation until the early 2000s. Meanwhile, there was hardly any improvement in the overall quality index. These two indexes explain well why Brazil has not been able to graduate to the high-income group.

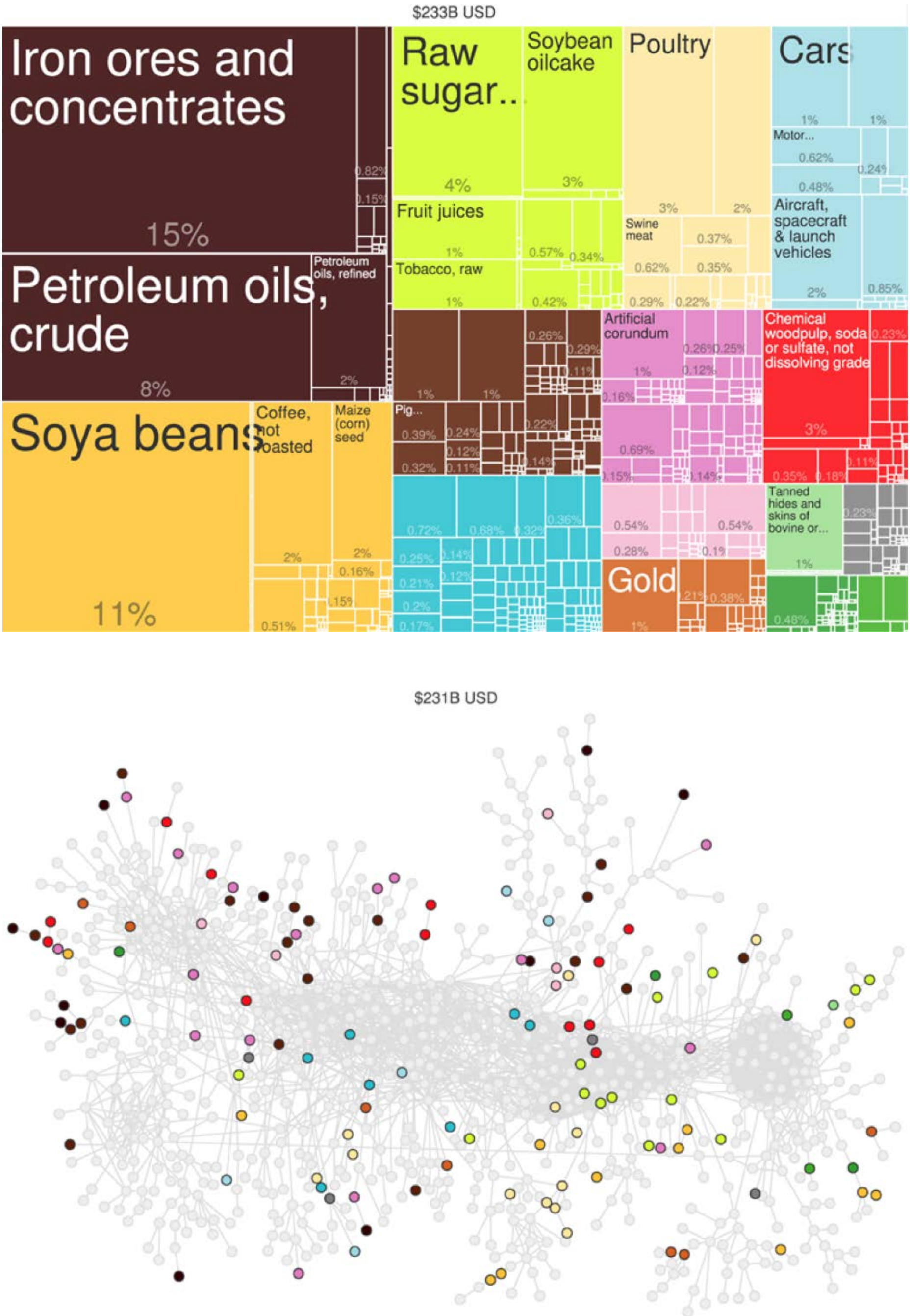
Figure 5.16. Variety and Quality Indexes, Pooled Manufacturing Industries, Brazil, 1972–2012



- **Export Complexity**

In terms of the economic complexity analyzed by Hausmann et al. (2014), Brazil performed well between 1964 and 2010. It ranks high in terms of the complexity outlook index (10th) (Figure 5.17). This is also shown in the product space, which indicates the potential for exports is good: Brazil has a comparative advantage, as indicated by the domestic resource cost, which is greater than 1. These relatively favorable positions, however, reflect the level of complexity due in part to the large size of the domestic economy, rather than the trend, as the above analysis shows.

Figure 5.17. Export Tree Map and Product Space, Brazil, 2010



Source: Hausmann et al. 2014.

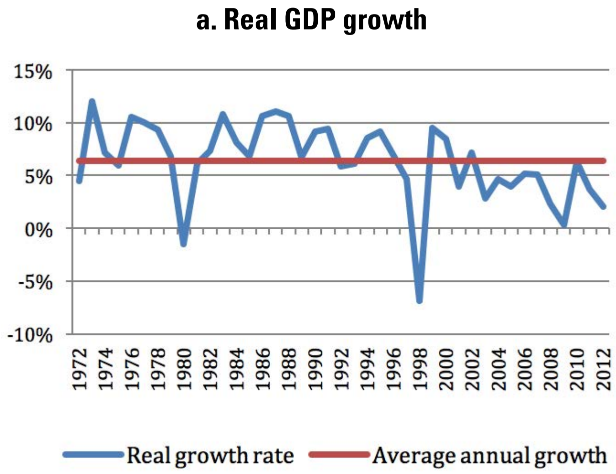
The analysis of the structure of exports and production in Brazil above reveals a pattern similar to the pattern in Argentina. First, Brazil has not been able to keep up with Korea and Taiwan in boosting its share of exports to the United States over the years. Second, the structure of exports and production in Brazil since 2005 has become more dominated by exports of raw materials and commodities rather than manufactures. In parallel, there has been a decline in exports of high technology and a rise in the export concentration (of crude exports). Third, the growth of jobs in less productive sectors such as nontradable services—government, community, trade, and restaurant services—has far exceeded the growth of jobs in manufacturing. Hence, Brazil has experienced a reverse structural transformation in recent decades. Indeed, the dynamic between effect reduced overall productivity growth by 60 percent in the 1990s and 11 percent in the 2000s. As a result, overall productivity growth slowed considerably, from 4 to 5 percent a year in 1950–1980 to less than 1 percent a year thereafter.

The Escapees From The Middle-Income Trap

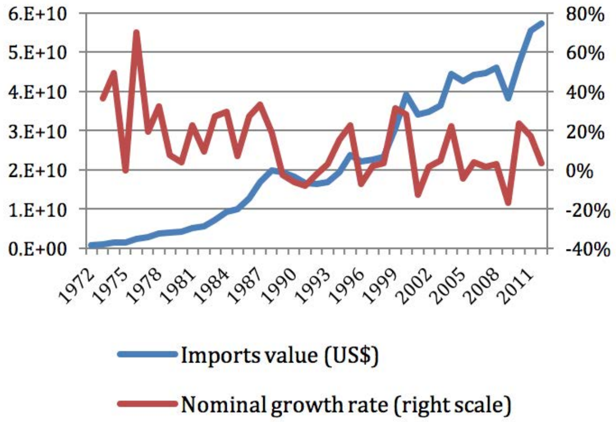
Republic Of Korea

Korea has experienced sustained rapid economic growth in the three decades from 1972 to 2002, except for the contractions in 1980 and the financial crisis of 1998 (Figure 5.18, panel a). The growth slowdown in the 2000s reflected the maturity of the economy.

Figure 5.18. Real GDP Growth of Korea and U.S. Imports from Republic of Korea, 1972–2012



b. U.S. imports from Korea, 1972-2012



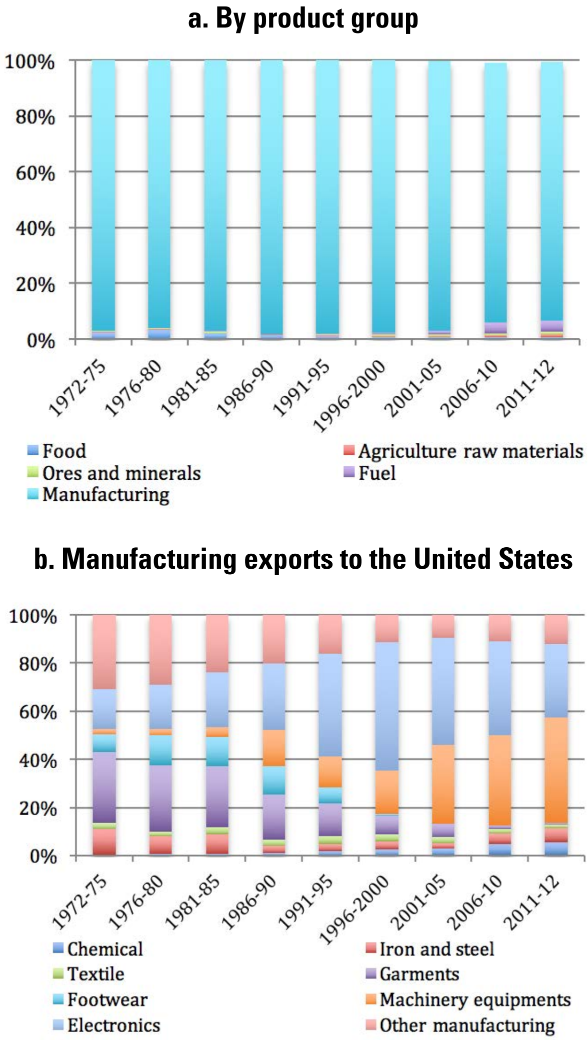
Source: Author's calculations

The growth rates of Korean exports to the United States in the 1970s and 1980s were greater than the growth rates of total U.S. imports (see Table 5.1; Figure 5.18, panel b). In the past 20 years, however, export growth fell short of U.S. import growth; in the 2000s, it slowed to 3 percent a year.

- **Structure of Exports**

More than 90 percent of the Korean exports to the United States were manufacturing goods over the entire period (Figure 5.19, panel a). In addition, Korea exported around 4 percent of refined petroleum products in recent years. Within manufacturing exports, the prominent trends are the diminishing share of garments and footwear exports, the expansion of electronic products exports until the late 1990s, and the growing share of machinery and equipment exports from 1990s onward (Figure 5.19, panel b).

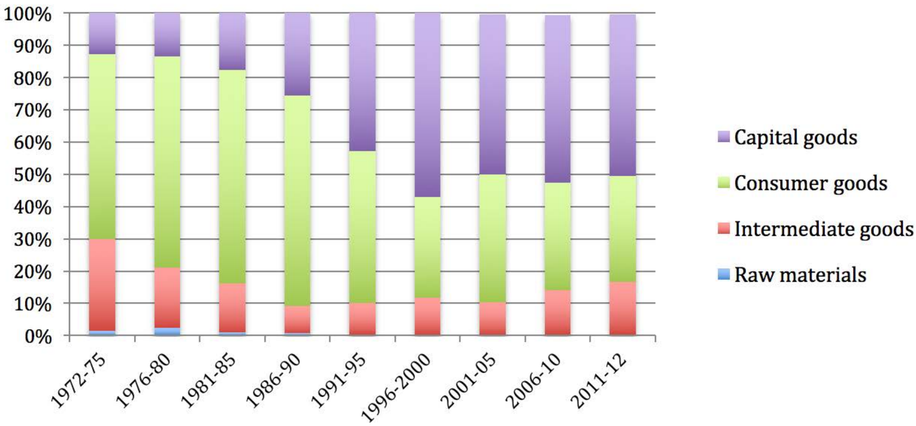
Figure 5.19. U.S. Imports from the Republic of Korea, 1972–2012



Source: Author's calculations

In terms of end use, capital goods exports took over consumer goods and became the leading export group to the United States since the late 1990s (Figure 5.20). Exports of intermediate goods shrank sharply in the 1970s and 1980s before growing moderately beginning in the 1990s. The main products within this category are chemicals, metal products, and some machinery parts.

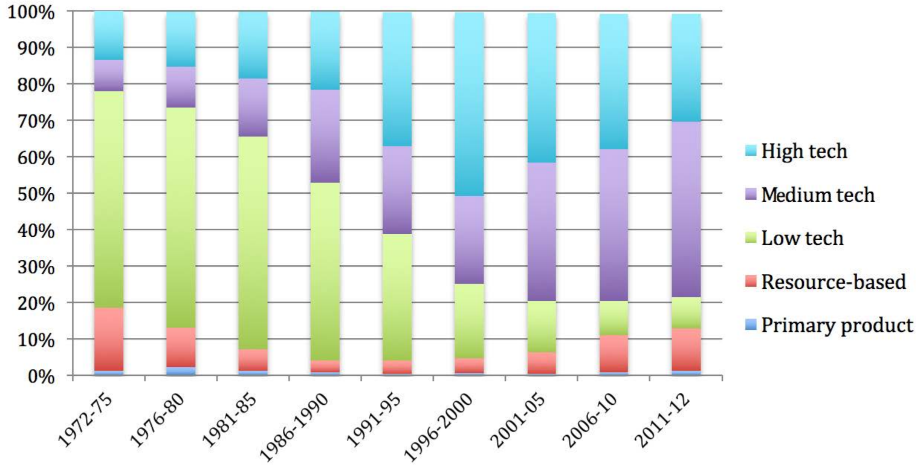
Figure 5.20. Exports to the United States, by End Use, Republic of Korea, 1972–2012



Source: Author's calculations.

The composition of Korean exports to the United States by technology classification is shown in Figure 5.21. The decrease of the share of low-technology products was driven by garments and footwear exports, and, to a lesser extent, by other low-technology exports. The fall in the share of high-technology export products since the late 2000s is attributed mainly to electronic and electrical products, including electronic microcircuits (SITC category 7764) and computer peripherals and parts (SITC categories 7525 and 7529). For example, exports of electronic microcircuits peaked in 1995 at 29 percent of total exports and then fell to less than 5 percent in 2012. The leading medium-technology products include motor vehicles, auto parts, industrial machines, and some metal products. The boom in motor vehicle exports contributed to the sharp rise of the share of medium-technology products in total exports in the early 2000s. In more recent years, the share of auto parts and industrial machinery has been rising.

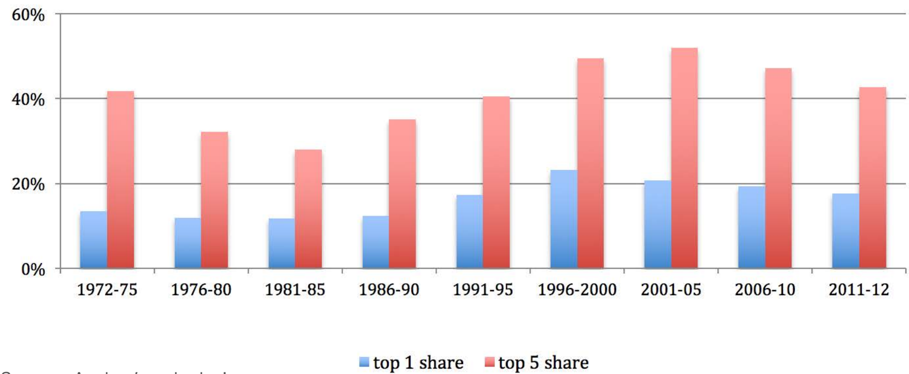
Figure 5.21. Exports to the United States, by Technology Classification, Republic of Korea, 1972–2012



Source: Author's calculations.

The concentration of Korea's exports to the United States declined between 1972 and 1985 and then increased until 2005 (Figure 5.22). Since then, it has declined slightly. The leading product now accounts for more than 15 percent of total exports by the country to the United States, and 40 percent to 50 percent of the exports were contributed by the top 5 export products.

Figure 5.22. The Share of the Top 1 and Top 5 Export Products in Korea Exports to the US, 1972–2012



Source: Author's calculations.

The structural shift of Korean exports is also shown in the change in the top products

(Table 5.10). The process of moving from footwear and garments to electronics and then to motor vehicles is fully consistent with the findings of the analysis above. Recall that Korea became a high-income country in the mid-1990s, while Taiwan's transition took place in the late 1980s.

Table 5.10. The Top 5 Exports, Republic of Korea, 1980–2012

SITC	Description	Share, %	Tech*	SITC	Description	Share, %	Tech
		1980				**1990**	
8510	Footwear	13.8	LT1	8510	Footwear	14.0	LT1
6783	Other tubes and pipes	5.2	MT2	7764	Electronic microcircuits	9.1	HT1
8441	Shirts	4.8	LT1	7810	Passenger motor cars	6.1	MT1
7764	Electronic microcircuits	4.7	HT1	8481	Art. of apparel and clothing accessories	5.3	LT1
8451	Jerseys	3.1	LT1	7525	Peripheral units	3.9	HT1
		2000				**2012**	
7764	Electronic microcircuits	18.7	HT1	7810	Passenger motor cars	19.0	MT1
7810	Passenger motor cars	12.2	MT1	7643	Radiotelegraphic and radiotelephonic transmitters and receivers	7.9	HT1
7643	Radiotelegraphic and radiotelephonic transmitters and receivers	7.5	HT1	7849	Other parts and accessories of motor	6.7	MT1
7599	Electronic parts of and accessories	7.2	HT1	7764	Electronic microcircuits	4.7	HT1
7525	Peripheral units	5.7	HT1	3344	Fuel oils	3.7	RB2

Source: Author's calculations.
* See Note to Table 5.4 on technology classification

- **Structural Transformation**

Table 5.11 shows productivity per worker in Korea by sector in thousands local currency at constant 2005 prices. The number of workers in agriculture remained fairly constant between 1963 and 1980 in absolute terms, but declined significantly between 1980 and 2010. Labor growth remained moderate during 1980–2010, and the growth in manufacturing employment continued to be strong (6.2 percent a year) until 1990, a few years before Korea graduated to high-income status, before dropping thereafter. Finance and insurance also took up the surplus labor from agriculture, growing at almost 8 percent and 11 percent a year from 1963–1980 and 1980–1990, respectively. Productivity in finance and insurance remained above the economy-wide average until 2000.

Several features of the exceptional structural transformation of the Korean economy stand out during the period before Korea became an industrialized economy. First, manufacturing employment grew by over 8 percent a year on average from 1963 to 1988, when it reached a peak of 28 percent of total share before starting to decline. Second, in 1986, the manufacturing sector overtook agriculture as the largest employment sector in the economy for the first time. Between 1963 and 1988, the agriculture sector shed 1.3 million workers while the manufacturing sector created 4.1 million more jobs. Third, employment in finance and insurance expanded rapidly during this period, by 10 percent on average a year, but this service sector also had a higher productivity than the economy-wide average (Table 5.11).

Table 5.11. Productivity per Worker, by Sector and Annual Employment Growth, 2005 Prices, Republic of Korea, 1963–2010

	Thousands of local currency at 2005 prices						**Annual Emp. Growth**	**Annual Emp. Growth**
	1963	**1970**	**1980**	**1990**	**2000**	**2010**	**63-80**	**1980-1990**
Agriculture	2038.6	2771.2	3284.6	6626.3	11093.6	17019.1	0.5%	-4.0%
Mining	13588.4	10858.5	17197.9	26710.2	114909.3	104208.7	1.7%	-1.1%
Manufacturing	2935.1	4736.1	8588.9	15216.7	39609.8	65365.6	10.7%	6.2%
Utilities	3641.3	9934.5	28194.4	72845.5	199564.7	299523.1	6.8%	6.7%
Construction	7367.4	19803.0	17801.6	29871.1	31059.3	31770.7	9.5%	3.9%
Trade, restaurants and hotels	4252.4	5887.6	6559.5	11221.7	13657.6	17632.1	5.8%	3.7%
Transport, storage and communication	3035.7	6158.5	11565.5	17015.2	31997.7	39599.7	5.8%	4.5%
Finance, insurance, real estate and business services	71261.5	60965.5	37350.7	34062.0	26254.5	21072.5	7.7%	11.0%
Community, social and personal services	28789.0	28529.1	33954.6	32844.3	33694.7	33476.6	3.6%	6.0%
GDP	6082.6	8304.3	10830.5	17942.3	26570.3	33761.3	3.9%	2.9%

Source: Author's calculations.
Note: There is no government services sector: it is part of community and social services.

Table 5.12 illustrates the decomposition analysis of productivity growth in Korea since 1963, the first year for which data on employment and output are available in the database. From 1963–1970, the growth in productivity was high because of structural transformation: more than half the growth in productivity was associated with the second and third terms in equation 2. Productivity growth slowed in 1970–1980, when the dynamic between effect was slightly negative, indicating that some reverse movement to less productive sectors was taking place, although this effect was more than offset by labor movement from less to more productive sectors, so that the structural transformation effect was still highly positive, accounting for over 40 percent of productivity growth. In the 1980s , overall productivity was high, averaging 4 percent to 5 percent a year, and the structural transformation effect—the sum of the second and third terms—was still significant, accounting for 37 percent of productivity growth. This effect became slightly negative in the 1990s as Korea became an industrialized country and in the first decade of the 21st century.

Table 5.12. The Decomposition of Annual Productivity Growth, Republic of Korea, 1963–2010

	Agriculture	Mining	Manufacturing	Utilities	Construction	Trade, restaurants and hotels	Transport, storage and communication	Finance, insurance, real estate and business services	Government services	Community, social and personal services	GDP
1963-1970	**(percentage of annual total productivity change)**										
First Term	0.9%	0.0%	0.3%	0.0%	0.7%	0.4%	0.2%	-0.2%	0.0%	-0.1%	2.2%
Second Term	-0.5%	0.1%	0.3%	0.0%	0.1%	0.3%	0.0%	0.4%	0.0%	1.5%	2.2%
Third Term	-0.2%	0.0%	0.2%	0.0%	0.1%	0.1%	0.0%	-0.1%	0.0%	0.0%	0.2%
Growth in productivity	4.5%										
First term	2.2%										
Second Term	2.2%										
Third Term	0.2%										
1970-1980											
First Term	0.3%	0.1%	0.6%	0.0%	-0.1%	0.1%	0.2%	-0.3%	0.0%	0.7%	1.6%
Second Term	-0.5%	0.0%	0.4%	0.0%	0.7%	0.3%	0.1%	0.8%	0.0%	-0.5%	1.2%
Third Term	-0.1%	0.0%	0.4%	0.0%	-0.1%	0.0%	0.1%	-0.3%	0.0%	-0.1%	-0.1%

Growth in productivity	2.7%										
First term	1.6%										
Second Term	1.2%										
Third Term	-0.1%										
1980-1990											
First Term	0.8%	0.1%	1.1%	0.1%	0.5%	0.7%	0.2%	-0.1%	0.0%	-0.1%	3.3%
Second Term	-0.4%	-0.1%	0.3%	0.0%	0.2%	0.1%	0.0%	0.8%	0.0%	0.9%	1.9%
Third Term	-0.4%	0.0%	0.2%	0.0%	0.1%	0.1%	0.0%	-0.1%	0.0%	0.0%	0.0%
Growth in productivity	5.2%										
First term	3.3%										
Second Term	1.9%										
Third Term	0.0%										
1990-2000											
First Term	0.4%	0.2%	3.1%	0.2%	0.0%	0.2%	0.4%	-0.2%	0.0%	0.1%	4.4%
Second Term	-0.2%	0.0%	-0.3%	0.0%	0.0%	0.2%	0.0%	0.8%	0.0%	0.5%	1.0%
Third Term	-0.1%	-0.1%	-0.8%	-0.1%	0.0%	0.1%	0.1%	-0.2%	0.0%	0.0%	-1.2%
Growth in productivity 2000-2010	4.0%										
First term	4.2%										
Second Term	1.0%										
Third Term	-1.1%										
2000-2010											
First Term	0.2%	0.0%	1.8%	0.1%	0.0%	0.4%	0.2%	-0.2%	0.0%	0.0%	2.4%
Second Term	-0.1%	0.0%	-0.3%	0.0%	0.0%	-0.2%	0.1%	0.4%	0.0%	0.5%	0.4%
Third Term	-0.1%	0.0%	-0.2%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	-0.4%
Growth in productivity	2.4%										
First term	2.4%										
Second Term	0.4%										
Third Term	-0.4%										

Source: Author's calculations

- **Export Variety and Quality**

Figure 5.23 shows the performance of the Korean economy in export variety and quality. Both indexes have shown steady improvement, particularly export variety. The two subsectors that did well are the machinery and transport subsetor and the electronics subsector (Figures 5.24 and 5.25).

Figure 5.23. Variety and Quality Indexes, Pooled Manufacturing Industries, Republic of Korea, 1972–2012

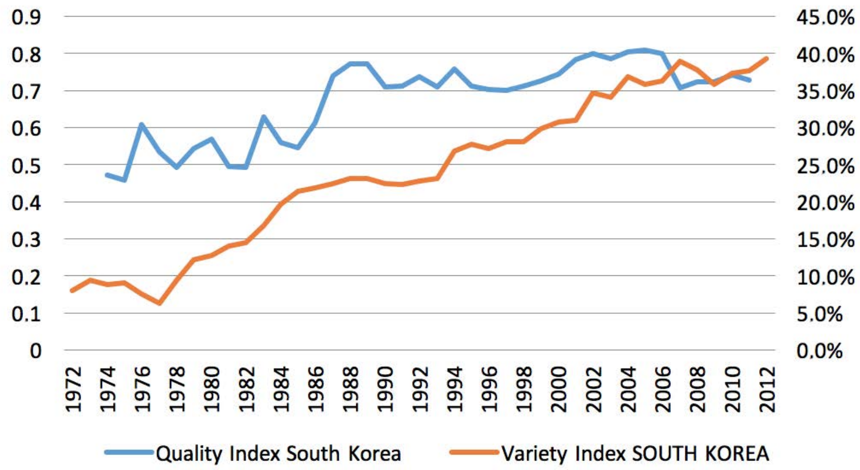


Figure 5.24. Variety and Quality Indexes, Machinery and Transport, Republic of Korea, 1972–2012

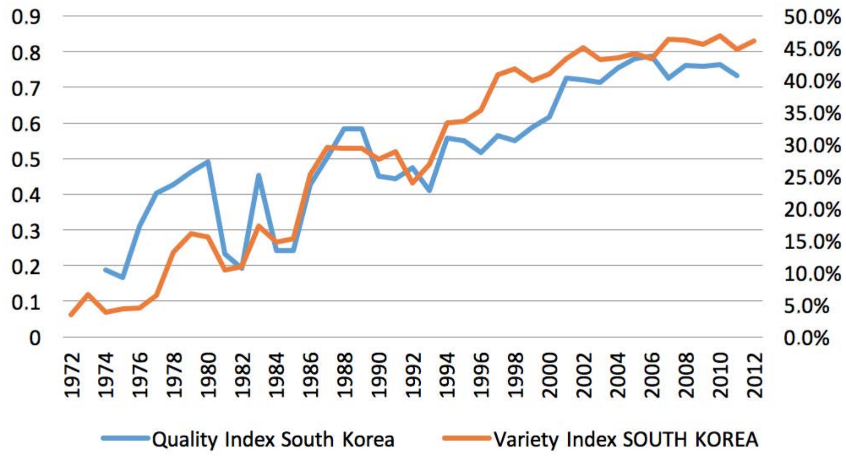
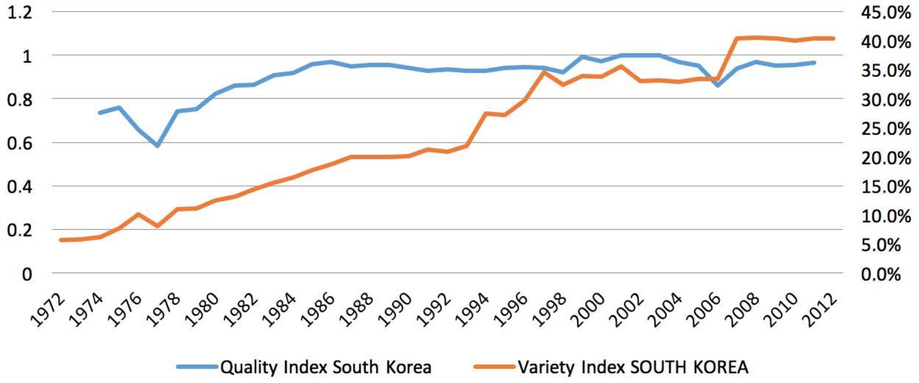


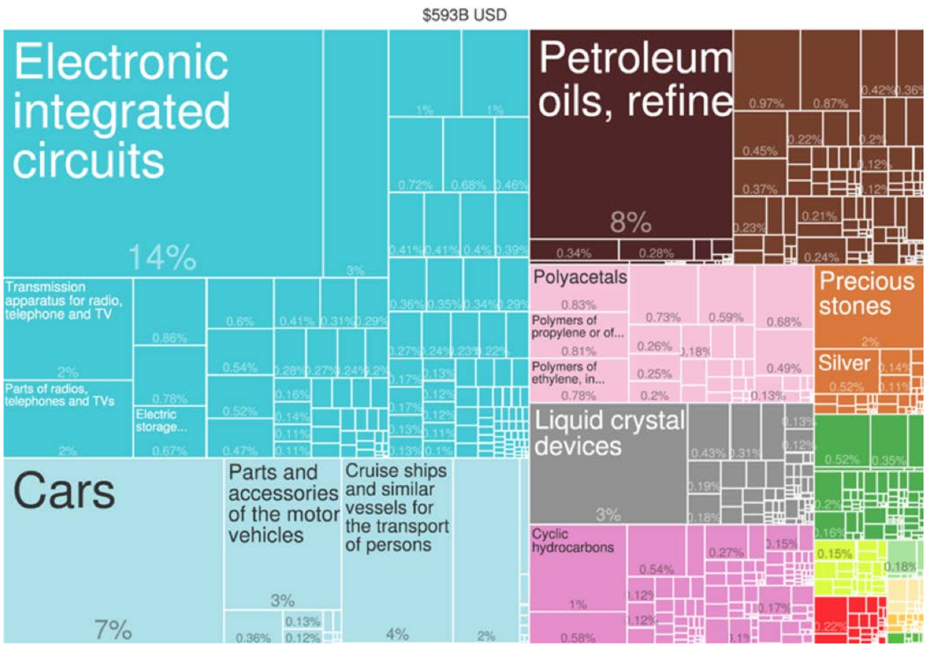
Figure 5.25. Variety and Quality Indexes, Electronics, Republic of Korea, 1972–2012

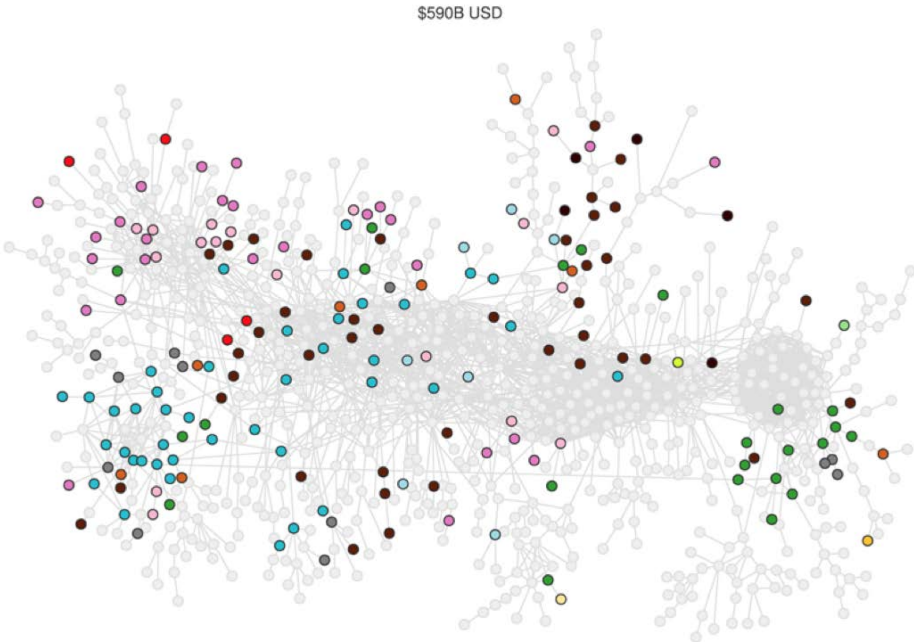


- **Export Complexity**

Korea ranks high (4th in the world in 2014) in terms of economic complexity. Figure 5.26 shows the export tree map and the product space of Korea.

Figure 5.26. Export Tree Map and Product Space, Republic of Korea, 2010



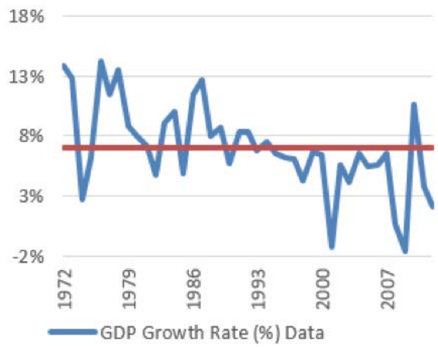


Taiwan

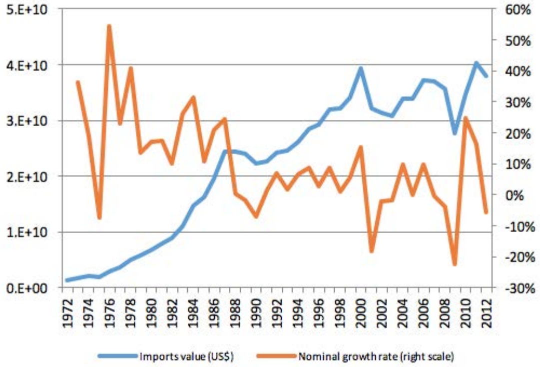
The growth pattern of Taiwan's exports is similar to that of Korea. Exports expanded quickly in the 1970s at more than 20 percent per year. Growth slowed in the 1980s, but the rate of growth was still above the rate of growth of U.S. imports. Over the last 20 years, export growth has slowed further, and the average growth rate has been less than the growth rate of U.S. imports (Figure 5.27, panel b).

Figure 5.27. Real GDP Growth of Taiwan and U.S. Imports from Taiwan, 1972–2012

a. Real GDP growth



b. U.S. imports from Taiwan, 1972-2012



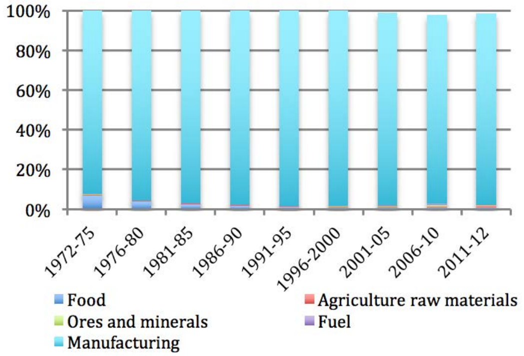
Source: National statistics, Republic of China (Taiwan) and Author's calculations

- **Structure Of Exports**

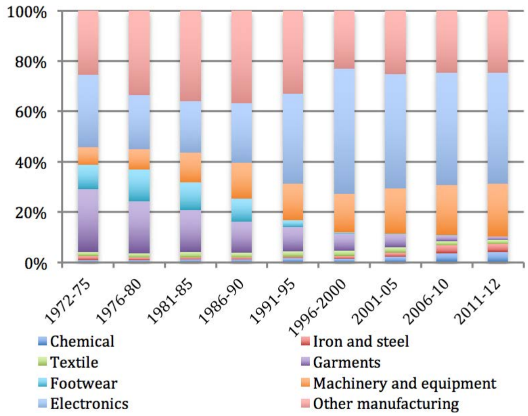
Taiwan's export structure and its path of structural transformation are similar to those of Korea. More than 95 percent of Taiwanese exports to the United States are manufacturing goods (Figure 5.28, panel a). Garments and footwear were the significant exporting sectors in the 1970s and 1980s, but their role has diminished over time. Electronics has been the leading sector over the whole period, the share of which peaked at around 50 percent of manufacturing exports in late 2000s and decreased to 45 percent more recently (Figure 5.28, panel b). Exports of machinery and transportation equipment have been growing throughout the four decades, albeit moderately, and accounted for around one-fifth of total manufacturing exports in the 2000s.

Figure 5.28. U.S. Imports from Taiwan, 1972–2012

a. By product group



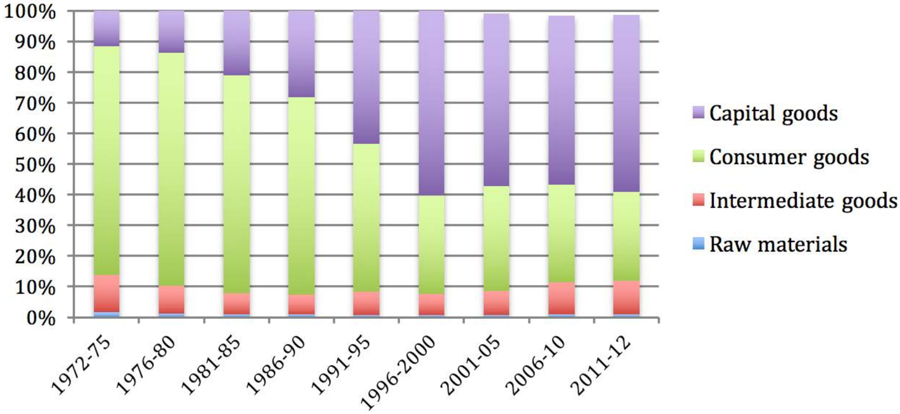
b. Manufacturing exports to the United States



Source: Author's calculations

Until the 2000s, the share of capital goods exports had been rising, while that of consumer goods was declining. Since then, the structure of Taiwanese exports to the United States in terms of end use has remained relatively stable (Figure 5.29). Capital goods accounted for around 55 percent to 58 percent; consumer goods represented around 30 percent to one-third; and intermediate goods were about 10 percent of the total.

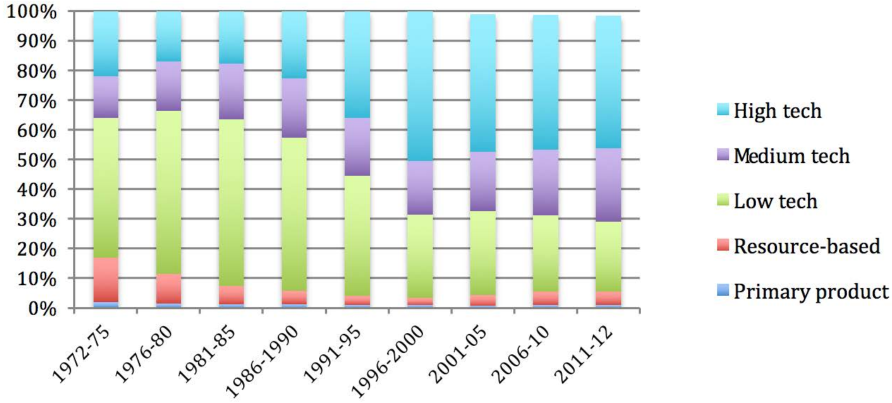
Figure 5.29. Exports to the United States, by End Use, Taiwan, 1972–2012



Source: Author's calculations.

In terms of technology content, the high-technology products representing about 45 percent of exports are predominantly electronic products. Despite the fall of garments and footwear, low-technology exports still contributed to a quarter of the total. The main products include nails, baby carriages, musical instruments and other miscellaneous manufacturing products. Medium-technology exports only grew moderately and also account for about a quarter of total exports. Major products in the category are auto parts, nonelectrical machinery parts, and sound recorders.

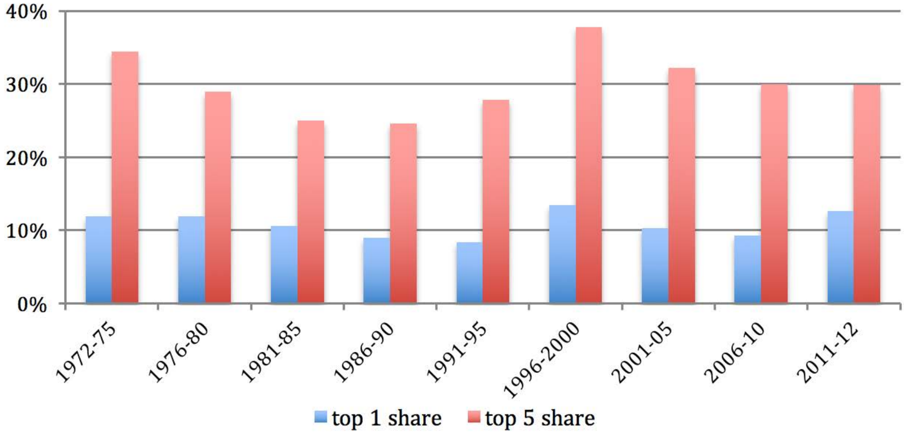
Figure 5.30. Exports of Taiwan to the United States, by Technology Classification, 1972–2012



Source: Author's calculations.

The top export product of Taiwan to the United States makes up around 10 percent, and the top 5 products represent 30 percent of total exports (Figure 5.31).

Figure 5.31. Share of Top 1 and Top 5 Exports in Taiwan's Total Exports to the United States, 1972–2012



Source: Author's calculations.

In the 1980s, the top products in Taiwan exports were all low-technology products, especially garments, footwear, travel goods, and toys (Table 5.13). In the 1990s, the production of office and data accessories began to expand so that, by 2000, high-technology electronics and central digital processing machines had become lead exports. However, since 2002–2003, exports of computers and computer parts (SITC rev.2: 7523 and 7525) have dropped sharply and have not yet recovered. Thus, the share of computers (SITC rev.2: 7523) in exports was 10 percent in 2001 and less than 1 percent in 2012. The share was taken up by radio telegraphic transmitters and receivers.

Table 5.13. The Top 5 Exports to the United States, Taiwan, 1980–2012

SITC	Description	Share, %	Tech*	SITC	Description	Share, %	Tech
	1980				**1990**		
8510	Footwear	12.9	LT1	8510	Footwear	6.6	LT1
8310	Travel goods	4.0	LT1	7525	Peripheral units	4.6	HT1
8942	Children's toys	3.8	LT2	8942	Children's toys	4.2	LT2
8451	Jerseys	3.4	LT1	7599	Parts and accessories for office and data processing machines	4.2	HT1
8463	Under garments	3.1	LT1	8939	Miscellaneous plastic manufactures	3.2	LT2
	2000				**2012**		
7764	Electronic microcircuits	12.2	HT1	7764	Electronic microcircuits	8.3	HT1
7523	Complete digital central processing machine	10.4	HT1	7643	Radiotelegraphic and radiotelephonic transmitters and receivers	6.8	HT1
7599	Parts and accessories for office and data processing machines	9.7	HT1	6940	Nails	4.0	LT2
7525	Peripheral units	3.1	HT1	7648	Telecommunications equipment	3.7	HT1
7643	Radiotelegraphic and radiotelephonic transmitters and receivers	2.5	HT1	7849	Parts and accessories of motor cars	3.6	MT1

Source: Author's calculations.
* See Note to Table 5.4 on technology classification

- **Structural Transformation**

Table 5.14 shows productivity per worker by sector in thousands of local currency constant 2005 prices in Taiwan. The number of workers in agriculture declined steadily between 1963 and 1980 in absolute terms, and this trend accelerated sharply in the next three decades. Overall labor growth remained moderate, at 1.3 percent pa. from 1980–2010, about a third of the growth rate in 1963–1980. The sharp slowdown in manufacturing employment after 1987 reflects the economy's maturity as Taiwan joined the group of advanced economies in 1986 (Chapter 2). As in Korea, finance and insurance took up surplus labor from agriculture and industry, growing at almost 7 percent a year over 1980–2010.

The analysis of structural transformation in the Taiwanese economy prior to it becoming an industrialized country brings out a number of features. First, unlike Korea, the share of manufacturing employment continued to grow even after 1986 when Taiwan became industrialized, reaching a peak of 33.7 percent in 1987. Second, manufacturing overtook agriculture as the largest employment sector as early as 1977. Between 1963 and 1977, the agriculture sector shed 269,000 workers while manufacturing created some 1.3 million jobs. Third, at least for the period 1963-1980, the slowest employment creating sectors were services sectors, where productivity was below the economy-wide average (Table 5.14). Fourth, just like the case of Korea discussed above, the structural transformation effect has always been positive, adding to growth in the overall productivity of the economy. As shown in Table 5.15 below, this effect accounted for over 21 percent of the overall productivity growth in the economy over the period from 1970-1980.

Table 5.14. Productivity per Worker, by Sector and Employment Growth, 2005 Prices, Taiwan, 1963–2010

	Thousands of local currency at 2005 prices						Annual Empl. Growth	
Year	**1963**	**1970**	**1980**	**1990**	**2000**	**2010**	**1963-80**	**1980-1990**
Agriculture	67.5	107.1	173.3	243.3	302.1	376.9	-1.4%	-2.8%
Mining	443.3	599.8	945.7	2408.6	4565.7	30024.2	-2.5%	-8.3%
Manufacturing	140.9	251.2	388.4	633.5	1035.8	1115.6	9.3%	0.6%
Utilities	290.0	1008.5	2006.3	3474.4	5559.8	2222.0	3.2%	0.9%
Construction	188.9	183.1	311.0	377.0	411.7	320.1	10.0%	3.4%
Trade, restaurants and hotels	67.8	114.5	272.9	443.7	809.0	1079.2	6.6%	3.2%
Transport, storage and communication	153.7	196.5	385.4	620.2	1250.4	1538.3	4.9%	1.8%
Finance, insurance, real estate and business services	488.2	618.0	941.3	877.5	1120.6	1501.3	8.3%	8.4%
Government services	364.9	500.9	597.3	941.1	1535.0	1362.2	3.1%	1.8%
Community, social and personal services	98.4	150.2	265.9	457.8	691.7	984.1	3.1%	4.2%
GDP	130.6	207.4	360.9	572.6	937.9	1105.0	3.8%	1.7%

Source: Author's calculations.

Table 5.15 shows the decomposition analysis of productivity growth in Taiwan since 1963, when consistent data on employment and output first became available. Over

1963–1970, growth in productivity was high (6.8 percent a year) largely because of the within effect (technology, organizational change, and so on) and, to a smaller extent, because of structural transformation. Productivity growth slowed in 1970–1980, but was still high compared with productivity growth in other countries on the back of changes in technology and other factors associated with the within effect. Changes in productivity growth because of structural transformation, including the dynamic between effect, were still robust, accounting for about 21 percent of the total. Between 1980 and 2000, overall productivity growth was high, averaging about 5 percent a year. Most of that growth derived from the within effect. In the first decade of the 21st century, productivity growth slowed to slightly less than 2 percent a year, in line with mature economies, and structural transformation was negligible (Figure 5.8).

Table 5.15. The Decomposition of Annual Productivity Growth, Taiwan, 1963–2010

	Agriculture	Mining	Manufacturing	Utilities	Construction	Trade, restaurants and hotels	Transport, storage and communication	Finance, insurance, real estate and business services	Government services	Community, social and personal services	GDP
1963-1970											
First Term	1.7%	0.3%	1.3%	0.3%	0.0%	0.5%	0.2%	0.1%	1.3%	0.2%	5.9%
Second Term	-0.8%	-0.2%	0.8%	0.0%	0.4%	0.3%	0.1%	0.2%	0.0%	0.0%	0.7%
Third Term	-0.5%	-0.1%	0.7%	-0.1%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.2%
Growth in productivity	6.8%										
First term	5.9%										
Second Term	0.7%										
Third Term	0.2%										
1970-1980											
First Term	0.9%	0.2%	1.0%	0.1%	0.2%	0.9%	0.4%	0.2%	0.4%	0.2%	4.5%
Second Term	-0.7%	-0.2%	1.1%	0.0%	0.2%	0.1%	0.0%	0.2%	0.0%	0.0%	0.7%
Third Term	-0.4%	-0.1%	0.6%	0.0%	0.2%	0.2%	0.0%	0.1%	0.0%	0.0%	0.5%
Growth in productivity	5.7%										
First term	4.5%										
Second Term	0.7%										

Third Term	0.5%										
1980-1990											
First Term	0.3%	0.3%	1.7%	0.1%	0.1%	0.7%	0.3%	0.0%	0.8%	0.2%	4.4%
Second Term	-0.2%	-0.1%	-0.1%	0.0%	0.0%	0.2%	0.0%	0.5%	0.1%	0.1%	0.4%
Third Term	-0.1%	-0.2%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	-0.1%
Growth in productivity	4.7%										
First term	4.4%										
Second Term	0.4%										
Third Term	-0.1%										
1990-2000											
First Term	0.1%	0.1%	1.7%	0.1%	0.0%	1.1%	0.5%	0.2%	0.9%	0.2%	4.8%
Second Term	-0.2%	0.0%	-0.3%	0.0%	0.0%	0.1%	0.0%	0.4%	0.1%	0.1%	0.2%
Third Term	0.0%	0.0%	-0.2%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.1%	0.0%
Growth in productivity	5.1%										
First term	4.8%										
Second Term	0.2%										
Third Term	0.0%										
2000-2010											
First Term	0.1%	0.3%	0.2%	-0.1%	-0.1%	0.6%	0.1%	0.3%	-0.2%	0.2%	1.5%
Second Term	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.3%	0.4%	0.0%	0.4%
Third Term	0.0%	-0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	-0.2%
Growth in productivity	1.7%										
First term	1.5%										
Second Term	0.4%										
Third Term	-0.2%										

Source: Author's calculations

- **Export Variety and Quality**

Figure 5.32 illustrates the performance of the Taiwanese economy in export variety and quality. Both indexes show steady improvement, particularly export variety. The three subsectors that did well were the textile, leather, and apparel subsector, the chemicals subsector, and the stone and metal subsector (Figures 5.33–5.35).

Figure 5.32. Variety and Quality Indexes, Pooled Manufacturing Industries, Taiwan, 1972–2012

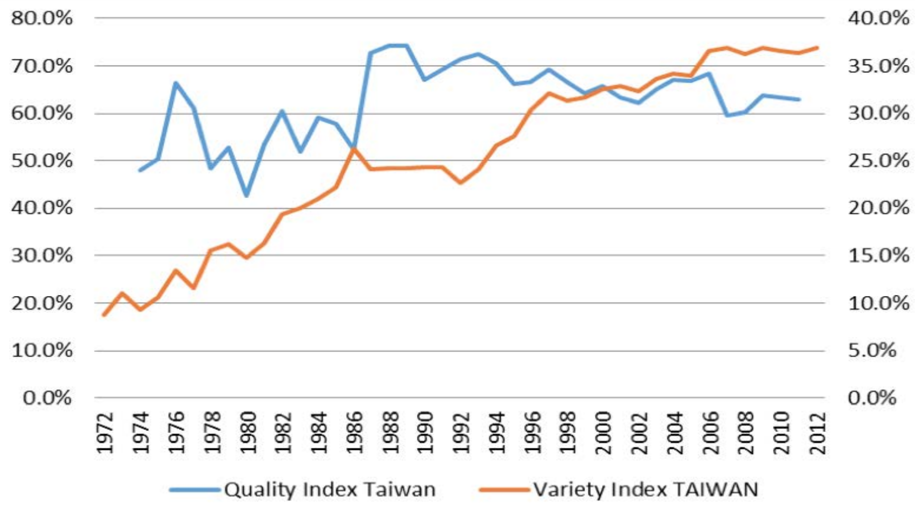


Figure 5.33. Variety and Quality Indexes, Textile, Leather, and Apparel, Taiwan, 1972–2012

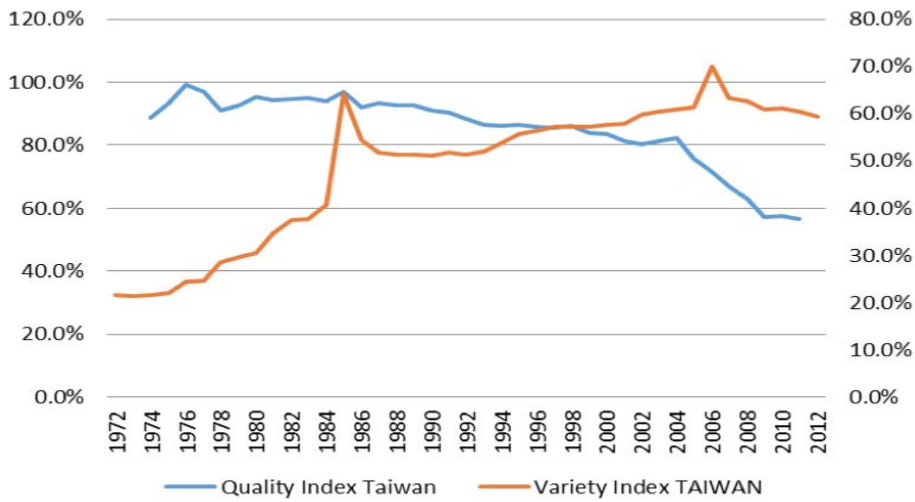


Figure 5.34. Variety and Quality Indexes, Chemicals, Taiwan, 1972–2012

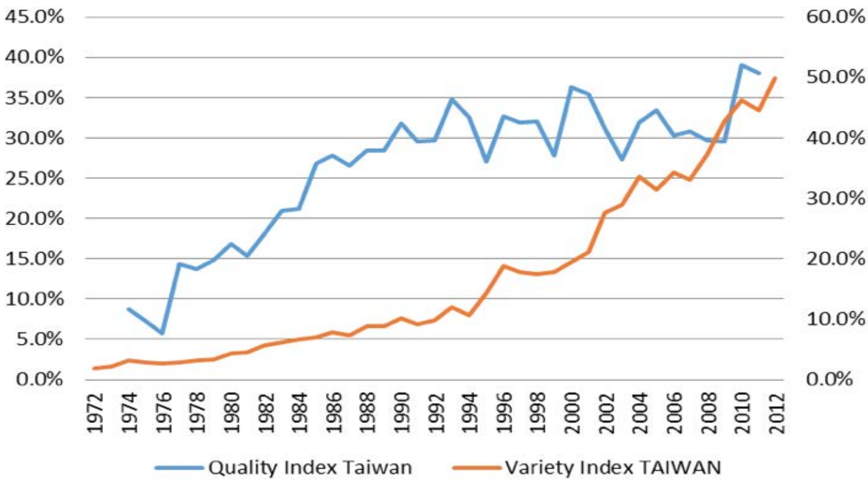
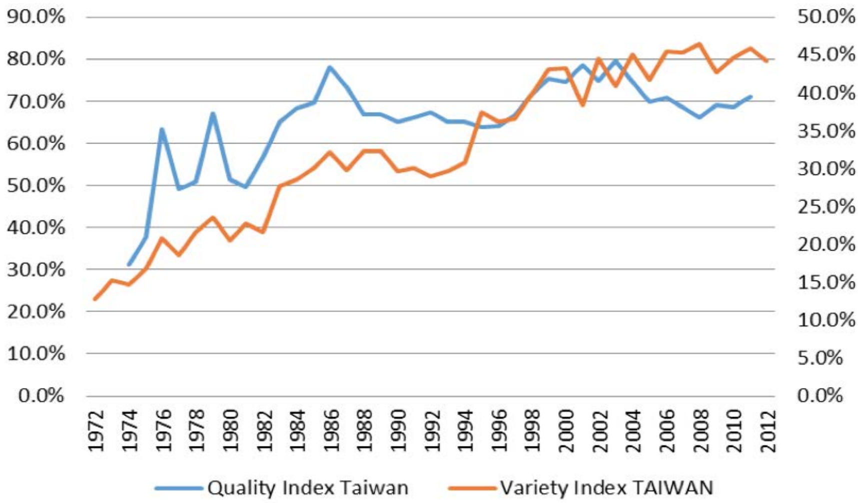


Figure 5.35. Variety and Quality Indexes, Stone and Metal, Taiwan, 1972–2012



- **Export Complexity**

The Atlas of Economic Complexity does not show Taiwan as a country; hence, there is no information on its capacity to grow.[50]

50 See Atlas of Economic Complexity (database), Center for International Development, Harvard University, Cambridge, MA, http://atlas.cid.harvard.edu/.

- **A Comparison of Old Timers with Escapees**

The export and production structure of two countries considered to be caught in the traditional middle-income trap relative to two other countries that were able to escape this trap reveal several features:

- Structural transformation, as represented by the sum of the static between and dynamic between did not take place in the former group. Instead, there was a reverse transformation that reduced the standing effect of static within improvement in productivity.
- This reverse transformation in the former group was caused by labor moving out of low-productivity sectors such as agriculture into other low-productivity, nontradable sectors such as government services (see the case of Argentina discussed above) or community services (Brazil).
- In parallel with this reverse structural transformation, exports performance was lackluster (as shown in the U.S. market), resulting in the loss of market share in major world markets
- Perhaps even more important is the failure to shift export structure from the dominance of raw materials and agriculture goods to manufacturing goods, and within manufacturing goods, to machinery and equipment and electronics. Correspondingly, this failure also results in the failure to shift the end use of exports from raw materials and consumer goods (typically associated with low-income economies) to capital goods and intermediate goods.

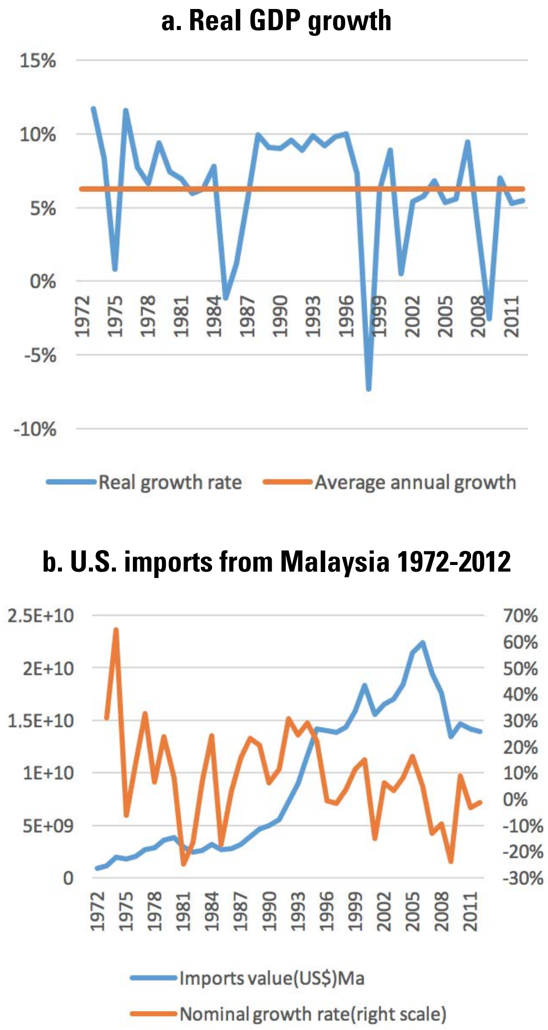
The above issues can also be seen in the two indexes on export variety and export quality. This is most likely a result of exhausted imitation opportunities before innovation activities can take hold (Agénor and Dinh 2013a) or before any investment in human capital can yield fruit (Tran 2013).

The Newcomers To The Middle-Income Trap

Malaysia

Among the six economies reviewed in this chapter, the growth rate of exports to the United States was lowest in Malaysia over 1972–2012, even though this was still respectable. The exception being in the 1990s, when the value of Malaysian exports to the United States grew by 14 percent a year, 4.6 percentage points higher than the average growth rate of total U.S. imports (Figure 5.36). This fast growth in exports is consistent with the rapid economic growth of Malaysia during the period. Exports experienced a sharp decline over 2007–2009, largely because of the global financial crisis of 2008–2009.

Figure 5.36. Real GDP Growth of Malaysia and U.S. Imports, Malaysia, 1972–2012



Source: Author's calculations.

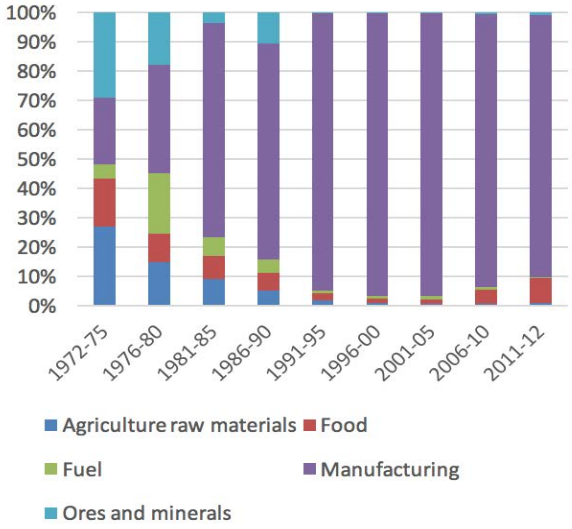
- **Structure Of Exports**

The share of manufacturing in total Malaysian exports to the United States surged dramatically over time, from 22.6 percent in 1972–1975 to 94.6 percent in 1991–1995.

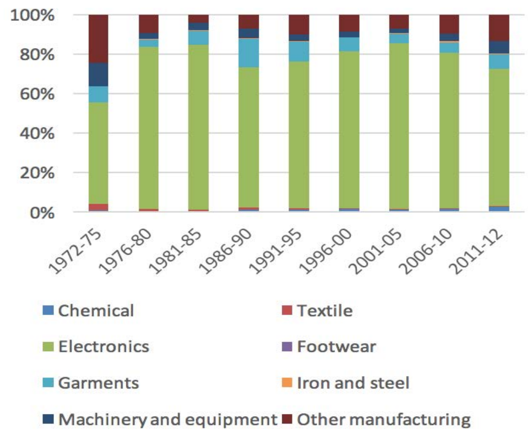
The share rose steadily from 1990 onward (Figure 5.37, panel a). Electronics accounted for the biggest share in total manufacturing exports, reaching 84 percent in 2001–2005, and dropped to 70 percent in 2011–2012 (Figure 5.37, panel b). Over the entire period, the share of exports from other sectors remained small and relatively stable.

Figure 5.37. U.S. Imports from Malaysia, 1972–2012

a. By product group



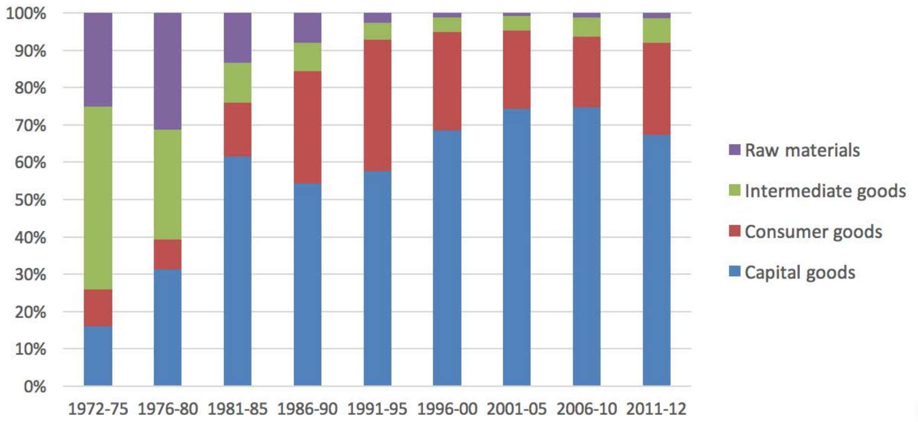
b. Manufacturing exports to the United States



Source: Author's calculations.

In terms of end use, the majority of exports to the United States were intermediate goods and raw materials before 1975 (Figure 5.38). Intermediate goods alone accounted for almost half of the total exports. The structure of exports began to change dramatically in the mid-1970s. The share of capital goods rose rapidly during 1976–2011, while the share of intermediate goods and raw materials declined sharply. In addition, consumer goods also grew significantly, from less than 10 percent in the early 1970s to 24.7 percent in 2011–2012. By 2012, capital goods represented 67 percent of total exports, while intermediate goods and raw materials accounted for merely 8 percent.

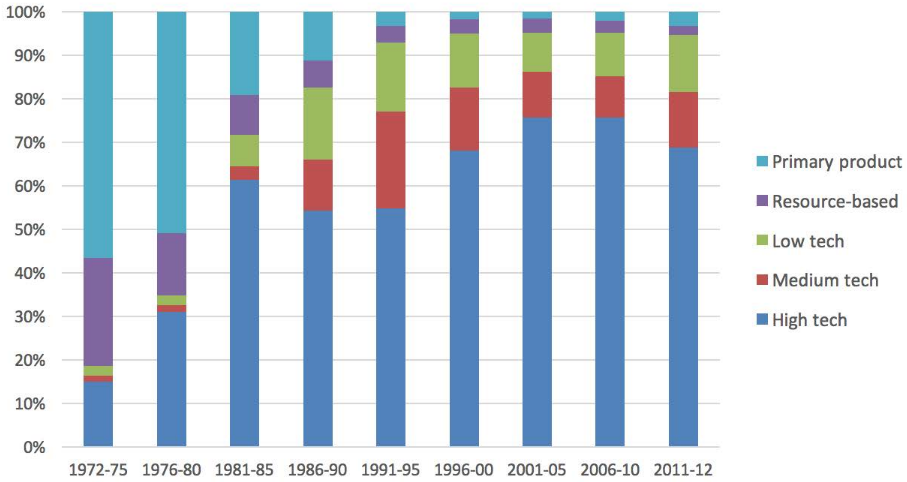
Figure 5.38. Exports to the United States, by End Use, Malaysia, 1972–2012



Source: Author's calculations.

The composition of Malaysian exports to the United States by technology classification is shown in Figure 5.39. Primary products and resource-based products used to dominate the exporting sector in Malaysia, contributing more than 80 percent of total exports. The pronounced shift from primary and resource-based products to technology-based products took place after the mid-1970s. In particular, high-technology exports took over resource-based products during 1976–1980 and primary products during 1981–1985. Primary products and resource-based products combined have accounted for roughly 5 percent of total exports since the early 1990s.

Figure 5.39. Exports to the United States, by Technology Classification, Malaysia, 1972–2012



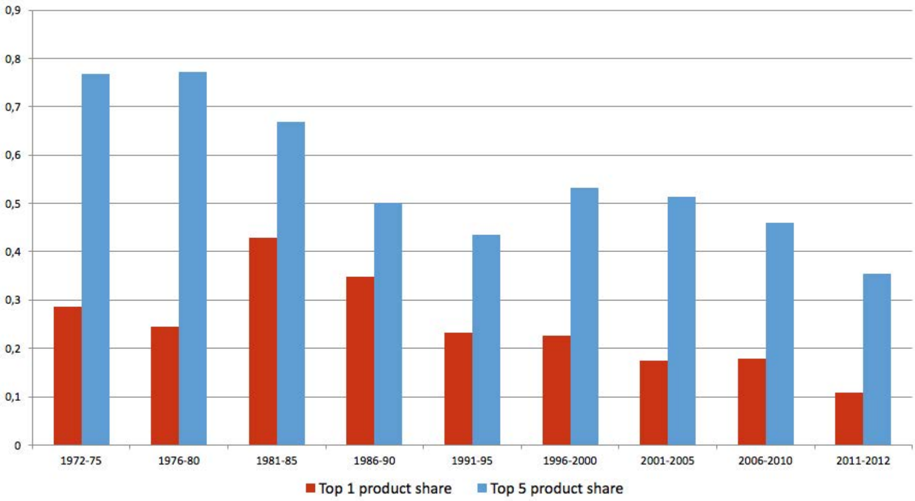
Source: Author's calculations.

In sharp contrast, the share of high-technology products peaked in the 2000s at 75 percent and declined moderately to 69 percent after 2010. The sharp decline in primary products was primarily driven by tin and tin alloys (SITC rev.2: 6871) and natural rubber latex (SITC rev.2 2320). On the other hand, the surge in exports of electronics and equipment contributed to the leading role of high-technology exports, including the three leading high-technology categories: telephone equipment (SITC rev.2 7641), electronic integrated circuits (SITC rev.2: 7764), and office equipment parts (SITC rev.2: 7599).

Malaysia diversified its exports over time. Table 5.03 shows that, among total Malaysian exports to the United States, 4-digit SITC products accounted for 21.5 percent in the early 1970s, but that this share had expanded to over 62 percent by 2012. However, this range was still almost 20 percentage points lower than the range of Korea and Taiwan.

In the years from 1972 to1995, there was a significant drop in the concentration of Malaysia's exports to the United States, and the drop was more salient among the top 5 exports than in the top 1 export (Figure 5.40).

Figure 5.40. The Share of the Top 1 and the Top 5 Export Products in Total Malaysia Exports to the US, 1972–2012



Source: Author's calculations.

Table 5.16 presents details on the top 5 exports. Electronics has consistently played a leading role in Malaysian exports, whereas petroleum, oil, and minerals have lost ground.

Table 5.16. The Share of Top Export Products in Malaysia Exports to the US, 1980–2012

SITC	Description	Share, %	Tech*	SITC	Description	Share, %	Tech
	1980				1990		
7764	Electronic microcircuits	28.1	HT1	7764	Electronic microcircuits	27.2	HT1
3330	Petrol, oils and crude oils obtained from bituminous minerals	27.6	PP	3330	Petrol, oils, and crude oils obtained from bituminous minerals	5.7	PP
6871	Tin and tin alloys, unwrought	10.4	PP	7622	Radio-broadcast receivers portable, including sound recorders	4.8	MT3

2320	Natural rubber latex; natural rubber and natural gums	8.3	PP	7638	Other sound recorders and reproducers	4.2	MT3
7763	Diodes, transistors, and semiconductor devices	2.7	HT1	7763	Diodes, transistors, and semiconductor devices	3.7	HT1
	2000				**2012**		
7764	Electronic microcircuits	21.4	HT1	7641	Electronic line telephonic and telegraphic apparatus	16.6	HT1
7599	Office equipment parts nes	13.6	HT1	7764	Electronic microcircuits	14.0	HT1
7524	Digital central storage units, separately consigned	9.7	HT1	7763	Diodes, transistors, and semiconductor devices	7.6	HT1
7525	Peripheral units, including control and adapting units	5.4	HT1	8482	Plastic, rubber clothing, accessories	4.4	LT1
7638	Other sound recorders and reproducers	4.8	MT3	7599	Office equipment parts n.e.s	4.1	HT1

Source: Author's calculations.
Note: nes = not elsewhere specified.
* See Note to Table 5.4 on technology classification

- **Structural Transformation**

This subsection analyzes the pattern of structural transformation in Malaysia based on 2014 data from the University of Groningen database.[51] Table 5.17 shows the sectoral productivity per worker in Malaysia from 1960–2010 expressed in thousands of local currency at 2005 prices. One first notices that there was steady improvement in productivity per worker across all sectors except construction. Second, compared with the least developed countries discussed in the previous chapters, there seems to be less productivity variation across sectors. The coefficient of variation ranges from .67 to 1.23 over the 1990-2010 period, compared with 1.11-1.91 for Senegal or 2.86-2.96 for Nigeria. This implies that there is less scope for achieving greater economic growth by shifting activities out of low-productivity to higher- productivity sectors. The scope for transformation seems to vary inversely with the development stage of a country, that

51 See GGDC (database), Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen, Groningen, the Netherlands. http://www.rug.nl/ggdc/.

is, it is large in the least developed countries, smaller in middle-income countries, and smallest in the developed economies.

Table 5.17. Productivity per Worker, by Sector and Employment Growth, Malaysia, 1975–2010

	Thousands of local currency at 2005 prices					**Av. Ann. Emp. Growth (%)**	
	1975	**1980**	**1990**	**2000**	**2010**	**1975-97**	**1997-10**
Agriculture	10.8	14.4	20.7	25.0	31.7	-1.4%	0.4%
Mining	240.7	521.5	1215.5	2320.2	1156.0	-4.1%	5.2%
Manufacturing	25.6	26.6	38.1	53.1	80.7	6.8%	-0.5%
Utilities	29.9	33.2	51.5	98.8	142.3	5.4%	0.8%
Construction	20.0	22.2	18.9	19.7	18.9	6.3%	2.6%
Trade, restaurants and hotels	14.7	16.3	18.3	31.5	40.7	5.1%	3.6%
Transport, storage and communication	20.9	23.2	31.4	50.7	67.0	5.8%	2.7%
Finance, insurance, real estate and business services	22.7	30.2	39.5	73.5	95.3	6.4%	4.8%
Government	10.9	12.0	15.9	21.4	26.4	2.3%	4.0%
Community, social and personal services	14.2	15.8	22.5	28.3	33.6	7.0%	3.6%
GDP	18.6	23.3	30.1	44.5	54.8	3.2%	2.2%

Source: Author's calculation based on 2014 data in GGDC (database), Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen, Groningen, the Netherlands. http://www.rug.nl/ggdc/.

Productivity was lower in agriculture than economy-wide (see Table 5.17). From 1975 until 1997, there was a steady decline in the employment share of agriculture, consistent with the need for structural transformation. Part of the labor surplus released from the agricultural sector during this period was being absorbed by manufacturing, where productivity was greater than average economy-wide productivity. Another part was absorbed into services, where productivity in most subsectors was lower than the average economy-wide productivity. Thus, between 1975 and 1997, employment in agriculture declined by about 1.4 percent a year (from 1.9 million workers to 1.3 million) while manufacturing employment increased by about 6.8 percent a year (from 417 thousand workers to 2.1 million) and that of domestic trade (the largest employment sector after manufacturing during this period) by about 5 percent a year. As shown in Table 5.17, productivity in domestic trade was lower than the average economy-wide productivity.

After 1997, when the Asian debt crisis took place, the employment share of agriculture remained the same, but the manufacturing share of employment started to decline and deindustrialization began to set in.[52] The sectors that gained the most employment during the post-1997 period were finance (4.8 percent growth a year), government (4 percent a year), and domestic trade and community services (each 3.6 percent a year). In 2010, the three largest service sectors, namely domestic trade, government, and finance accounted for 47 percent of the labor force, while manufacturing accounted for about 18 percent. Domestic trade overtook manufacturing as the lasrgest employment sector in the economy in 2004. Malaysia clearly shows the situation of a country where deindustrialization took place before the country had reached high-income status. Note that, as argued in Chapters 1 and 2, while it is true that a few service sectors (such as finance and transport) could have productivity higher than the average economy-wide productivity, they are not employment intensive, either by nature or by limited domestic demand, and therefore cannot be used to lead the structural transformation of an economy. This certainly represents a lesson for other middle-income countries.

To investigate the structural transformation issue further, we decompose the productivity equation (see the discussion in Chapter 2). The structural term --the second term in equation (1)—is broken down into two components, the static reallocation effect and the dynamic reallocation effect. The first term of equation (2) is the same as the first term of equation 1. It measures the within effect, or the change in sectoral productivity because of capital, technology, and so on, assuming there is no change in sectoral employment. For example, in agriculture, an improvement in yields because of the application of a new type of seed or an improvement in irrigation infrastructure would lead to positive change in this within effect, even if there is no change in the labor share in the sector. Conversely, a drought or a war could cause a drop in agricultural output, leading to a negative within effect.

The second term in equation (2) refers to the between effect or static structural change and reflects the change in productivity brought about by the sectoral gain or loss in employment, assuming there is no change in productivity over the period. It thus measures the pure effect of labor movement on productivity change.

The third term refers to dynamic structural change. It is a product of the change in sectoral employment and the change in productivity and therefore indicates the appropriate direction of productivity change. This term is therefore positive if the economy progresses along the structural transformation path, that is, resources are being moved from low-productivity to high-productivity sectors. It is negative if the reverse happens, that is, resources are being moved from high- to low-productivity sectors.

Table 5.18 provides the breakdown of these effects over the 35 years from 1975 to

52 Ordinary least squares growth rates were used to avoid end-point arbitrariness.

2010. Throughout this period, the between dynamic effect in Malaysia was negative and was the primary reason that growth in overall productivity was less than it should have been. For instance, in 2000–2010, both the within effect and the between static effect were positive, amounting to 2.0 percent and 0.8 percent, respectively. If the between dynamic effect had been zero, the overall productivity growth in the economy would have been 2.8 percent a year. The actual productivity growth was only 2.1 percent a year because of the negative 0.7 percent between dynamic effect. This effect was large, more than half the productivity growth arising from technological or reorganizational changes in the economy (the within effect).

Table 5.18. The Decomposition of Annual Productivity Growth, Malaysia, 1975–2010

	Agriculture	Mining	Manufacturing	Utilities	Construction	Trade, restaurants and hotels	Transport, storage and communication	Finance, insurance, real estate and business services	Government services	Community, social and personal services	GDP
1975-1980					**(percentage of total productivity change)**						
First Term	1.6%	5.3%	0.1%	0.0%	0.1%	0.2%	0.1%	0.3%	0.2%	0.0%	7.9%
Second Term	-1.1%	-1.9%	0.9%	0.1%	0.3%	0.5%	0.2%	0.1%	0.1%	0.0%	-0.8%
Third Term	-0.4%	-2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-2.4%
Growth in productivity	4.6%										
First term	7.9%										
Second Term	-0.8%										
Third Term	-2.4%										
1980-1990											
First Term	3.2%	11.0%	2.2%	0.2%	-0.3%	0.5%	0.5%	0.5%	0.9%	0.2%	18.9%
Second Term	-2.2%	-4.7%	1.5%	0.0%	0.2%	1.0%	0.2%	0.6%	-0.1%	0.2%	-3.2%
Third Term	-0.9%	-6.2%	0.7%	0.0%	0.0%	0.1%	0.1%	0.2%	0.0%	0.1%	-6.1%
Growth in productivity	9.6%										
First term	18.9%										

Second Term	-3.2%										
Third Term	-6.1%										
1990-2000											
First Term	0.3%	1.5%	0.7%	0.1%	0.0%	0.8%	0.3%	0.5%	0.2%	0.0%	4.5%
Second Term	-0.5%	-0.6%	0.7%	0.0%	0.1%	0.0%	0.0%	0.1%	-0.1%	0.1%	-0.2%
Third Term	-0.1%	-0.6%	0.3%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	-0.3%
Growth in productivity	4.0%										
First term	4.5%										
Second Term	-0.2%										
Third Term	-0.3%										
2000-2010											
First Term	0.2%	-0.7%	1.4%	0.1%	0.0%	0.4%	0.2%	0.3%	0.1%	0.0%	2.0%
Second Term	-0.2%	0.9%	-0.7%	0.0%	0.0%	0.2%	0.1%	0.3%	0.1%	0.0%	0.8%
Third Term	0.0%	-0.5%	-0.4%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	-0.7%
Growth in productivity	2.1%										
First term	2.0%										
Second Term	0.8%										
Third Term	-0.7%										

Source: Author's calculations

The detailed decomposition of the between effect shows clearly the root cause of Malaysia's problem: labor actually moved from high-productivity sectors (capital-intensive sectors such as utilities) to lower-productivity sectors (domestic trade and restaurants). Table 5.17 illustrates that during the post-1997 period, except for mining, those sectors in which employment grew at a faster pace than the average growth of the economy (the last row) are the ones in which productivity was lower than the average and vice versa. The next chapter shows that this can occur in developed economies such as the United States if the labor force in the manufacturing sector is reduced because of rising competition from abroad or because of robotization.

Ideally, for each sector in which productivity is rising (because of technology, greater efficiency, reorganization, and so on), the second effect (labor movement to the sector) should be positive. Conversely, in sectors in which productivity is declining, labor should be moving out. The third effect measures the extent to which this occurs. The fact that this third effect has been negative for all periods shown in Table 5.19 indicates that progress has been hampered by a lack of structural transformation. By nature, sectors such as transport and communication may exhibit rising productivity, but they do not absorb many workers. Thus, their rising productivity means fewer and fewer workers will be employed as the economy progresses.

- **Export Variety and Quality**

Figure 5.41 shows the performance of the Malaysian economy as far as export variety and quality are concerned. Both indexes show steady improvement, particularly export variety. The subsector that did well is electronics. Figure 5.42 shows these two indexes for the subsector.The lack of structural transformation in the domestic economy after 1997 is mirrored in the performance of both indexes.

Figure 5.41. Variety and Quality Indexes, Pooled Manufacturing Industries, Malaysia, 1972–2012

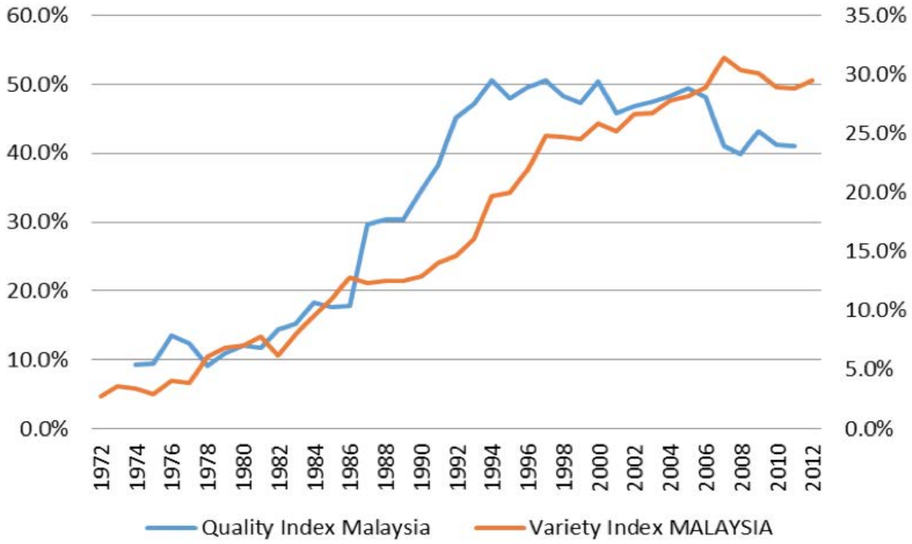
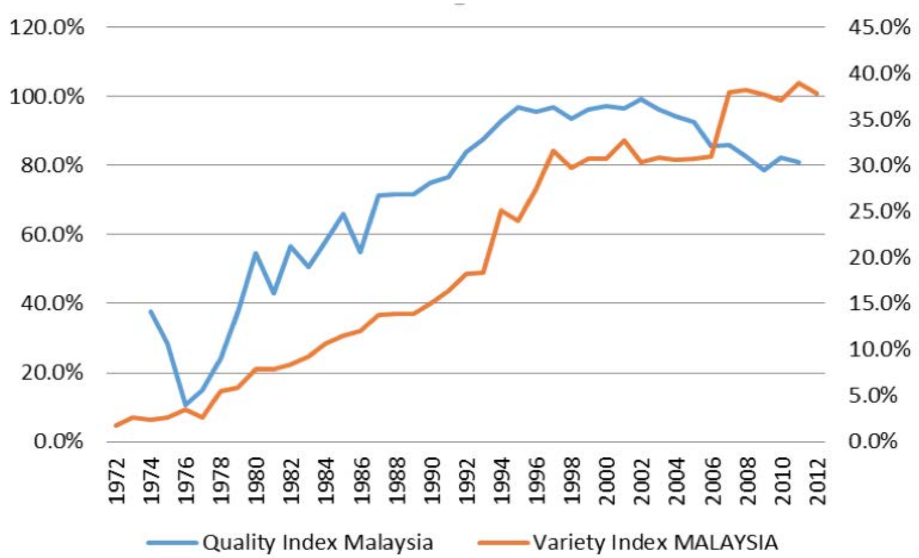


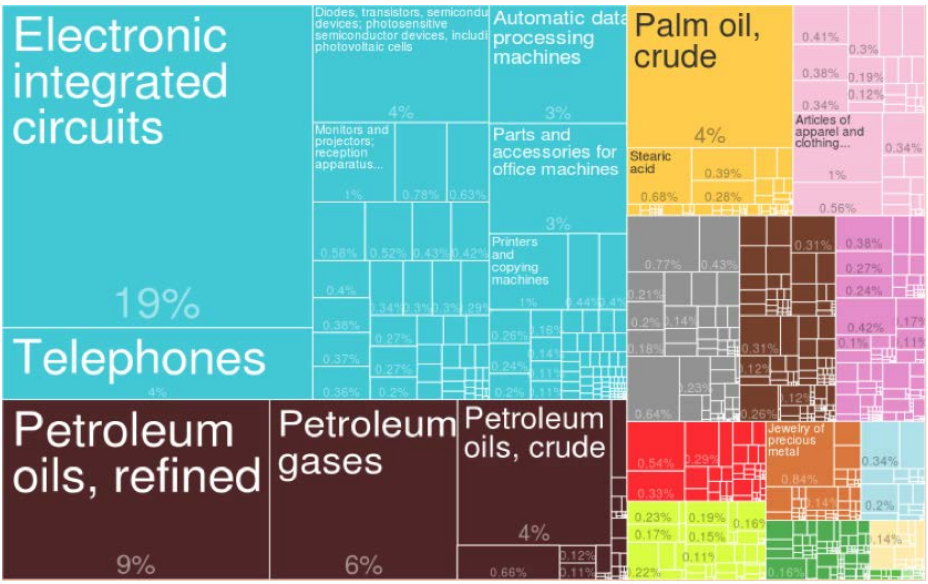
Figure 5.42. Variety and Quality Indexes, Electronics, Malaysia, 1972–2012

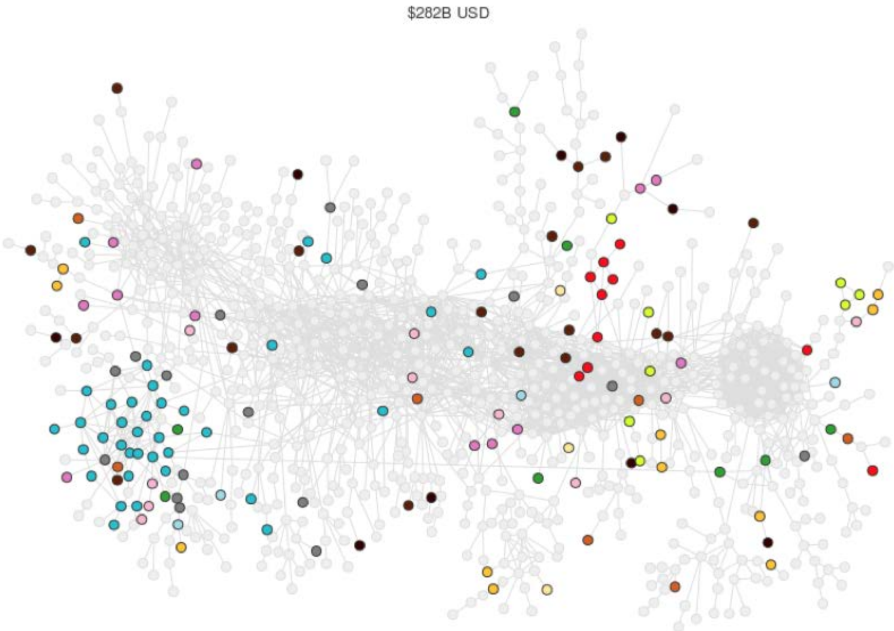


- **Export Complexity**

Figure 5.43 shows the export tree map and product space in Malaysia.

Figure 5.43. Export Tree Map and Product Space, Malaysia, 2010



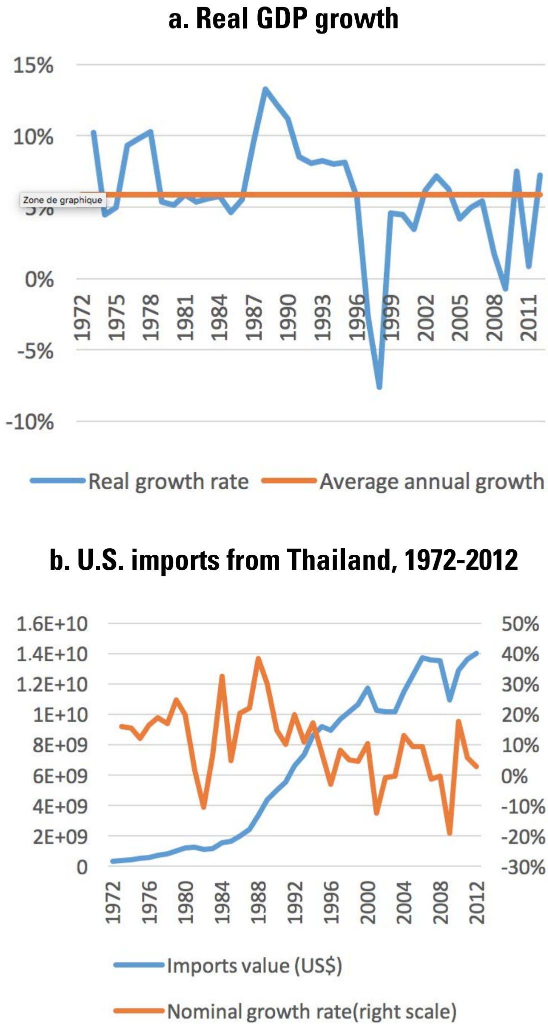


Source: Atlas of Economic Complexity (database), Center for International Development, Harvard University, Cambridge, MA (accessed on September 28, 2016), http://atlas.cid.harvard.edu/.

Thailand

Thailand experienced sustained economic growth before the economy was hit by the 1997 financial crisis (Figure 5.44, panel a). Although the economy began to pick up in 1999, the pace had slowed substantially relative to the pace of growth before the crisis. The four decades between 1972 and 2012 witnessed an average annual growth rate of 5.9 percent.

Figure 5.44. Real GDP Growth of Thailand and U.S. Imports from Thailand, 1972–2010



Source: Author's calculations.

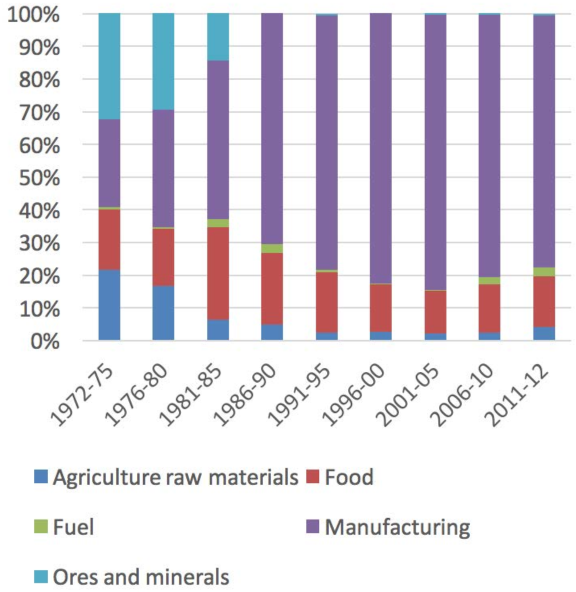
Exports grew steadily during the entire period, and the value of Thailand exports rose 40-fold, outperforming most of the economies under study except Korea. However, Thailand exports slowed considerably, to 1.5 percent a year after 2000 (Figure 5.44, panel b), reflecting the overall performance of the economy.

- **Structure of Exports**

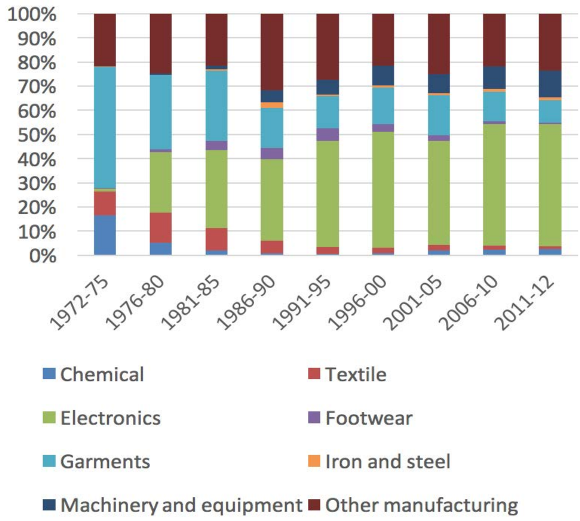
The share of manufacturing in Thailand's exports to the United States surged dramatically over time, from 26.9 percent in 1972–1975 to 70.8 percent in 1985–1990. The share remained around 80 percent from 1990 onward (Figure 5.45, panel a). In sharp contrast, agricultural raw materials and ores and minerals experienced a pronounced drop. The two groups combined took up only a tiny share of total exports, slightly above 4 percent. In addition, a structural change was taking place within manufacturing exports: exports shifted largely from garments to electronics (Figure 5.45, panel b). Electronics accounted for more than half of total manufacturing exports in 2011–2012.

Figure 5.45. U.S. Imports from Thailand, 1972–2012

a. By product group



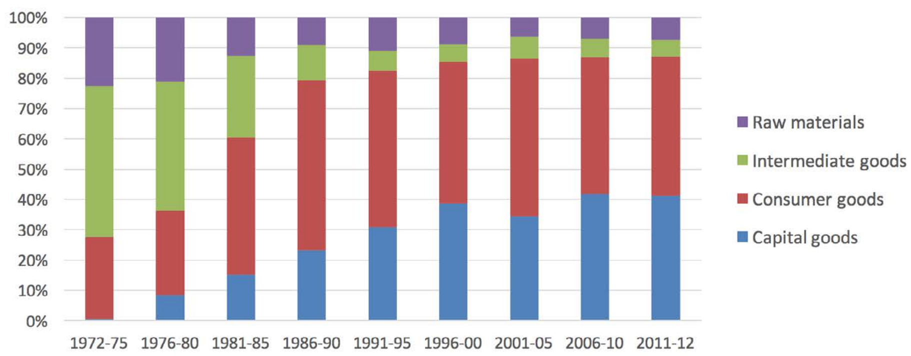
b. Manufacturing exports to the United States



Source: Author's calculations

In terms of end use, the share of intermediate goods shrank most rapidly (Figure 5.46). Intermediate goods lost the leading role to consumer goods in the early 1980s, and the share continued to decline, to about 5 percent recently. The share of raw materials also experienced a non-negligible fall, while consumer goods maintained the leading role from the early 1980s and contributed 46 percent of total exports over 2011– 2012. Another striking feature during the four decades 1972–2012 was the prominent rise of capital goods, which picked up from around zero to become almost equal in importance to consumer goods.

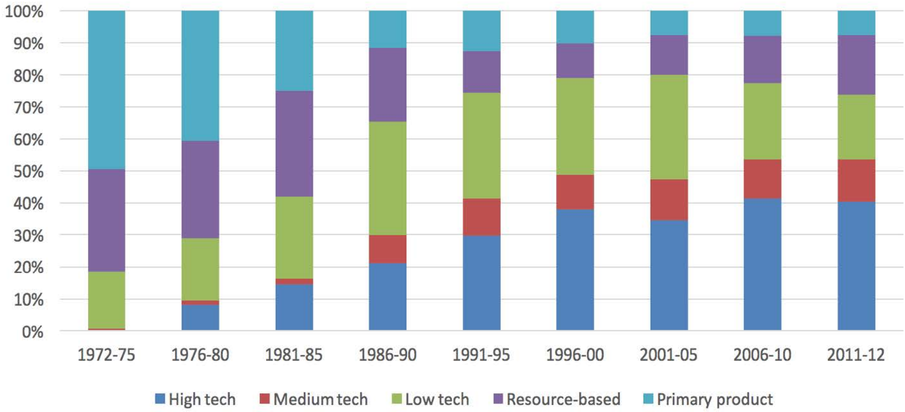
Figure 5.46. Exports to the United States, by End Use, Thailand, 1972–2012



Source: Author's calculations.

The composition of Thailand's exports to the United States by technology classification is shown in Figure 5.47. The majority of Thailand's exports were primary products and resource-based products before the mid-1980s. However, the share of primary products declined significantly throughout the 1970s and 1980s and dropped slightly further afterward, to about 8 percent by 2012. In addition, the share of resource-based products went down substantially throughout the three decades 1972–2000 and picked up moderately afterward, resulting in a non-negligible share of 19 percent by 2012. Thai exports then shifted dramatically to technology-based products, especially to high-technology products, which accounted for more than 40 percent of total exports over 2011–2012.

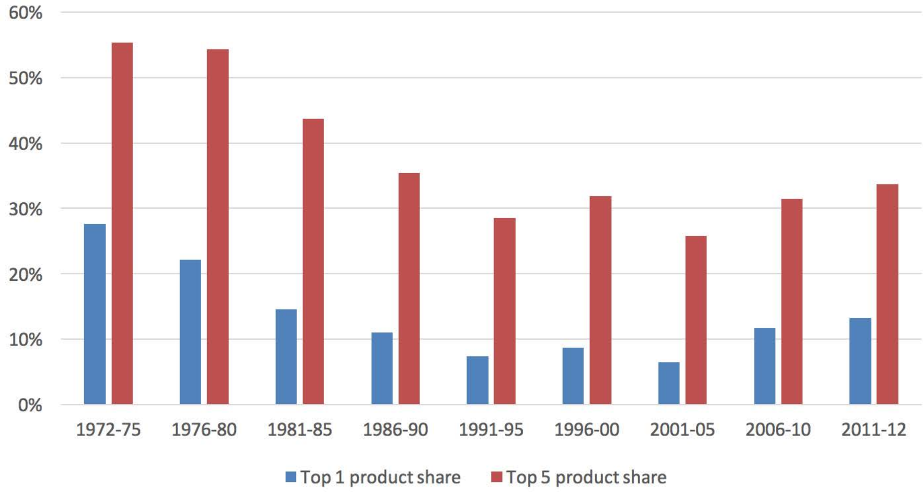
Figure 5.47. Exports to the United States, by Technology Classification, Thailand, 1972–2012



Source: Author's calculations.

Thailand sharply diversified its exports during 1972–2012. Table 5.3 shows that, in the early 1970s, exports of 4-digit SITC products to the United States by Thailand represented about 26 percent of Thailand's total exports to the United States and that this share had risen to 70 percent by 2012. However, this range was still almost 10 percentage points lower than the range for Korea and Taiwan. The concentration of Thailand's exports to the United States declined over time (Figure 5.48). The leading product accounted for 13 percent of exports in 2011–2012, less than half the share in the early 1970s. The share of the top 5 products had dropped by more than 20 percentage points, to 34 percent, by 2012.

Figure 5.48. The Share of the Top 1 and Top 5 Export Products in Thailand Exports to the US, 1972–2012



Source: Author's calculations.

The structural shift in Thailand's exports is also reflected in the change in the top export products (Table 5.19). The process of moving from tin, tin alloys, and precious stones to electronics is fully consistent with the shift in exports by technology classification discussed above.

Table 5.19. The Top 5 Exports, Thailand, 1980–2012

SITC	Description	Share, %	Tech*	SITC	Description	Share, %	Tech
	1980				**1990**		
6871	Tin and tin alloys, unwrought	25.2	PP	7764	Electronic microcircuits	7.1	HT1
6673	Other precious and semiprecious stones, and so on	11.3	RB1	7524	Digital central storage units, separately consigned	7.0	HT1
7764	Electronic microcircuits	10.1	HT1	0371	Fish, prepared or preserved, n.e.s., including caviar	5.5	RB1
2881	Ash and residues, contain. metals/metallic compounds	8.3	RB2	8510	Footwear	5.1	LT1
2320	Natural rubber latex; nat. rubber and sim. nat. gums	5.6	PP	8942	Children's toys, indoor games, and so on	5.0	LT2
	2000				**2012**		
7764	Electronic microcircuits	7.7	HT1	7527	Adp storage units	15.7	HT1
7525	Peripheral units, incl. control and adapting units	6.8	HT1	7641	Telephone equipment	8.5	HT1
7524	Digital central storage units, separately consigned	6.7	HT1	8973	Precious metal jewelry	4.0	LT2
0360	Crustaceans and molluscs, fresh, chilled, frozen, and so on	6.0	PP	7616	Reception apparatus for television	3.7	HT1
8973	Jewellery of gold, silver, or platinum	3.9	LT2	0361	Crustaceans, frozen	2.7	PP

Source: Author's calculations.
Note: n.e.s. = not elsewhere specified.
* See Note to Table 5.4 on technology classification

- ### Pattern of structural transformation

Table 5.20 shows the sector productivity per worker in Thailand over the five decades from 1960–2010, expressed in thousands of local currency at 2005 prices. One first notices that there was steady improvement in productivity per worker across all sectors except construction. Moreover, compared with the least developed countries discussed in the previous chapter, there seems to have been less productivity variation across sectors. This implies that there is less scope for achieving higher economic growth by shifting activities from low-productivity to higher-productivity sectors. The scope for transformation seems to vary inversely with the development stage of a country, that is, large in the least developed countries, smaller in middle-income countries, and smallest in developed economies.

Table 5.20. Productivity per Worker, by Sector and Employment Growth, Thailand, 1960–2010

	In thousands of local currency at 2005 prices						Emp. Growth (annual %)	
	1960	**1970**	**1980**	**1990**	**2000**	**2010**	**1960-1990**	**1990-2010**
Agriculture	13.4	18.6	23.2	25.4	40.7	54.9	2.1%	-1.1%
Mining	196.8	186.4	334.0	1451.2	4154.6	6272.2	3.2%	-0.9%
Manufacturing	93.4	163.2	205.9	317.8	404.3	574.6	5.7%	3.1%
Utilities	74.2	334.8	554.4	911.1	1453.0	2623.3	8.1%	-0.8%
Construction	340.8	303.2	223.6	263.8	136.4	98.8	8.3%	2.7%
Trade, restaurants and hotels	95.3	188.3	183.1	256.9	199.1	180.7	4.8%	4.3%
Transport, storage and communication	152.7	165.7	191.5	272.1	415.2	525.9	5.1%	1.7%
Finance, insurance, real estate and business services	14.1	84.3	125.1	492.4	164.3	241.6	5.1%	5.5%
Government services	17.5	20.6	26.5	28.4	36.0	43.5	6.2%	3.4%
Community, social and personal services	488.5	568.0	680.6	685.9	850.2	820.6	6.2%	3.3%
GDP	31.8	54.0	78.1	119.3	164.3	213.4	3.0%	1.2%

Source: Author's calculation based on 2014 data of GGDC (database), Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen, Groningen, the Netherlands. http://www.rug.nl/ggdc/.

As in Malaysia, productivity in agriculture in Thailand is lower than the average economy-wide productivity (see Table 5.20). Yet the number of workers in agriculture continued to rise in absolute terms, reaching close to 19.7 million workers and 66 percent of the labor force in 1989. Although this share was still an improvement compared to 81 percent in 1960, when data was first available, clearly this pace of transformation was much slower than in Taiwan and Korea. In Taiwan, both the absolute number and the share of agricultural employment declined continually since 1963, when data was first available. In Korea, agricultural employment increased slightly between 1963 and 1973, but since then has contracted sharply both in absolute number and in share.

Between 1990 and 2010, the labor surplus released from the agricultural sector in Thailand (about 4.4 million workers) was not being absorbed in manufacturing, where productivity was higher than the average economy-wide productivity but where only 2.4 million jobs were being created. The remaining workers were being absorbed into government, construction, insurance, and real estate (all non-tradable). Most of these sectors exhibited productivity that is lower than the average economy-wide productivity.

There are several features of structural transformation in Thailand that stand out compared with other countries discussed in this chapter. First, while agriculture has the lowest productivity among all sectors, it still employs the most workers in the economy and no other sector has even come close to its share in employment (38 percent in 2010). Second, the manufacturing share in employment is still very small compared with other countries (less than 15 percent in 2010) and does not appear to have reached a peak yet. Third, because many of the workers shed from agriculture did not end up working in the manufacturing sector, where productivity is higher than the average economy-wide productivity, the increase in productivity resulting from structural transformation has been weak (Table 5.22).

Table 5.21 provides the breakdown of these effects in Thailand over the 50 years from 1960 to 2010. Between 1960 and 1990, the between dynamic effect was positive and contributed to the large growth in overall productivity of about 4 percent a year. For instance, from 1980–1990, both the within effect and the static between effect were positive, amounting to 1 percent and 0.3 percent, respectively. If there had been no favorable structural transformation term, the overall productivity growth in the economy would have been 3 percent a year. The actual productivity growth was 4.3 percent a year. However, since 1990, overall productivity growth has slowed because of both the within effect and the dynamic between effect. This is consistent with the pattern of GDP growth and export growth shown in Figure 5.45.

Table 5.21. The Decomposition of Annual Productivity Growth, Thailand, 1960-2010

	Agri-culture	Min-ing	Man-ufac-turing	Utili-ties	Con-struc-tion	Trade, res-tau-rants and hotels	Trans-port, storage and com-muni-cation	Finance, insur-ance, real estate and busi-ness services	Gov-ern-ment ser-vices	Com-mu-nity, social and per-sonal ser-vices	GDP
1960-1970					**(percentage of total productivity change)**						
First Term	1.0%	0.0%	0.7%	0.1%	0.0%	1.9%	0.0%	0.1%	0.0%	0.2%	4.0%
Second Term	-0.1%	0.1%	0.2%	0.0%	0.6%	-0.1%	0.2%	0.0%	0.0%	0.4%	1.3%
Third Term	0.0%	0.0%	0.2%	0.0%	-0.1%	-0.1%	0.0%	0.0%	0.0%	0.1%	0.1%
Growth in productivity	5.4%										
First term	4.0%										
Second Term	1.3%										
Third Term	0.1%										
1970-1980											
First Term	0.6%	0.1%	0.4%	0.0%	-0.2%	-0.1%	0.1%	0.0%	0.0%	0.2%	1.2%
Second Term	-0.3%	0.0%	0.7%	0.0%	0.4%	0.9%	0.1%	0.0%	0.0%	0.4%	2.4%
Third Term	-0.1%	0.0%	0.2%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%
Growth in productivity	3.8%										
First term	1.2%										
Second Term	2.4%										
Third Term	0.1%										
1980-1990											
First Term	0.2%	0.3%	1.0%	0.1%	0.1%	0.9%	0.2%	0.4%	0.0%	0.0%	3.0%
Second Term	-0.1%	0.0%	0.3%	0.0%	0.3%	0.2%	0.1%	0.0%	0.0%	0.2%	1.0%
Third Term	0.0%	-0.1%	0.2%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.3%
Growth in productivity	4.3%										
First term	3.0%										
Second Term	1.0%										

Third Term	0.3%										
1990-2000											
First Term	0.7%	0.4%	0.6%	0.1%	-0.3%	-0.5%	0.3%	-0.3%	0.0%	0.2%	1.2%
Second Term	-0.3%	-0.1%	0.9%	0.0%	0.1%	1.2%	0.1%	0.4%	0.0%	0.2%	2.6%
Third Term	-0.2%	-0.1%	0.2%	0.0%	0.0%	-0.3%	0.0%	-0.3%	0.0%	0.0%	-0.5%
Growth in productivity	3.3%										
First term	1.2%										
Second Term	2.6%										
Third Term	-0.5%										
2000-2010											
First Term	0.4%	0.1%	1.2%	0.2%	-0.1%	-0.2%	0.2%	0.1%	0.0%	0.0%	2.0%
Second Term	-0.2%	0.0%	0.1%	-0.1%	0.2%	0.5%	0.0%	0.1%	0.0%	0.2%	0.8%
Third Term	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%
Growth in productivity	2.6%										
First term	2.0%										
Second Term	0.8%										
Third Term	-0.2%										

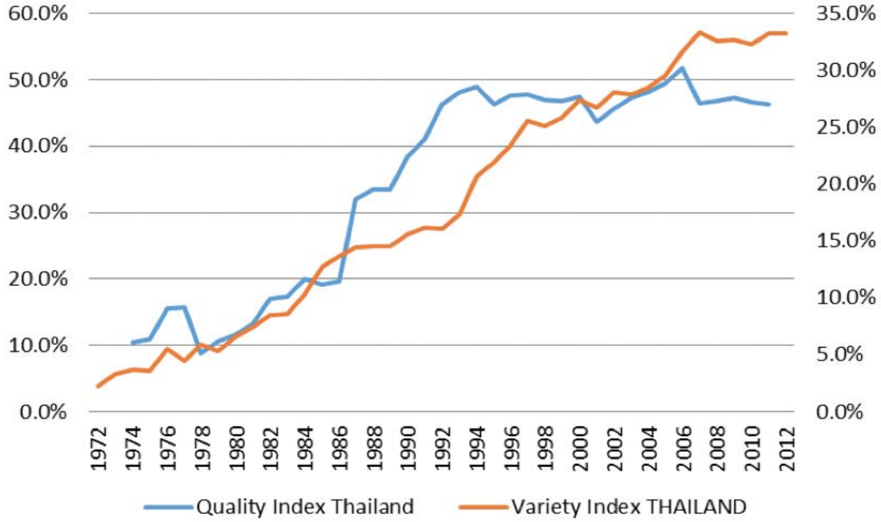
Source: Author's calculations

The detailed decomposition of the between effect shows that the structural transformation effect, which had aided Thailand prior to 1990, has become smaller since then. There has been a continuing movement of labor out of agriculture, but not to manufacturing. Labor actually moved from agriculture to other low-productivity sectors such as government, construction, insurance, and real estate (all nontradable) sectors. The next chapter shows that this could happen in developed economies such as the United States if the labor force in the manufacturing sector were reduced because of rising competition from abroad or robotization.

- **Export Variety and Quality**

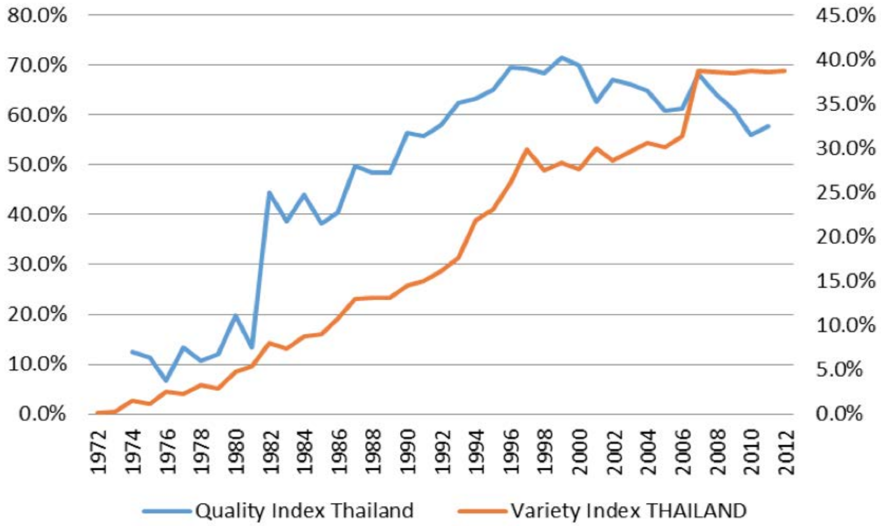
Figure 5.49 shows Thailand's performance in export variety and quality. Both indexes have improved steadily, particularly export variety. The subsector that did well is electronics. Figure 5.50 shows the two indexes for this subsector.

Figure 5.49. Variety and Quality Indexes, Pooled Manufacturing Industries, Thailand, 1972–2012



Source: Author's calculation.

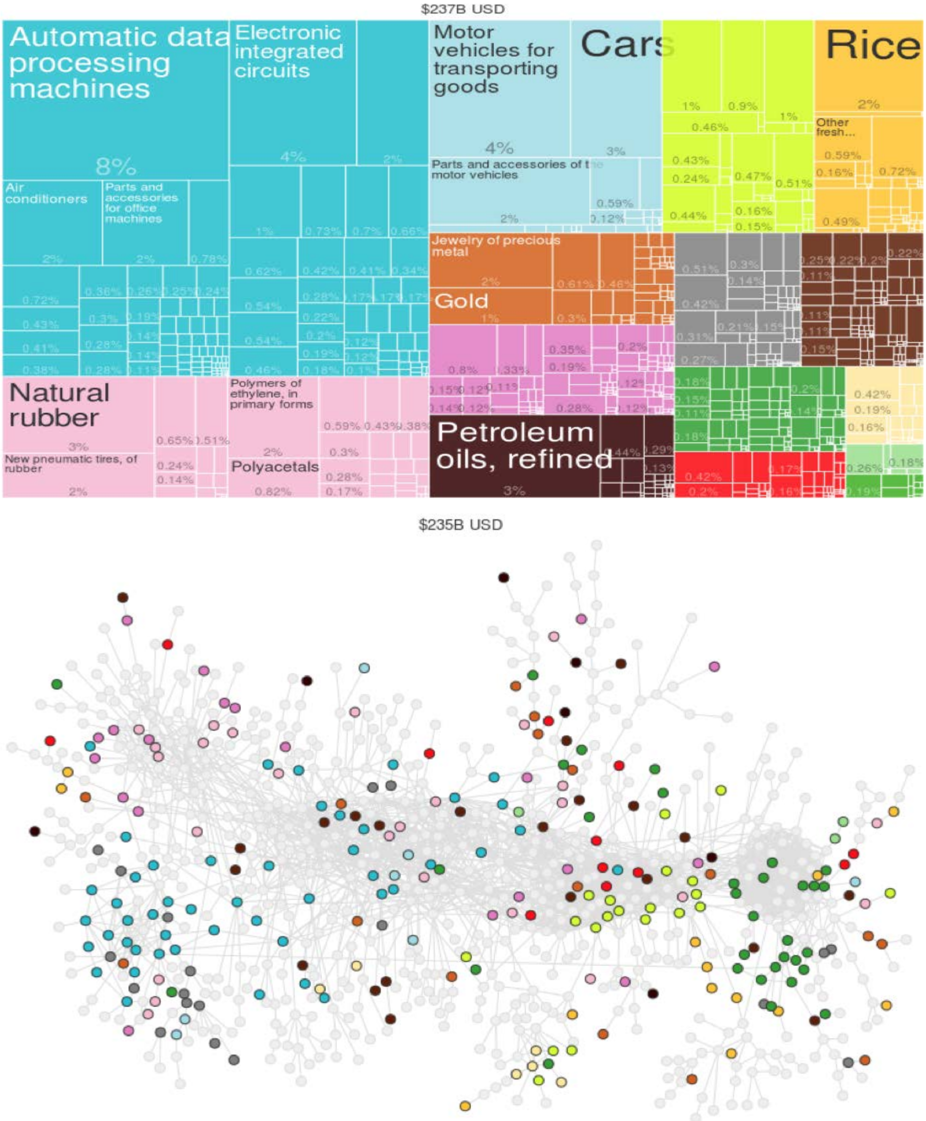
Figure 5.50. Variety and Quality Indexes, Electronics, Thailand, 1972–2012



- **Export Complexity**

Figure 5.51 shows the export tree map and product space in Thailand.

Figures 5.51. Export Tree Map and Product Space, Thailand, 2010



Source: Hausmann et al. 2014.

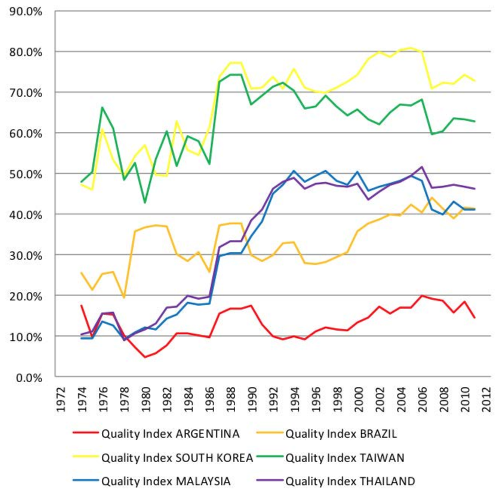
A Comparison of the Six Economies

Figure 5.52 shows the performance of the six economies discussed in this chapter in terms of quality and variety for the overall manufacturing sector as well as by subsector. Both Korea and Taiwan were leading the pack in both categories over the four decades.

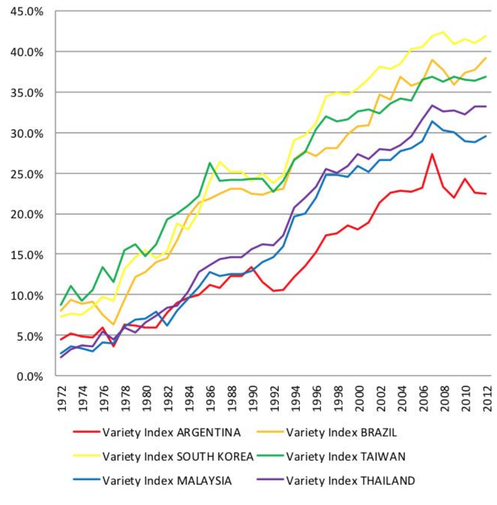
Argentina underperformed in both quality and variety, while Brazil did well in variety, but not in quality. This may be because the exports of both Argentina and Brazil are dominated by commodities and natural resources rather than manufacturing.

Figure 5.52. Variety and Quality Indexes, Pooled Manufacturing Industries, Six Economies, 1972–2012

a. The quality index



b. The variety index

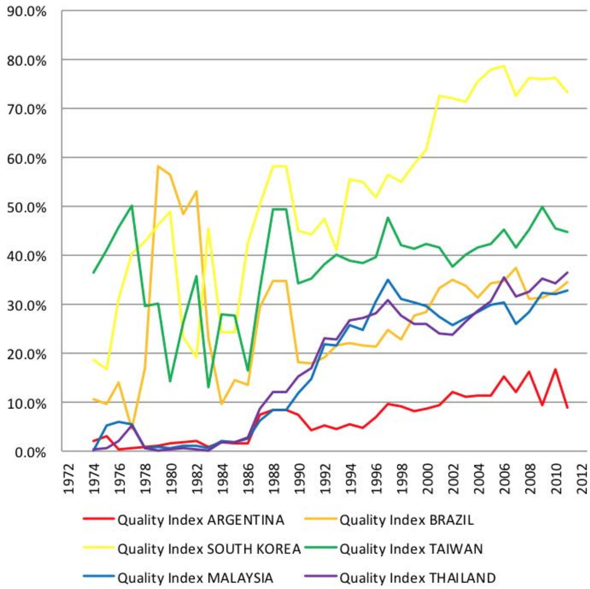


Source: Author's calculations.

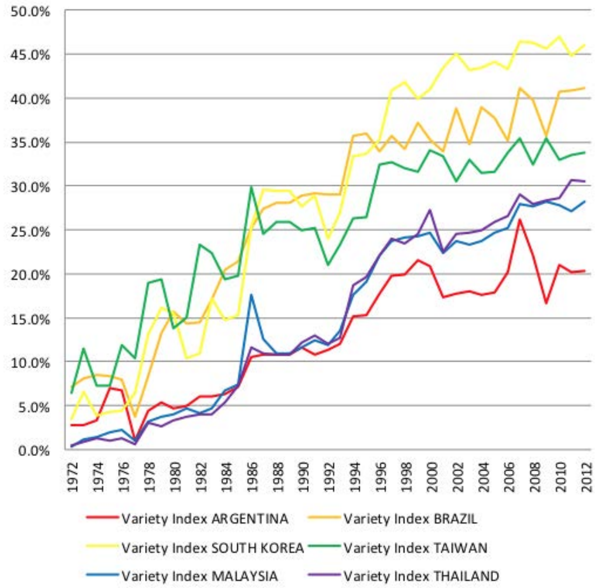
At the same time, it is noticeable that Brazil is doing well in export variety in machinery and transport, the category that is often said to represent the transition to high-income status (Figure 5.53).

Figure 5.53. Variety and Quality Indexes, Machinery and Transport, Six Economies, 1972–2012

a. The quality index



b. The variety index



Source: Author's calculations.

Summary of features of middle-income trap newcomers compared with Korea and Taiwan. A comparison of the export and production structures of Malaysia and Thailand with Korea and Taiwan reveal several features:

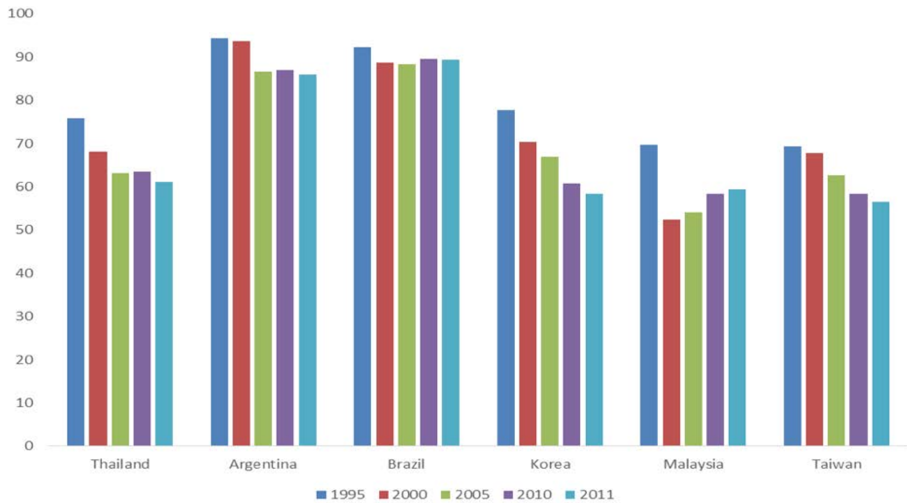
- There seems to be a divergence between domestic production and exports in the case of Malaysia and Thailand. Both countries show a slowdown in structural transformation in the 1990s. While labor continued to move out of agriculture, where productivity was low, this surplus labor did not move to manufacturing, but to other low-productivity, nontradable sectors such as government services (similar to the case of Argentina or community services in Brazil). Like Argentina and Brazil, Malaysia is endowed with natural resources, and this may explain why structural transformation is difficult to achieve.Consequently, there was a slowdown in overall productivity and in economic growth making it difficult for these economies to reach high-income status.
- In contrast with the domestic economy, both countries are doing well in terms of export growth and structure. In particular, both are doing well in terms of export variety (see Figure 5.52). In terms of export quality, both countries have been able to remain steady since 1994.
- Unlike the case of Argentina and Brazil, where export structure is dominated by raw materials and agricultural goods, the exports of Malaysia and Thailand are

dominated by manufacturing and, within that, by electronics.

- The divergence between domestic production and exports means that external demand is not a factor in the growth slowdown in Malaysia and Thailand (or in newly emerging middle-income countries such as Vietnam). It simply means that under the vertically-specialized industrialization and global value chains discussed in Chapter 2, exports of these countries are doing well in the world market, but the associated value-added, which is what counts toward economic growth and development, is not doing well. As this book argues, the global value chain arrangement helped these countries move quickly from low- to middle-income status. But it is the same arrangement that seems to be holding them back now, at a time when imitation opportunities are exhausted before innovation activities can come on line (Agénor and Dinh 2013a). These issues are examined below.

Figure 5.54, derived using a world input-output table, shows the evolution of the ratio of value added to exports among the six economies discussed in this chapter. It is not surprising that both Argentina and Brazil have among the highest ratios because their production structure has a higher share of natural resources and raw materials. Malaysia's ratio seems to be improving over the years and therefore is less of a problem than Thailand's ratio, which has been declining over the years.

Figure 5.54. Ratio of Value Added to Gross Exports, Six Economies, 1995–2011



Source: "Domestic Value Added in Gross Exports," Organisation for Economic Co-operation and Development, Paris (accessed March 23, 2017), https://data.oecd.org/trade/domestic-value-added-in-gross-exports.htm.

But perhaps even more important than these aggregate ratios is the trend in the ratios for each detailed subsector shown in Table 5.22, for Malaysia, and Table 5.23 for Thailand.

Table 5.22. Ratio of Domestic Value Added to Gross Exports, Malaysia, 1995–2011 (%)

Industry	**1995**	**2000**	**2005**	**2010**	**2011**
Total	69.6	52.3	54.1	58.3	59.4
Agriculture,hunting,forestry,and fishing	87.5	82.6	81.5	82.6	82.9
Mining and quarrying	85.3	90.6	86.9	87.8	87.0
Total Manufactures	61.3	39.5	43.4	48.3	47.6
Wood, paper, paper products, printing, and publishing	74.8	63.6	64.7	67.3	71.1
Chemicals and nonmetallic mineral products	71.6	63.0	60.5	62.1	58.6
Coke, refined petroleum products, and nuclear fuel	78.4	70.8	65.6	65.5	57.0
Rubber and plastics products	66.9	61.0	56.7	59.6	61.4
Other nonmetallic mineral products	79.1	68.9	61.6	63.4	60.2
Basic metals and fabricated metal products	54.1	41.7	40.4	46.7	44.2
Machinery and equipment, nec	53.9	37.6	42.3	49.4	48.0
Electrical and optical equipment	53.1	30.2	29.8	34.9	33.6
Computer, electronic, and optical equipment	54.1	29.7	29.2	34.5	33.1
Electrical machinery and apparatus ,nec.	45.1	39.3	36.1	38.8	37.7
Transport equipment	66.3	53.7	42.3	46.7	46.7
Electricity, gas, and water supply	83.5	82.8	72.3	73.6	70.1
Construction	56.4	59.8	58.6	60.5	58.2
Total Business Sector Services	82.4	77.8	76.6	78.4	78.0
Transport and storage, post, and telecommunication	78.3	59.9	63.8	66.8	65.4
Community, social, and personal services	85.6	80.4	68.8	72.3	71.1

Source: "Domestic Value Added in Gross Exports," Organisation for Economic Co-operation and Development, Paris (accessed March 23, 2017), https://data.oecd.org/trade/domestic-value-added-in-gross-exports.htm.
Note: nec = not elsewhere classified.

Table 5.23. Ratio of Domestic Value Added to Gross Exports, Thailand, 1995–2011 (%)

Industry	1995	2000	2005	2010	2011
Total	75.7	68.1	63.2	63.4	61.1
Agriculture,hunting,forestry,and fishing	90.4	86.7	83.5	83.6	81.9
Mining and quarrying	89.9	89.1	84.1	84.7	82.4
Total Manufactures	68.2	60.3	55.5	55.1	51.6
Wood, paper, paper products, printing, and publishing	75.5	75.9	70.2	66.4	61.4
Chemicals and nonmetallic mineral products	71.2	64.1	59.3	60.0	55.4
Coke, refined petroleum products, and nuclear fuel	70.4	53.3	38.5	44.0	40.5
Rubber and plastics products	72.7	67.6	64.7	66.0	62.6
Other nonmetallic mineral products	74.8	70.6	61.5	65.2	59.9
Basic metals and fabricated metal products	52.9	56.5	43.8	42.4	37.2
Machinery and equipment, nec	51.6	53.2	47.9	51.5	44.3
Electrical and optical equipment	51.4	40.6	39.8	41.6	37.5
Computer, electronic, and optical equipment	51.0	39.0	37.3	39.2	34.7
Electrical machinery and apparatus ,nec.	52.9	45.8	46.7	50.0	46.5
Transport equipment	51.8	48.7	49.4	50.5	45.1
Electricity, gas, and water supply	82.5	77.3	63.2	67.2	62.4
Construction	71.8	64.1	54.2	58.0	52.6
Total Business Sector Services	88.6	84.1	80.5	81.9	80.3
Transport and storage, post, and telecommunication	83.9	75.2	69.5	71.6	69.0
Community, social, and personal services	80.1	75.7	74.7	75.0	71.3

Source: "Domestic Value Added in Gross Exports," Organisation for Economic Co-operation and Development, Paris (accessed March 23, 2017), https://data.oecd.org/trade/domestic-value-added-in-gross-exports.htm.
Note: nec = not elsewhere classified.

From Table 5.22, it is clear why, despite the seemingly perfect performance of electronics exports, domestic value added was gaining less and less in Malaysia. Between 1995 and 2011, the ratio of domestic value added to exports dropped significantly, from 54 percent to 33 percent. This decline is evident in all categories of medium- and high- technology exports.

Similarly, in Table 5.23, the ratio of value added to gross exports of electronics fell from 51 percent in 1995 to 35 percent in 2011. As in Malaysia, this decline is also seen in other medium and high-technology products.

Thus, it is clear that export performance itself can be misleading unless it is viewed in the context of domestic production. Chapter 7 examines policies to promote domestic value added in the context of middle-income countries as a way to escape the middle-income trap.

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Chapter 6: The Plight Of Manufacturing Employment In The Developed Countries: The United States As Exemplar

Introduction

In the previous chapters, we have seen the importance of manufacturing as an engine of economic growth for the low- and middle-income countries, facilitated by globalization in the last four decades. This chapter looks at the role of manufacturing in economic growth for developed countries and reviews the effects of globalization on output and job creation. To focus the discussion on policy issues, the U.S. case is illustrated. Unlike the previous chapters, data used in this chapter are based on U.S. government statistics, which are generally more comprehensive and more reliable.

Among the findings:

- The U.S. manufacturing share in GDP reached a peak of about 14 percent in 1953 and, since then, has remained at around 12 percent. Meanwhile, the manufacturing share of employment has dropped precipitously and consistently from 23 percent in 1953 to about 8 percent today. This trend has accelerated since China joined the World Trade Organization in 2001.
- The decline in the manufacturing share of employment masks two critical aspects: (1) the high productivity in manufacturing so that the output share

remains high; and (2) the line between manufacturing and services is becoming blurry; so, distinctions in accounting for output and productivity in manufacturing and services may not be valid.

- A large part of the declining share of manufacturing in employment was associated with automation and robotization, not with globalization.
- The effect of globalization, defined in this book as freer flow of trade in goods and services, on capital flows and in migration, for the United States has been cheaper products, larger quantity and quality of household products, more convenience and more time saving. At the same time, there is no doubt that it has raised profits for the industrialists, hollowing out the American economy.
- Contrary to the thinking of many mainstream economists, there are many reasons to worry about this drop in employment concomitant with the rise in productivity and the steady share of output. This is because the evidence in this book shows that the rise in productivity has been accompanied by a net shift from high- to low-productivity activities, thus causing a reverse structural transformation, reducing overall productivity growth.
- A large group of older, unskilled workers were forced out of the labor market because of automation or increasing competition from workers abroad. For several reasons, these workers could not participate in retraining or had become disillusioned and quit the labor force.

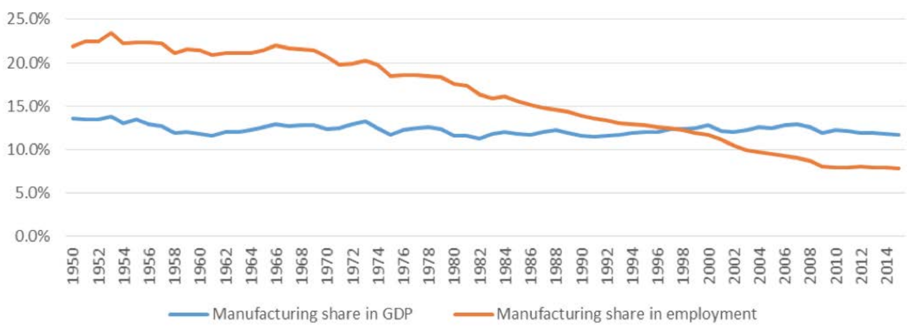
Economists have long been aware of the relationship between free trade and job losses. But as long as the total benefits exceed total costs, they assume that there is a way to compensate the losers through the winners so that the society as a whole is better off. This is the essence of Pareto optimality that underlies all the efficiency gains. In theory, production should go to the lowest cost places. If China's wages are lower than the United States, products made in China would be cheaper than if they had been made in the United States (and indeed they are) so that throughout the last century, the steady erosion of job losses has been taken for granted by various administrations.

But this assumption was wrong for a number of reasons. First, the compensation for losers turned out to be lip service, in part because it is difficult to identify the losers and target adjustment assistance toward them. Second, it was always assumed that workers who had lost jobs because of free trade would be retrained and find jobs elsewhere. It turned out that these workers had to transition to sectors with lower productivity or simply give up, leading to a terrible waste of resources. There are various reasons for this , including inadequate training, inability to be retrained because of age or inertia, lack of opportunities in the same location, unwillingness to relocate, and so on. Third, because productivity has always been higher in manufacturing than in other sectors, wages in manufacturing are also higher than average, leading to a decline in standards of living when manufacturing jobs decrease. Fourth, health care, retail, and food services, while providing jobs, cannot produce the same steady income as traditional manufacturing jobs.

The Serious Decline Of Manufacturing Employment

The manufacturing share in GDP and employment in the United States reached a peak of 13.8 percent and 23.4 percent, respectively, in 1953, several years after the end of World War II (Figure 6.1). Since then, while the former has been more or less constant at around 12 percent, the share in employment has dropped precipitously to 8 percent. While this decline is long-standing, the trend accelerated from 1.5 percent a year between 1953 and 2001, to 2.2 percent a year since 2002, after China joined the World Trade Organization on December 11, 2001.

Figure 6.1. Share of Manufacturing in GDP and Employment, United States, 1950–2015



Source: U.S. Bureau of Labor Statistics.

Though still the largest employer among goods-producing industries, manufacturing now accounts for only half what its share of total employment was in the early 1980s. Between 2000 and 2015, the U.S. manufacturing sector lost a net 5 million jobs and today is home for 12.3 million workers. This decline in manufacturing jobs has been characterized as the deindustrialization of America.

Table 6.1 shows the trend in U.S. employment growth by sector since 1948. Data on a detailed breakdown of many sectors are not available prior to 1977, so such detailed analysis can only be carried out for 1977–1997 and 1998–2015.

Table 6.1. Employment Growth, by Sector, United States, 1948–2015

	Employment Growth (Average Annual %)		
	1948-1997	1977-1997	1998-2015
All industries	2.0%	1.7%	0.4%
Private industries	2.0%	1.8%	0.4%
Agriculture, forestry, fishing, and hunting	-1.2%	-1.0%	0.1%
Farms		-2.6%	-0.8%
Forestry, fishing, and related activities		2.9%	1.6%
Mining	-0.4%	-3.2%	2.8%
Oil and gas extraction		-2.2%	2.9%
Mining, except oil and gas		-3.4%	-0.8%
Support activities for mining		-3.5%	5.9%
Utilities	1.2%	0.3%	-0.6%
Construction	1.8%	1.5%	-0.8%
Manufacturing	0.3%	-0.7%	-2.5%
Durable goods	0.5%	-0.8%	-2.5%
Wood products		0.1%	-4.1%
Nonmetallic mineral products		-1.1%	-2.8%
Primary metals		-3.4%	-3.1%
Fabricated metal products		-0.6%	-1.4%
Machinery		-1.6%	-1.8%
Computer and electronic products		0.0%	-3.5%
Electrical equipment, appliances, and components		-1.8%	-3.1%
Motor vehicles, bodies and trailers, and parts		-0.2%	-3.4%
Other transportation equipment		-0.5%	-0.7%
Furniture and related products		0.5%	-4.5%
Miscellaneous manufacturing		-0.1%	-1.7%
Nondurable goods	0.1%	-0.5%	-2.6%
Food and beverage and tobacco products		-0.3%	-0.5%
Textile mills and textile product mills		-1.6%	-6.8%
Apparel and leather and allied products		-3.0%	-8.6%
Paper products		-0.2%	-3.5%
Printing and related support activities		1.8%	-3.8%
Petroleum and coal products		-2.9%	-0.6%
Chemical products		-0.6%	-1.5%
Plastics and rubber products		1.7%	-2.5%
Wholesale trade	2.0%	1.2%	0.2%
Durable goods			-0.1%
Nondurable goods			0.5%

Retail trade	2.5%	1.8%	0.3%
Motor vehicle and parts dealers			0.0%
Food and beverage stores			0.2%
General merchandise stores			1.2%
Other retail			0.0%
Transportation and warehousing	0.5%	1.7%	0.2%
Air transportation		3.6%	-2.0%
Rail transportation		-5.1%	-0.5%
Water transportation		-0.7%	1.7%
Truck transportation		2.2%	-0.2%
Transit and ground passenger transportation		2.0%	1.2%
Pipeline transportation		-0.6%	-0.2%
Other transportation and support activities		3.1%	0.1%
Warehousing and storage		2.5%	2.6%
Information	1.7%	1.4%	-1.7%
Publishing industries (includes software)		2.4%	-1.6%
Motion picture and sound recording industries		1.8%	0.3%
Broadcasting and telecommunications		0.1%	-2.2%
Information and data processing services		5.4%	-2.3%
Finance and insurance	3.2%	2.0%	0.3%
Federal Reserve banks, credit intermediation, and related act.		1.3%	0.0%
Securities, commodity contracts, and investments		5.6%	0.5%
Insurance carriers and related activities		1.8%	0.6%
Funds, trusts, and other financial vehicles		5.6%	-8.7%
Real estate and rental and leasing	3.0%	2.7%	0.1%
Real estate		1.8%	0.7%
Rental and leasing services and lessors of intangible assets		5.4%	-1.4%
Professional, scientific, and technical services	5.0%	4.6%	1.8%
Legal services		4.5%	0.3%
Computer systems design and related services		11.2%	3.1%
Miscellaneous professional, scientific, and technical services		3.9%	1.7%
Management of companies and enterprises	2.2%	2.4%	1.5%
Administrative and waste management services	6.1%	6.7%	0.5%
Administrative and support services		6.9%	0.4%
Waste management and remediation services		2.7%	1.5%
Educational services	3.6%	3.2%	2.5%
Health care and social assistance	5.5%	4.3%	2.5%
Ambulatory health care services		5.9%	3.0%
Hospitals		3.2%	1.8%
Nursing and residential care facilities		5.4%	1.6%
Social assistance			3.7%
Arts, entertainment, and recreation	3.5%	3.2%	1.3%

Performing arts, spectator sports, museums, and related act.		2.9%	1.3%
Amusements, gambling, and recreation industries		3.4%	1.2%
Accommodation and food services	3.3%	3.3%	1.4%
Accommodation		3.1%	0.3%
Food services and drinking places		3.4%	1.6%
Other services, except government	1.0%	1.3%	0.2%
Government	1.9%	1.1%	0.4%
Federal	0.1%	-0.3%	0.1%
General government		-0.5%	0.6%
Civilian			1.2%
Military			-0.1%
Government enterprises		0.9%	-2.4%
State and local	3.2%	1.6%	0.5%
General government		1.6%	0.4%
Education			0.6%
Other			0.3%
Government enterprises		1.6%	0.9%

Sources: BEA 2012; author's calculations.

The classification of sectors changed slightly in 1998, hence the break. A review of data shows that, after World War II, the United States continued to gain employment in manufacturing in absolute value (but not in share of total), reaching a peak of 20 million in 1979 (62 percent of which was in durable goods) before starting to decline. The steepest decline was in primary metals and apparel and leather during 1948-1997 and apparel and leather and textiles during 1998-2015.

Against these job losses, what have been the gains in jobs created by other sectors?

Between 1998 and 2015, the U.S. economy gained a net average of over 9 million jobs (Table 6.2): 15.3 million new jobs were created, while 6.1 million jobs were lost. In addition to manufacturing, there were job losses in the information and construction sectors. The sectors which create the most jobs during this period are health care and social assistance, accommodation and food services, professional services, retail trade, and government.

Table 6.2. Job Gains and Losses and Ranking by Job Gains, by Sector, 1998–2015

	Annual Growth %	**Average (thousands)**			
	1998-2015	**1998-2000**	**2013-2015**	**Gains/ Losses**	**Rank**
Total	0.4%	120771	129997	**9226**	
Agriculture, forestry, fishing, and hunting	0.1%	1180	1188	**8**	**16**
Mining	2.8%	530	758	**228**	**13**
Utilities	-0.6%	595	543	**-51**	
Construction	-0.8%	6350	6123	**-227**	
Manufacturing	-2.5%	17082	11912	**-5170**	
Wholesale trade	0.2%	5444	5676	**232**	**12**
Retail trade	0.3%	12636	13863	**1227**	**4**
Transportation and warehousing	0.2%	4133	4288	**155**	**14**
Information	-1.7%	3211	2556	**-655**	
Finance and insurance	0.3%	5376	5790	**414**	**8**
Real estate and rental and leasing	0.1%	1799	1918	**118**	**15**
Professional, scientific, and technical services	1.8%	6112	8021	**1909**	**3**
Management of companies and enterprises	1.5%	1607	2021	**414**	**8**
Administrative and waste management services	0.5%	7198	7900	**701**	**7**
Educational services	2.5%	2101	3081	**980**	**6**
Health care and social assistance	2.5%	11386	16514	**5128**	**1**
Arts, entertainment, and recreation	1.3%	1398	1747	**349**	**10**
Accommodation and food services	1.4%	8188	10172	**1984**	**2**
Other services, except government	0.2%	5564	5869	**305**	**11**
Government	0.4%	18882	20056	**1174**	**5**
Gross Changes				**15327**	
Losses				**-6103**	
Net Gains				**9224**	

Sources: 2016 data of the U.S Bureau of Labor Statistics; author's calculations.

But such aggregation conceals a great deal of what is going on. Table 6.3 provides a detailed breakdown of the subsectors of the top 10 job-gaining sectors. The wages and salaries associated with most of the new jobs are insufficient to offset the lost jobs in manufacturing. The data behind Table 6.4 show that even in health care, the best subsector, the average wage in ambulatory health care services[53] was US$50,000–US$53,000 in 2013–2015, compared with US$64,000–US$67,000 in manufacturing.

53 Defined by U.S. Bureau of Economic Analysis (BEA 2012, 47) as "Businesses engaged in providing health care services directly or indirectly to ambulatory patients and that do not usually provide inpatient services." Examples of businesses in this industry are ambulance services, dentist offices, health maintenance organizations, medical centers, home health care services, and kidney dialysis centers.

Table 6.3. Top 10 Job-Gaining Sectors, 1998–2015

	Annual Growth %	Average (thousands)	Average (thousands)	
	1998-2015	**98-2000**	**2013-2015**	**Gains/ Losses**
Health care and social assistance	2.5%	11386	16514	5128
Ambulatory health care services	3.0%	3854	6012	2157
Hospitals	1.8%	3489	4553	1064
Nursing and residential care facilities	1.6%	2330	2962	633
Social assistance	3.7%	1713	2988	1275
Accommodation and food services	1.4%	8188	10172	1984
Accommodation	0.3%	1611	1715	105
Food services and drinking places	1.6%	6577	8457	1880
Professional, scientific, and technical services	1.8%	6112	8021	1909
Legal services	0.3%	1005	1079	74
Computer systems design and related services	3.1%	1100	1717	617
Miscellaneous professional, scientific, and technical services	1.7%	4007	5225	1218
Retail trade	0.3%	12636	13863	1227
Motor vehicle and parts dealers	0.0%	1527	1682	155
Food and beverage stores	0.2%	2517	2710	194
General merchandise stores	1.2%	2286	2802	517
Other retail	0.0%	6306	6668	362
Government	0.4%	18882	20056	1174
Federal	0.1%	4179	4171	-9
State and local	0.5%	14703	15886	1183
Educational services	2.5%	2101	3081	980
Administrative and waste management services	0.5%	7198	7900	701
Administrative and support services	0.4%	6904	7526	622
Waste management and remediation services	1.5%	294	374	79
Management of companies and enterprises	1.5%	1607	2021	414
Finance and insurance	0.3%	5376	5790	414
Federal Reserve banks, credit intermediation, and related activities	0.0%	2426	2528	102
Securities, commodity contracts, and investments	0.5%	793	861	67
Insurance carriers and related activities	0.6%	2143	2397	254
Funds, trusts, and other financial vehicles	-8.7%	14	5	-9
Arts, entertainment, and recreation	1.3%	1398	1747	349
Performing arts, spectator sports, museums, and related activities	1.3%	392	494	102
Amusements, gambling, and recreation industries	1.2%	1006	1253	247

Sources: BEA 2016; author's calculations.

Table 6.4. Job Gains and Losses and Average Annual Wages and Salaries, by Sector, 1998–2015

	Annual Growth %	**Ave. Gains/ Losses**	**Av. Ann. Wages & Salaries per Worker (US$'000)**		
	1998-2015	**1998-2015**	**2013**	**2014**	**2015**
		('000)			
Total	0.4%	**9226**			
Agriculture, forestry, fishing, and hunting	0.1%	**8**	34.5	35.0	36.6
Mining	2.8%	**228**	99.9	116.0	104.3
Utilities	-0.6%	**-51**	98.8	101.5	105.1
Construction	-0.8%	**-227**	56.0	56.2	59.7
Manufacturing	-2.5%	**-5170**	63.5	65.4	66.8
Wholesale trade	0.2%	**232**	72.4	73.1	77.2
Retail trade	0.3%	**1227**	33.5	30.6	35.4
Transportation and warehousing	0.2%	**155**	53.3	60.4	55.7
Information	-1.7%	**-655**	94.3	98.9	103.7
Finance and insurance	0.3%	**414**	95.5	100.7	103.6
Real estate and rental and leasing	0.1%	**118**	54.7	57.3	60.0
Professional, scientific, and technical services	1.8%	**1909**	88.8	92.1	95.5
Management of companies and enterprises	1.5%	**414**	117.1	123.1	125.7
Administrative and waste management services	0.5%	**701**	39.2	40.1	41.3
Educational services	2.5%	**980**	43.8	45.1	45.9
Health care and social assistance	2.5%	**5128**	50.5	51.4	53.0
Arts, entertainment, and recreation	1.3%	**349**	45.2	46.3	48.0
Accommodation and food services	1.4%	**1984**	25.9	26.7	27.5
Other services, except government	0.2%	**305**	39.0	39.8	41.0
Government	0.4%	**1174**	60.4	61.7	63.4
Gross Changes		**15327**			
Losses		**-6103**			
Net Gains		**9224**			

Sources: BEA 2016; author's calculations.

Table 6.5 shows details on the wages and salaries in the subsectors that lost jobs. There are two striking features of the table. First, all subsectors within the manufacturing category lost employment, so the job losses occurred across the board. Second, the computers and electronic products subsector, which had the highest productivity and highest wages and salaries per worker, also lost the most workers over the period, many more than the textile products subsector. This is disturbing because the sectors that lost the most workers are also the ones with much higher productivity than the average, causing a double whammy effect on income and expenditure in the economy.

Table 6.5. Job Losses and Average Wages and Salaries per Worker, 2013–2015

	(in thousands)		Av. Wages & Sal. per Worker ($US '000)		
	Gains/Losses	**Rank**	**2013**	**2014**	**2015**
Total	9226				
Manufacturing	-5170	1	63.5	65.4	66.8
Durable goods	-3209		66.8	68.9	70.0
Wood products	-247		41.4	43.6	44.8
Nonmetallic mineral products	-164		53.8	55.4	57.3
Primary metals	-232		64.3	66.9	66.6
Fabricated metal products	-307		53.8	55.5	56.0
Machinery	-351		66.6	69.0	69.8
Computer and electronic products	-731		103.5	108.6	111.3
Electrical equipment, appliances, and components	-211		65.4	66.0	66.6
Motor vehicles, bodies and trailers, and parts	-429		58.6	60.6	61.7
Other transportation equipment	-93		86.2	89.9	90.0
Furniture and related products	-296		42.4	42.5	44.9
Miscellaneous manufacturing	-150		61.5	62.4	64.8
Nondurable goods	-1959		58.0	59.6	61.3
Food and beverage and tobacco products	-91		46.6	47.5	49.4
Textile mills and textile product mills	-388		41.7	43.0	44.2
Apparel and leather and allied products	-454		39.2	41.0	42.0
Paper products	-248		65.4	68.4	68.5
Printing and related support activities	-323		47.8	48.7	49.7
Petroleum and coal products	-13		108.9	113.4	116.1
Chemical products	-177		91.0	94.5	98.5
Plastics and rubber products	-265		50.5	51.4	52.6
Information	-655	2	94.3	98.9	103.7
Publishing industries (includes software)	-194		112	116	127
Motion picture and sound recording industries	35		74	73	81
Broadcasting and telecommunications	-396		82	88	86
Information and data processing services	-99		114	120	126

Construction	-227	3	56.0	56.2	59.7
Utilities	-51	4	98.8	101.5	105.1

Sources: BEA 2016; author's calculations.

Pattern Of Structural Transformation In The U.S. Economy

This section analyzes the pattern of structural transformation in the United States based on official data from the U.S. Bureau of Labor Statistics as well as the Bureau of Economic Analysis of the U.S. Department of Commerce as of November 2016. The methodology follows that of Chapter 2 to measure the contribution of employment reallocation to productivity growth.

Table 6.6 shows labor productivity (value added per U.S. worker) in selected years since 1950, expressed in thousands of 2009 prices, together with annual employment growth. The first finding that one notices in the table is that the vast majority of sectors exhibit a steady increase in labor productivity over the past half century. The rate of growth is highest in agriculture (4.8 percent a year in 1950–2015), followed by information services (4.2 percent a year), wholesale (3.7 percent a year), and manufacturing (3.4 percent a year). Second, compared with the developing countries discussed in the previous chapter, there seems to be less variation in productivity across sectors. This implies that there is less scope for achieving greater economic growth by shifting activities from low- productivity sectors to higher-productivity sectors. McMillan, Rodrik, and Verduzco-Gallo (2014) also note that this feature seems to be less pronounced in developed economies. Furthermore, the coefficient of variation declined over time, from about 1.0 in 1950 to 0.825 in 2015, while, for example, the corresponding coefficient in developing countries tended to increase. For example, the coefficient of variation in Brazil rose from about 0.67 in 1950 to about 1.27 in 2010 (Chapter 5).

Table 6.6. Labor Productivity (Value Added per Worker), by Sector, United States, 1950–2015

	Thousands of 2009 prices								Emp. Growth (annual %)			
Year	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**	**2010**	**2015**	**1950-1970**	**1970-1990**	**1990-2010**	**2000-2015**
Farm (Agriculture, forestry, fishing, and hunting)	3.51	6.00	10.62	14.25	27.29	42.79	66.86	69.51	-3.9%	-1.6%	-1.9%	-0.5%
Mining	211.79	297.74	378.32	148.30	260.99	351.87	386.82	459.68	-1.9%	1.0%	-0.1%	-0.1%
Utilities	215.55	296.38	396.05	358.89	382.65	505.49	496.43	449.19	1.1%	1.8%	-1.6%	0.0%
Construction	101.82	125.40	136.09	115.03	119.18	113.29	99.96	96.05	1.6%	1.8%	2.0%	0.1%
Manufacturing	20.82	23.97	33.44	40.15	59.01	92.87	157.72	155.15	1.0%	0.0%	-1.9%	0.0%
Wholesale Trade	20.77	26.66	35.86	51.81	75.30	124.84	155.60	166.40	1.9%	2.3%	0.6%	0.0%
Retail Trade	31.42	32.67	33.06	30.53	35.21	51.23	59.71	61.19	2.2%	2.9%	0.8%	0.0%
Transportation, and warehousing	76.97	155.63	52.79	63.57	70.98	86.13	100.56	90.03	6.7%	1.2%	1.3%	0.0%
Information	16.09	33.63	53.61	89.42	109.25	122.52	271.56	319.34	0.8%	1.3%	0.5%	0.0%
Finance, insurance, real estate, rental, and leasing	136.50	170.21	204.46	241.01	243.68	298.82	380.18	390.39	3.1%	3.4%	1.2%	0.0%
Professional and business services	33.27	50.76	65.66	74.96	90.52	84.65	102.71	103.59	2.9%	3.8%	2.6%	0.0%
Educational services, health care, and social assistance	38.01	72.75	88.17	84.19	70.52	60.48	61.10	61.06	3.9%	4.6%	3.0%	0.0%
Arts, entertainment, recreation, accommodation, and food services	31.77	30.49	27.62	27.56	27.46	30.59	29.45	29.75	2.9%	3.7%	1.8%	0.0%
Government & other services	26.80	26.83	37.93	41.46	48.05	59.49	69.84	75.52	1.3%	1.5%	0.4%	0.0%
Total	33.70	43.38	55.55	60.91	70.59	84.87	101.88	104.33	1.4%	2.0%	1.0%	0.0%

Sources: 2016 data of the U.S Bureau of Labor Statistics; author's calculations.

Third, over 1950-2015, the U.S. manufacturing, along with agriculture, lost the most jobs in relative and in absolute terms. The share of manufacturing in the labor force declined from 22 percent in 1950 to about 8 percent in 2015, while total manufacturing employment dropped from 14.0 million to about 12.3 million over the same period. Was this caused by demographic factors such as shrinking population or changes in the age structure of the population? No, because during the same period, the U.S. workforce increased from 63.9 million to 157.0 million.

However, if both agriculture and manufacturing have continued to shed jobs throughout the past half century, the former at an average of 2 percent a year and the latter at 0.3 percent, which sectors are absorbing this labor surplus? Table 6.7 shows that the biggest employment sectors in the U.S. economy today are government (22.4 percent), followed by education (14.0 percent) and arts and entertainment (13.2 percent). Yet these are also sectors with lower productivity. This pattern of reverse structural transformation can explain a great deal of what is occurring in the U.S. economy (see below).

Table 6.7. Pattern of Employment, United States, 1950–2015

	Farm (Agriculture, forestry, fishing, and hunting)	Mining	Utilities	Construction	Manufacturing	Wholesale Trade	Retail Trade	Transportation, and warehousing	Information	Finance, insurance, real estate, rental, and leasing	Professional and business services	Educational services, health care, and social assistance	Arts, entertainment, recreation, accommodation, and food services	Government & other services	Total
Average annual growth rate 1950-2015	-2.0%	-0.3%	0.5%	1.6%	-0.3%	1.6%	2.1%	3.0%	1.1%	2.5%	3.3%	4.0%	3.0%	1.1%	1.5%
Employment in thousands (av. 1950-1952)	8112.9	936.0	422.2	2597.3	14791.3	2332.6	4739.6	943.2	1693.0	1893.0	3039.0	2215.3	3733.0	18948.6	66397.0
Percentage	12.2%	1.4%	0.6%	3.9%	22.3%	3.5%	7.1%	1.4%	2.5%	2.9%	4.6%	3.3%	5.6%	28.5%	100.0%
Employment in thousands (av. 2013-2015)	2171.4	858.0	554.0	6151.0	12174.3	5807.2	15359.1	4668.0	2727.3	7995.7	19083.0	21526.7	20251.0	34369.3	153696.0
Percentage	1.4%	0.6%	0.4%	4.0%	7.9%	3.8%	10.0%	3.0%	1.8%	5.2%	12.4%	14.0%	13.2%	22.4%	100.0%
Value added per worker (av. 2013-2015)	70.4	417.0	476.4	97.2	154.8	163.4	60.5	94.6	305.5	389.0	102.2	61.0	29.8	75.0	103.9

Sources: 2016 data of the U.S Bureau of Labor Statistics; author's calculations.

To investigate the structural transformation issue, we decompose the productivity equation into three terms as explained in equation (2) of Chapter 2.

$$(2) \qquad \Delta Y_t = \sum_{i=1,n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=1,n} y_{i,t\text{-}k} \Delta \theta_{i,t} + \sum_{i=1,n} \Delta y_{i,t} * \Delta \theta_{i,t}$$

The first term in the decomposition is the weighted sum of productivity growth within individual sectors, where the weights are the employment share of each sector at the beginning of the period. This is the within component of productivity growth, which is associated with capital deepening or new technology (high variety yield, better inputs, and so on) in the sector. The second term refers to the between effect, or static structural change, and reflects the change in productivity brought about by the sectoral gain or loss in employment, assuming there is no change in productivity over the period. It thus measures the pure effect of the movement of labor on productivity change. For the economy as a whole, this term is negative if there are more labor losses than labor gains across sectors. In general, in an economy that is growing, this term is positive because there tends to be more jobs created, so the gains more than offset the losses. The third term refers to the dynamic structural change. It is a product of the change in sectoral employment and the change in productivity and therefore indicates the appropriate direction of productivity change. This term is positive if the economy is advancing along the path of structural transformation, that is, if resources are being moved from low-productivity to high-productivity sectors. It is negative if the reverse is occurring, that is, if resources are being moved from high- to low-productivity sectors.

Table 6.8 provides a breakdown of these effects over the 65 years from 1950 to 2015. Throughout this period, the dynamic between effect in the United States is either zero or negative, and, since 1990, it has been the primary reason why growth in overall productivity has been less than it should be. Recall the meaning of the dynamic between effect: it measures the extent to which productivity is affected by resources moving in and out of the "right" sector. A negative number indicates resources moving out of the appropriate sectors into the wrong sectors. For instance, in the decade of 1990–2000, both the within effect and the static between effect were positive, amounting to 2.0 percent and 0.1 percent, respectively. If there had been no adverse dynamic between-effect term, the overall productivity growth in the economy would have been 2.1 percent a year. However, the actual productivity growth was only 1.9 percent a year because of the –0.2 percent dynamic between effect, or reverse structural transformation. Of particular concern is the fact that, since 2000, both the static between effect and the dynamic between effect have been negative. Thus, the reverse structural transformation has been reinforced by the net loss in productivity caused by employment changes.

Table 6.8. Decomposition of Annual Productivity Growth, United States, 1950–2015

	Farm (Agriculture, forestry, fishing, and hunting)	Mining	Utilities	Construction	Manufacturing	Wholesale Trade	Retail Trade	Transportation, and warehousing	Information	Finance, insurance, real estate, rental, and leasing	Professional and business services	Educational services, health care, and social assistance	Arts, entertainment, recreation, accommodation, and food services	Government	Total
1950-1960															
First Term	0.1%	0.3%	0.1%	0.2%	0.2%	0.1%	0.0%	0.3%	0.1%	0.3%	0.2%	0.3%	0.0%	0.0%	2.2%
Second Term	0.0%	-0.2%	0.0%	0.1%	0.0%	0.0%	0.1%	-0.1%	0.0%	0.2%	0.0%	0.1%	0.1%	0.2%	0.4%
Third Term	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	-0.1%
Growth in productivity	2.6%														
First term	2.2%														
Second Term	0.4%														
Third Term	-0.1%														
1960-1970															
First Term	0.1%	0.2%	0.1%	0.1%	0.4%	0.1%	0.0%	-0.2%	0.1%	0.2%	0.2%	0.1%	0.0%	0.7%	2.1%
Second Term	0.0%	-0.2%	0.0%	0.0%	0.0%	0.0%	0.1%	0.7%	0.0%	0.2%	0.1%	0.2%	0.1%	-0.1%	1.0%
Third Term	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.5%
Growth in productivity	2.5%														
First term	2.1%														
Second Term	1.0%														
Third Term	-0.5%														
1970-1980															
First Term	0.0%	-0.3%	0.0%	-0.2%	0.2%	0.1%	0.0%	0.1%	0.1%	0.3%	0.1%	0.0%	0.0%	0.2%	0.5%
Second Term	0.0%	0.1%	0.0%	0.0%	-0.2%	0.0%	0.1%	0.0%	0.0%	0.2%	0.1%	0.2%	0.1%	-0.1%	0.5%

Third Term	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%
Growth in productivity	0.9%														
First term	0.5%														
Second Term	0.5%														
Third Term	-0.1%														
1980-1990															
First Term	0.1%	0.2%	0.0%	0.0%	0.5%	0.2%	0.1%	0.0%	0.1%	0.0%	0.2%	-0.1%	0.0%	0.3%	1.4%
Second Term	0.0%	-0.1%	0.0%	0.0%	-0.2%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	0.3%	0.1%	-0.1%	0.3%
Third Term	0.0%	-0.1%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%
Growth in productivity	1.5%														
First term	1.4%														
Second Term	0.3%														
Third Term	-0.2%														
1990-2000															
First Term	0.0%	0.1%	0.1%	0.0%	0.6%	0.3%	0.2%	0.1%	0.0%	0.4%	-0.1%	-0.1%	0.0%	0.4%	2.0%
Second Term	0.0%	-0.1%	-0.1%	0.1%	-0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.1%	0.0%	-0.2%	0.1%
Third Term	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%
Growth in productivity	1.9%														
First term	2.0%														
Second Term	0.1%														
Third Term	-0.2%														
2000-2010															
First Term	0.0%	0.0%	0.0%	-0.1%	0.8%	0.1%	0.1%	0.0%	0.4%	0.5%	0.2%	0.0%	0.0%	0.3%	2.4%
Second Term	0.0%	0.0%	0.0%	-0.1%	-0.4%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.2%	0.0%	0.1%	-0.2%
Third Term	0.0%	0.0%	0.0%	0.0%	-0.3%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.3%

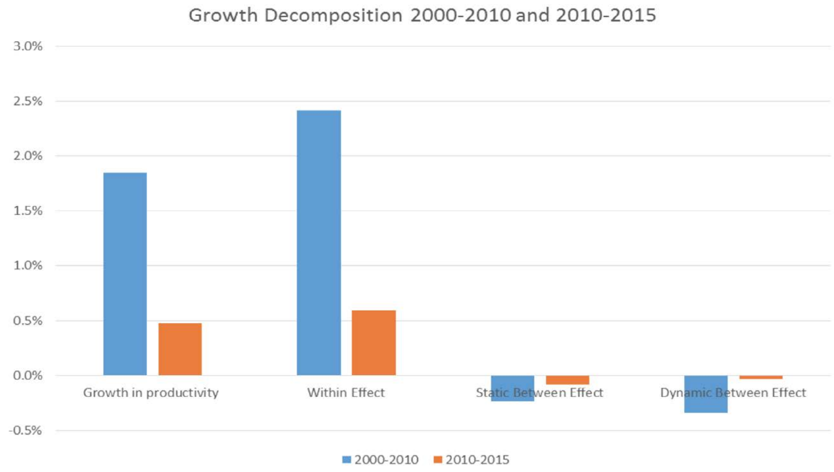
Growth in productivity	1.8%														
First term	2.4%														
Second Term	-0.2%														
Third Term	-0.3%														
2010-2015															
First Term	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	-0.1%	0.2%	0.1%	0.0%	0.0%	0.0%	0.3%	0.6%
Second Term	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%	0.2%	0.0%	0.0%	-0.3%	-0.1%
Third Term	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Growth in productivity	0.5%														
First term	0.6%														
Second Term	-0.1%														
Third Term	0.0%														

Sources: 2016 data of the U.S Bureau of Labor Statistics; author's calculations.

A detailed decomposition of the between effect shows clearly the root cause of the problem in the United States (see Figure 6.4 below). Since the 1970s, labor has been moving out of manufacturing. Some of this labor, especially workers who can be retrained or who are young enough to go back to school, can be absorbed into services such as finance, insurance, or education services. However, note that these sectors exhibit lower productivity than the manufacturing sector; so, in net terms, the U.S. economy experienced a slowdown in productivity because of this labor movement. This effect worsened in 2000–2010 when, because of rising import competition, especially from China, and other reasons, the shedding of labor from manufacturing accelerated.

Figure 6.2 presents the results of Table 6.8 in graphic terms for 2000–2015. Ideally, for each sector in which productivity is greater than average in the beginning of the period (because of technology, efficiency, reorganization, and so on), labor should be moving into the sector, and conversely, for sectors whose productivity is lower than average, labor should move out. If this is the case, the second term will be positive. The third effect measure the extent to which the second term (labor movement) is aided by productivity change during the period --labor moving into the rising productivity sector or moving out of declining productivity sector for example. That this third effect has been negative for all sectors in Figure 6.2 shows that while some labor surplus has been absorbed by the service sector (positive second term), this labor movement took place in the wrong direction (moving into declining productivity sectors or moving out of sectors in which productivity is rising). Note that progress in structural transformation can only take place in sectors that can absorb labor, such as manufacturing. Thus, sectors such as transport and communication have rising productivity but they do not absorb many workers so that their rising productivity means fewer and fewer workers will be employed as the economy progresses.

Figure 6.2. Growth Decomposition, Within, Static Between, and Dynamic Between Effects, United States, 2000–2015



Source: Author's calculations.

McMillan, Rodrik, and Verduzco-Gallo (2014) note that Africa and Latin America are the only two regions in the world in which this reverse transformation took place and that the exchange rate played a role in this process:

"We find that countries that maintain competitive or undervalued currencies tend to experience more growth-enhancing structural change. This is in line with other work that documents the positive effects of undervaluation on modern, tradable industries (Rodrik 2008). Undervaluation acts as a subsidy on those industries and facilitates their expansion." (McMillan, Rodrik, and Verduzco-Gallo 2014, 12)

This study confirms that Africa, Latin America, and the United States are facing a similar situation, and the reverse transformation in the past may have been caused by an overvalued exchange rate, especially relative to China.

The dispersion in sectoral productivity is also measured in the sample. The productivity gap is supposed to shrink as an economy develops so that agricultural productivity is comparable with productivity in other sectors of an economy. This dispersion indicator refers to the coefficient of variation. The dispersion in the United States has remained the same over the years.

The analysis on the United States shows there is room for growth through structural transformation if more investment and growth in manufacturing have taken place. Even if capital deepening or the application of new technology is not taking place, job creation in higher-productivity sectors such as manufacturing will boost the rate of growth, generate higher income, and provide jobs for a growing workforce.

The Impact Of The Decline In Manufacturing Employment

Many economists have thought of the decline in manufacturing employment as a necessary step in the quest for higher income and welfare. Thus, Larry Summers, former White House economic adviser and U.S. secretary of the treasury under President Clinton, stated: "America's role is to feed a global economy that's increasingly based on knowledge and services rather than on making stuff," while N. Gregory Mankiw, then chairman of the Council of Economic Advisers under President Bush, said "the long-term trends that we have recently seen in manufacturing mirror what we saw in agriculture a couple of generations ago."[54]

These economists believe that, similar to the way the industrial revolution moved workers from agriculture to industry, resulting in rapid income growth, the computer and technology-based productivity increases of the last three or four decades have made possible the production of more goods using fewer employees. They reason that, although manufacturing's share in total employment has declined, it still accounts for about 12 percent of total GDP today, as it has for the last three decades. Indeed, technological progress in modern manufacturing allows the same output to be produced with fewer workers. An example is the widespread use of just-in-time production. With this mode of production, firms carefully time their production schedules to the needs of their retail outlets or end users, avoiding costly storage of inventory, while boosting efficiency and cutting employment. Cost reduction has driven part of the recent loss in U.S. manufacturing jobs. Many United States–based multinational corporations have relocated much of their low-skilled production to foreign countries, such as Mexico and Asian countries such as China, Malaysia, and Thailand, where wage rates among the

54 Quoted, respectively, in Gertner (2011) and "The Manufacturing Sector: Remarks of Dr. N. Gregory Mankiw Chairman, Council of Economic Advisers, at the Exchequer Club," Council of Economic Advisers, White House, Washington, DC, https://georgewbush-whitehouse.archives.gov/cea/20031217.html.

unskilled are relatively low. Large numbers of U.S. jobs have been lost in the textile and apparel industries. In response to import growth, some textile firms have invested heavily in labor-saving capital equipment, further reducing employment.

This trend in labor saving may have happened without competition from abroad. But it has certainly been aided by foreign competition made possible through various trade agreements and when China joined the World Trade Organization in 2001, the rate of job loss accelerated.

The issue of whether U.S. job losses are caused by foreign competition, whether just or unjust (thus the call for protection against free trade) or by technological change is complicated and has been discussed at length in the economics literature. In a careful analysis of the U.S. electronics industry 30 years ago, Alic and Harris (1986, 31–32) argue as follows:

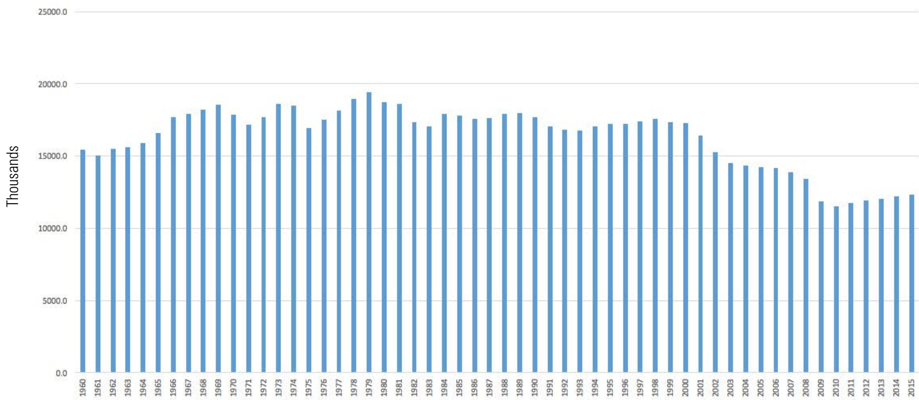
"It is oversimple to argue that the total number of foreign workers engaged in production for shipment to the United States—whether employed by U.S. or foreign firms—represents domestic employment loss. In most cases, U.S. consumer electronics firms had little choice concerning offshore production. Movement abroad was a defensive reaction, not a strategy aimed at expanding markets and improving profitability. To assume that jobs overseas substitute directly for U.S. employment is tantamount to assuming a stable competitive environment, not at all the case. Rather, employment declines followed losses in competitiveness. American firms had higher costs than their rivals. They pursued the obvious route: increases in automation to raise productivity at home, combined with transfers of labor-intensive operations offshore. Only some companies survived; the others left the industry or were purchased by more successful manufacturers. In this complex chain of events, then, import competition must be counted as the primary cause of job losses in the U.S. consumer electronics industry."

Some Misunderstandings About Globalization & Manufacturing Unemployment

The impact of globalization on U.S. manufacturing unemployment is perhaps one of the most misunderstood phenomena in recent times. The misunderstanding has led economists to be indifferent to the massive layoffs in the sector as a result of trade and has led policy makers to not pay sufficient attention to the design and implementation of effective programs to reduce the adjustment burden of the unemployed worker. As a result, the setting up of adequate retraining programs and addressing the long-term consequences of the disappearance of the middle class, the foundation of democracy, have both also been largely ignored..

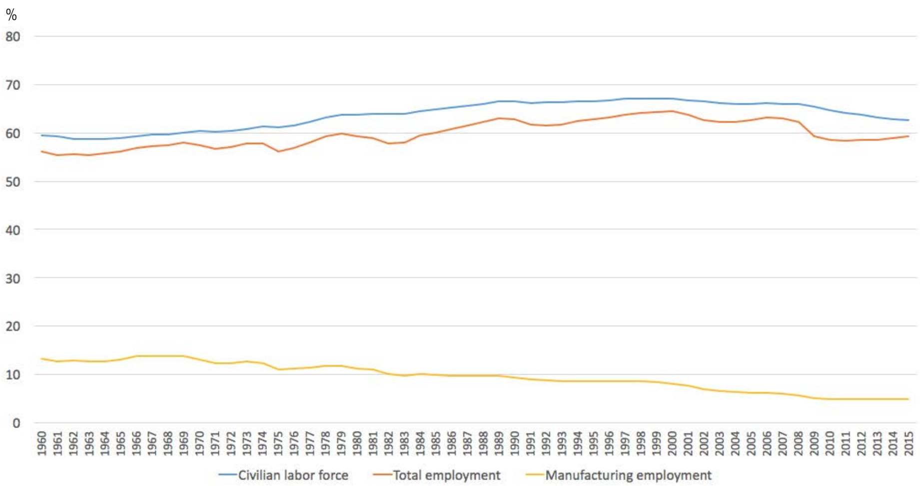
Figure 6.3 shows the absolute level of employment in U.S. manufacturing from 1960–2015. In 2015, total manufacturing employment stood at 12.3 million workers, about 80 percent of the share in 1960, while the civilian labor force more than doubled, from 70 million to 157 million over the same period. Figure 6.4 shows the ratio of the labor force, total employment, and manufacturing employment to the total population. Clearly, as a percent of the total population, manufacturing employment has been in continuous decline for more than a half century.

Figure 6.3. Manufacturing Employment, United States, 1960–2015



Sources: 2016 data of the U.S Bureau of Labor Statistics; author's calculations.

Figure 6.4. The Share of Total Employment and Manufacturing Employment in the Labor Force, United States, 1960–2015

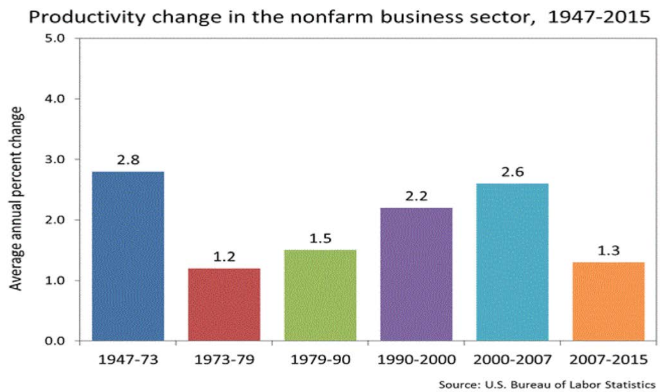


Sources: 2016 data of the U.S Bureau of Labor Statistics; author's calculations.

Many economists have argued that, as in agriculture in the early 20th century, U.S. manufacturing has lost employment because of rising sectoral productivity. Essentially, this view holds that employment losses in manufacturing are derived from technological advances and robotization, which replace labor with machinery. However, several factors refute this view. First, the trend in productivity shows a slowdown since 2000, when job losses accelerated (Figure 6.5). Second, Baumol, Blinder, and Wolff (2003) point out that productivity improvement does not lead only to job destruction; it also leads to job creation. For example, U.S. productivity increased 11-fold between 1870 and 2000, but unemployment remained much the same even though employment could have been reduced by more than 90 percent without affecting per capita income. The same point also applies to foreign trade. Third, productivity growth in the United States has been below that of Germany and Japan; yet, manufacturing employment in those countries has been more or less stable since 1950 (Figure 6.6).

Figure 6.5. Productivity Changes, United States, 1947–2015

a. Changes in nonfarm business, 1947–2015



b. Changes in manufacturing, 1987–2015

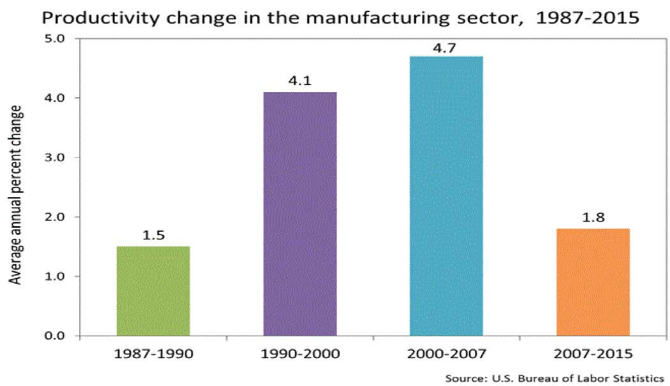
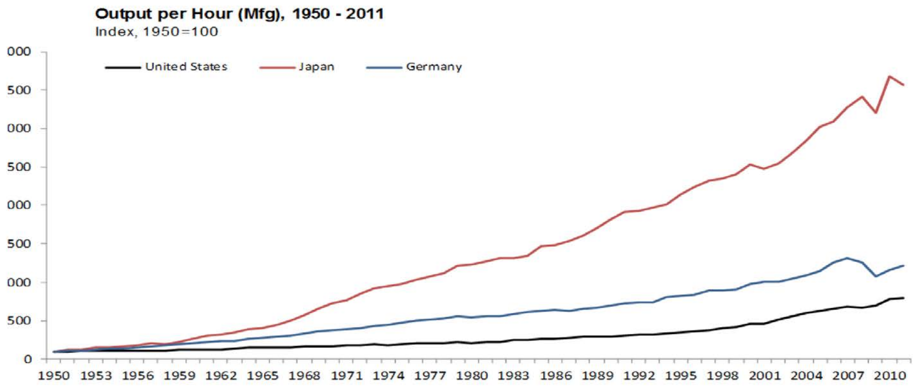


Figure 6.6. Manufacturing Output per Hour, United States, 1950–2011



Source: 2016 data of the U.S Bureau of Labor Statistics.

In a comprehensive study of U.S. job losses, Baumol, Blinder, and Wolff (2003) argue that advances in technology lead to a shift in labor composition and a cut in the size of the workforce. This is because these advances favor a regression toward the mean, that is, larger and smaller firms adjust the workforce to shift toward an intermediate size. In the process, skilled workers tend to adapt more effectively relative to unskilled workers. Technology change also fosters a widening of skill differentials in wages.

Baumol finds that, in many reported cases of downsizing in the 1990s, job losses were associated with restructuring, meaning shifts across firms of varying size within individual industries, without a net reduction in the workforce. He identifies two major forces affecting job losses: (1) in the short run, the demand for products; and (2) technology, which drives firm size in the long run. Moreover, he finds that more rapid productivity growth does not lead to downsizing, though lower profit does because of the attempt by firms to squeeze the labor share.

Causes Of Manufacturing Job Losses: Poor Manufacturing Output Growth

Moreover, the claim that, despite job losses, manufacturing output continues to perform well, and therefore policy makers should not be concerned is simply wrong. Table 6.9 shows that, over the 55-year period, while manufacturing output (value added) in aggregate quantity terms kept pace with overall GDP, almost all subsectors grew at a rate below the average GDP growth rate. This discrepancy was caused by the serious problems in manufacturing, which were masked by the performance in the computers and electronic products subsector and in the petroleum products subsector.

Table 6.9. Growth Rates in Manufacturing Value Added, by Subsector, United States, 1960–2015

	Chain-Type Quantity Indexes for Value Added by Industry				
	[2009=100]				
				1960-2015	2000-2015
	1960	2000	2015	Annual Growth Rate	Annual Growth Rate
Gross domestic product	21.6	87.1	113.4	3.2%	1.6%
Manufacturing	21.4	92.9	110.7	3.2%	1.3%
Durable goods	17.1	92.2	126.5	3.8%	2.5%
Wood products	64.1	121.5	112.3	1.1%	-0.8%
Nonmetallic mineral products	73.2	137.4	111.9	0.9%	-2.1%
Primary metals	130.9	116.9	142.1	0.1%	0.6%
Fabricated metal products	51.5	137.5	116.8	1.7%	-0.7%
Machinery	30.8	112.6	116.4	2.6%	1.3%
Computer and electronic products	0.2	40.1	132.3	13.3%	9.3%
Electrical equipment, appliances, and components	35.1	106.9	99.8	2.1%	-0.4%
Motor vehicles, bodies and trailers, and parts	70.8	220.7	306.2	2.7%	1.5%
Other transportation equipment	63.5	82.5	101.4	0.8%	2.1%
Furniture and related products	56.7	176.2	107.4	1.5%	-4.0%
Miscellaneous manufacturing	16.3	77.6	98.4	3.5%	2.1%
Nondurable goods	30.2	94.7	95.8	2.3%	-0.2%
Food and beverage and tobacco products	42.3	86.3	88.9	1.4%	0.5%
Textile mills and textile product mills	53.1	196.4	105.3	1.7%	-4.5%
Apparel and leather and allied products	143.2	198.0	102.9	-0.3%	-3.9%
Paper products	53.7	124.0	82.9	1.1%	-2.5%
Printing and related support activities	41.1	103.7	101.2	1.8%	-0.5%
Petroleum and coal products	2.6	66.2	103.3	7.3%	0.1%
Chemical products	23.6	84.9	94.7	2.7%	0.8%
Plastics and rubber products	20.1	127.6	110.6	3.5%	-1.0%
Addenda:					
Private goods-producing industries [1]	28.0	96.6	113.1	2.7%	0.9%
Private services-producing industries [2]	16.4	85.0	114.4	3.7%	1.8%
Information-communications-technology-producing industries [3]	...	50.7	...		
Legend / Footnotes:					
1. Consists of agriculture, forestry, fishing, and hunting; mining; construction; and manufacturing.					

2. Consists of utilities; wholesale trade; retail trade; transportation and warehousing; information; finance, insurance, real estate, rental, and leasing; professional and business services; educational services, health care, and social assistance; arts, entertainment, recreation, accommodation, and food services; and other services, except government.
3. Consists of computer and electronic product manufacturing (excluding navigational, measuring, electromedical, and control instruments manufacturing); software publishers; broadcasting and telecommunications; data processing, hosting and related services; internet publishing and broadcasting and web search portals; and computer systems design and related services.
(u): Underlying Detail. All statistics for 2015 are prepared by taking the average of the corresponding quarterly series. For annual series marked as underlying detail, the quarterly statistics on which these estimates rely are of lower quality and pass through a less rigorous review process than the higher level aggregates in which they are included.

Source: BEA 2016.

Specifically, with the exception of these two subsectors, U.S. manufacturing has grown at a rate lower than GDP growth rate, and, over the last 15 years, growth rate has been mostly negative. Table 6.9 shows that, between 2000 and 2015, 5 of the 11 subsectors involved in the durable manufacturing goods sector shrank; 4 grew at a paltry 1.5 percent a year or less, and only 2 grew at rate above 1.5 percent a year. The situation in nondurable goods is much worse: five of eight categories declined sharply (textiles by 4.5 percent a year). Nondurable manufacturing goods are usually labor-intensive goods. Hence, the impact on unemployment has been devastating, particularly among less highly skilled workers.

The only two sectors that showed positive trends in growth in the last 15 years are computers and petroleum and coal products. However, the latter is capital intensive. It employs few people, and, in any case, is not expected to grow in the United States. The former exhibits serious measurement problems. Atkinson et al. (2012) point out issues that cause official statistics on U.S. manufacturing to overestimate output growth in manufacturing. The statistical agencies derive the quantity change from the actual value of a product by first estimating the price change, and this causes two problems. First, the fragmentation of production and consumption raises difficulties in accurately estimating the imports of intermediate goods needed to extract value added (see Chapter 2). Thus, if a manufacturer switches from a domestic supplier to a foreign supplier because of lower prices, the drop in prices is not picked up by price index data. The derivation process thus underestimates the intermediate inputs, leading to overestimates of the value added in manufacturing. The second problem relates to the measurement of the computer and electronics industry (North American Industry Classification System category 334). Much of the output growth in this industry has been attributed to quality improvements (such as enhancements in speed, storage capacity, and so on), rather than greater quantities shipped. Atkinson et al. (2012) give data of the U.S. Census

Bureau showing that the number of units of consumer electronic products shipped from U.S. factories fell by between 69 percent and 75 percent from 2000–2010. Likewise, while data on unit quantities are not available for computer and peripheral products, data on export unit quantities are available. These quantities show that the number of units exported by U.S. factories was essentially flat over the period (a 0.3 percent drop). Atkinson et al. (2012) state that value added in these industries was highly inflated and therefore distorted the overall position of manufacturing. After taking into account these factors, Atkinson et al. readjust official data on output and value added. They conclude that manufacturing fell by 11.0 percent between 2000 and 2010, instead of the 15.5 percent growth reported.

Causes Of Manufacturing Job Losses: Trade Versus Technology

How much of the job losses can be attributed to technology advances and how much to foreign competition, especially from China? This is a complicated question. Berger and Martin (2011) combine detailed Chinese export and U.S. trade data to review the issue. They find that, while the exchange rate undervaluation of the Chinese renminbi helped boost Chinese exports to the United States, there are other factors involved. In textiles, the explosion in Chinese exports was a result of China's joining the World Trade Organization, China's low-wage advantage, and the expiration of prior trade-restraining agreements such as the Multi Fibre Agreement. In metals, the Chinese government's intervention in the sector (through state-owned enterprises) helped boost China's metals exports by 630 percent between 2001 and 2007. In machinery, the concentration of Chinese exports in four products—cell phones, liquid crystal displays, integrated electronic circuits, and laptops—were a result of fortuitous events such as: (1) the frequent appearance of new products requiring a lot of capital investment, (2) demand factors such as rising global demand for laptops over the period, and (3) a supply factor such as the relocation of production facilities from Korea and Taiwan. Of course, the main factor behind this Chinese export performance was the deliberate Chinese government policy to promote high-technology industries as the quickest path to industrialization (Dinh et al. 2013). Berger and Martin (2011) also find that the United States did not invest sufficiently in capital equipment in the high-technology sector after the dot-com collapse and the ensuing recession.

Berger and Martin find that, over the years from 2001–2007, Chinese exports accounted for 750,000 of the 3.5 million jobs lost in the U.S. manufacturing sector, about 21 percent. This is roughly consistent with estimates given by Acemoglu et al. (2016), who find that, between 1999 and 2011, Chinese imports accounted for about 10 percent of the direct job losses in U.S. manufacturing. Thus, if imports from China had not grown after 1999, about 560,000 jobs would have been saved among the 5.8 million jobs that were actually lost. Adding to these direct effects on manufacturing are the indirect effects to the economy, and they estimate that the total job losses could amount to about 1 million workers in the manufacturing (about 17 percent of the actual losses) and about 2 million jobs for the entire economy. Given that over 1999–2011, total U.S. employment increased from 139.4 million to 153.6 million, this savings in jobs could have raised labor force participation from an average of 64.1 percent to 65.4 percent, still less than the 67.1 percent at the beginning of the period (1999), but certainly an improvement, if not in the number of employed people then at least in raising wage pressures.

In a comprehensive article in the American Economic Review, Autor, Dorn, and Hanson (2013) examine the impact of China–United States trade on local labor markets. They find that Chinese import competition accounted for a third of the decline in U.S. manufacturing employment between 1990 and 2000, 55 percent between 2000 and 2007, and 44 percent in the entire period from 1990 to 2007. They also look at the supply shock effect on U.S. manufacturing only (that is, allowing for the demand-driven effect of Chinese imports, which would reduce the above impact), and the estimates become 16 percent, 26 percent, and 21 percent, respectively. This means that the net supply shock effect of Chinese import exposure was a loss of 548,000 workers between 1990 and 2000 and of 982,000 workers between 2000 and 2007. Moreover, import shocks led to a decline in wages, mainly outside the manufacturing sector. Furthermore, transfer payments for unemployment, disability, retirement, and health care also rose sharply in the local markets exposed to trade competition. Thus, however beneficial trade with China could be at the macro level, the distribution consequences of the budgetary impact of trade must be reassessed.

Atkinson et al. (2012) refute the argument that job losses in manufacturing can be made up somewhere. First, it is not certain that this is the case. Second, manufacturing jobs are not the same as other jobs: they pay more, they are a good source of income among the middle-income class, especially for non–college-educated workers, and manufacturing is the key driver of innovation—the foundation of the modern economy. Unlike the demand for food, which is restrained by Angel's law, demand for manufacturing could increase with per capita income. Furthermore, if the agriculture sector is heavily subsidized in the United States because land and food are strategic values, why not do the same for manufacturing?

It should be noted that the association of productivity growth with job losses in manufacturing does not find supporting evidence. Nordhaus (2005) finds that, within each manufacturing industry, increases in the rate of productivity growth were associated with increases in the rate of job growth in 1948–2003. He points out that, at the microeconomic level, the impact of productivity growth on employment could be positive or negative depending upon the bias of technological change, on the prices of competing goods and services, and on the price-elasticity of demand.

The empirical results of the Nordhaus study reject the view that higher growth in manufacturing productivity leads to a decline in employment. The reason the United States exhibited rapid growth in manufacturing productivity and declining manufacturing employment is the price-elastic demand; the positive effect of technological change on employment is more than offset by the rapid drop-off in the prices of competing goods. The paradoxical case of rapid productivity growth and falling employment appears to hold in the United States, while the opposite case, growing manufacturing employment because domestic costs and prices are falling rapidly, holds most notably for China. It is likely that productivity and costs have been declining even more rapidly in other countries, such as China, than in the United States. This is obvious in some industries, such as consumer electronics or apparel, where China simply did not compete two decades ago, and Chinese prices were, from an economic point of view, essentially infinite. Nordhaus (2005, 18) thus concludes as follows:

> "On the whole, [in the United States,] higher productivity has led to lower prices, expanding demand, and quickly to higher employment, but the partial effects of rapid domestic productivity growth have been more than offset by more rapid productivity growth and price declines from foreign competitors."

Eberstadt (2016) estimates that, in 2015, nearly 22 percent of U.S. men ages 20–64 were not engaged in paid work of any kind, and the employment rate among this group was about 13 percent lower than it had been in 1948. If the corresponding employment rate in 1965 held today, about 10.0 million men ages 20–64 would now be working for pay. This takes place even after taking into account schooling and training, which has improved since then. Of these 10.0 million, about 1.2 million are in their early 20s; 5.5 million between the ages 25 and 54; and 3.3 million between 54 and 64. Eberstadt (2016), however, seems to think that the issue is on the demand side, and that social welfare policy plays a major role, especially disability programs, which are subject to abuse and gaming. While it is true that government welfare programs have an effect in terms of incentives among laid-off workers not to move across states to seek work,thereby decreasing the mobility of labor (see below), the automation process and import competition also have a part in limiting the supply of jobs created.

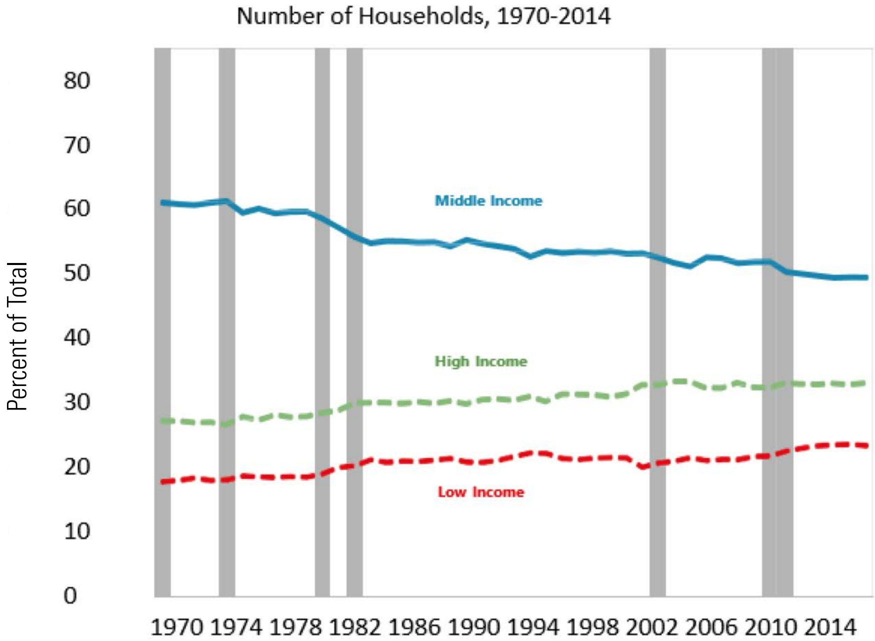
The Disappearance Of The Middle Class

Because of their higher productivity and, therefore, their higher wages, manufacturing jobs are frequently associated with the emergence of the middle-income class, which, arguably, constitutes the backbone of a democracy. This is especially true in China and India, where manufacturing has helped greatly in expanding prosperity. China and India are estimated to have accounted for half of global middle-class consumption in 2015 (the other half was accounted for by the European Union, Japan, and the United States). Middle-class demand is expected to grow from US$21 trillion in 2009 to US$56 trillion by 2030, and around 80 percent of the growth is anticipated to occur in Asia (Schwab 2014). Hepburn (2011) finds that growing populations and incomes in developing countries will soon account for most of the rise in global consumer spending. The larger workforce will also continue to fuel the developing world's emergence, while rapid innovation may help the developed world move up the value chain even as the preeminence of these countries is being challenged.

The implication of this rapidly growing middle-class population is that supply chains will need to adapt to growing demand and rising costs in the developing world–especially as those population centers in China and India mature and more and more middle-class population enters the market for high consumption. Trade agreements and growth in manufacturing's contribution to GDP are closely linked. The close links between trade and manufacturing exports and output mean that trade will be a key strategy in economic expansion among countries that understand to use them. But, in developed economies, it is exactly the opposite: it is frequently said that these trade agreements have an impoverishing effect: the hollowing out of the middle-income class.

Alichi, Kantenga, and Solé (2016) show that, between 1970 and 2014, the share of U.S. households in the middle-class-income group shrank from 58 percent of the total to 47 percent (Figure 6.7). Half of these households went to the higher-income group, and half went to the lower-income group. The economy therefore became hollowed out.

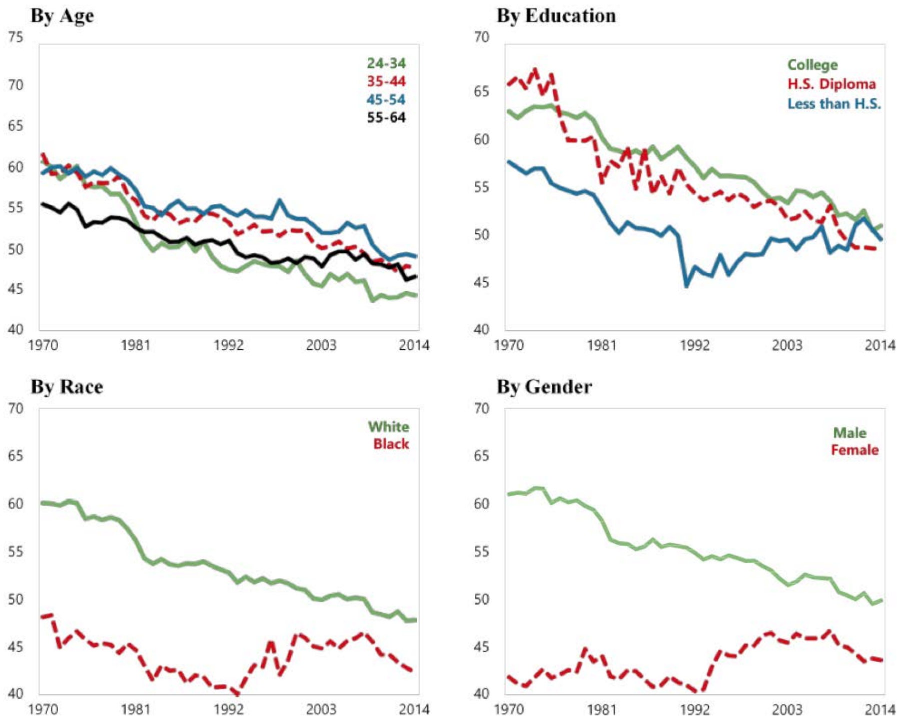
Figure 6.7. Households, Percentage, by Income, United States, 1970–2014



Source: Alichi, Kantenga, and Solé 2016.
Note: Income is adjusted for household size using the OECD equivalence scale. Low income: households with less than 50 percent of the median income. Middle income: households with 50 percent–150 percent of the median income. High income: households with more than 150 percent of the median income.

Since 2000, the share of households that have moved down to the low-income ranks has been much larger than the share that has moved up to the high-income ranks. This divergence is immune to age, race, and education, but not to gender, indicating that economic policy does matter in reducing this trend (Figure 6.8).

Figure 6.8. Middle-Income Population, by Age, Education, Race, and Gender (percent of total population with the same characteristic), 1970–2014



1/ Income is adjusted for household size, using OECD's equivalence scale. See footnote 6 for details.

Source: Current Population Survey.

Source: Alichi, Kantenga, and Solé 2016.

The effect of this hollowing out on U.S. consumption has been large. The authors show that, partly because of this hollowing out and partly because of behavioral changes (a decline in the marginal propensity to consume), the lost consumption amounts to about one year of consumption within the permanent income changes among the low-, middle-, and high-income brackets.

Both the hollowing out and income inequality have been widening in the United States, but it is the former that is more worrisome. This is because, while income inequality has stabilized since 2000, the hollowing has continued to widen since the global financial crisis. Moreover, even if one excludes the top 1 percent of households, the hollowing trend continues. Note that the increase in income polarization has not merely been a result of rising female labor force participation.

In his groundbreaking work, Piketty (2013) notes that income distribution has become more unequal in the United States than in Europe in the 20th century and, indeed, is as unequal as income distribution in Europe during the Belle Epoque of the late 19th and early 20th centuries. However, the structure of inequality is different: the distribution of assets (capital) was less extreme in the United States in 2013 than it was in Europe 100 years earlier. Milanović (2016) notes that inequality in the United States rose between the American Revolution and the Civil War (from 1774 to 1860) and continued to rise, reaching a peak in the early 20th century.

However, this state of inequality in the United States is new. Lindert and Williamson (2016) show that colonial America was one of the most income egalitarian societies in the world. In 1774, the richest Americans received only 8.5 percent of income, compared with more than 20.0 percent of income today. Between 1800 and 1860, income inequality in the United States rose sharply, but levelled off between the 1910s (the end of World War I) and the 1970s because of wars (which destroyed wealth), rising trade barriers protecting low-skilled workers, and a half century of tight financial regulation that held down the incomes of people working in the financial sector. Lindert and Williamson thus suggest that the widening in income inequality is not a natural phenomenon, but results from five basic forces: education, financial regulations, demography, trade competition, and inheritance taxation.

When did the United States become the world leader in standards of living? Lindert and Williamson note that the British colonies of North America had become the richest area as early as 1700, contradicting the statement of Madison (2001) that the United States did not catch up to the United Kingdom until the beginning of the 20th century. Moreover, the economic growth process has been characterized by ups and downs. For example, in the United States, the War of Independence cut per capita income by almost one-third, and the Civil War wiped out the big lead the United States had over the United Kingdom.

What about retraining? In theory, it is always easy to assume that people can be retooled and reequipped to deal with changes in technology and global competition. But in reality, this has not happened. Box 6.1 summarizes an article on the New York Times in February 2016 about how AT&T, the mammoth telephone company in the United States went about retraining its 280,000 workers to adapt to new technology.

Box 6.1. Labor Retraining in the Face of Technology Adaption: The Story of AT&T

In 2016, AT&T wants to transform itself from an old telephone company into a digital management company covering telephones, satellite television, and data collection and analysis. In 2015, it purchased Direct TV for US$63 billion and is planning to acquire more wireless businesses. It is expected that eventually one-third of workers will not be needed while the existing workforce has to undergo substantial training to adapt to the cloud-based system, a computer based set up replacing the old wires, fiber, and switches. In this new line of business, AT&T has to compete with companies such as Amazon and Google, relatively new companies with young and talented staff. The average tenure of AT&T staff is 22 years (excluding call center staff).

The company sets up a training program called Vision 2020 which combines on-line and classroom teaching on digital related courses. Staff could take advantage of the company's tuition assistance for the two year Master's program in computer science by studying at nights and on weekends, or they could go to an internal website to explore what types of careers could be available to them individually and the types of training to get there. Based on their progress, the company eventually will conduct performance review and career promotion.

For young people, this offers an excellent opportunity to be retooled and to reinvent themselves. For older people, this will be difficult. While one year into the program, the company claims that half of the workforce has started the training, it is not clear that by 2020, when the cloud-based system is supposed to be fully in place, how many will be ready. But by then, AT&T could shed 30 percent of its workforce and will be able to compete with other companies.

Source: Adapted from Quentin Hardy, New York Times, February 15, 2016.

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Chapter 7: Policies For Industrialization & Economic Development

In view of the findings for each group of countries discussed in the previous chapters, this last chapter focuses on the salient policies that could address the pertinent problems.

The Low-income Countries

This section summarizes the findings of our previous research project carried out in Ethiopia, Tanzania, and Zambia. Details on the quantitative and qualitative evidence and on the project findings and recommendations can be found in the publications listed in the reference section.

In most African countries, light manufacturing is an attractive choice in the effort to capitalize on human and natural resource endowments and generate more jobs that pay more among the many low-skilled laborers in the informal sector. While the technological complexity of many manufacturing industries may have increased since the East Asian tigers emerged, several labor-intensive industries, such as apparel, footwear, and furniture, still need unskilled workers (Panagariya 2008). Millions of informal low-skilled workers in East Asia and some South Asian countries have been lifted out of poverty through the growth of light manufacturing. For example, in the Fujian and Guangdong provinces, China, the industrial labor force swelled from 6 million in 1985 to 11 million at the end of 2001 (likely an understatement, given the large number of migrant workers) (Naughton 2007).

Labor-intensive manufacturing is important for non–resource-based countries, but it is even more important for resource-based economies, because the exploitation of natural resources tends to discourage development in job-creating sectors such as agriculture and manufacturing. There are many well-known problems associated with managing mineral resources. First, the exploitation of natural resources does not generate many jobs, especially the productive jobs needed in economies where unemployment or severe underemployment is significant. Second, pressures on the real exchange rate tend to discourage labor-intensive growth in these countries (the Dutch Disease). Third, mineral revenues are volatile and uncertain because of their dependence on international commodity prices. Finally, mineral resources tend to stimulate rent-seeking, which, coupled with weak institutions, means that addressing governance issues becomes difficult, particularly in developing countries.

Beyond its capacity to stimulate job creation, the strong connection between light manufacturing and trade also supports the development choice to focus on light manufacturing. The case for export-led growth is well-established for developing countries (Chenery 1980; Commission on Growth and Development 2008; Harrison and Rodríguez-Clare 2010). Harrison and Rodríguez-Clare (2010) find that export-oriented countries have grown more rapidly, though establishing causality is difficult. Trade also enables developing countries to take advantage of the important learning that can be derived from exposure to global competition and thereby import the skills and technology necessary to move up the value chain.

For the low-income countries, the lesson from East Asia's experience in the transition to middle-income level status is clear: a sustainable growth strategy should focus, in a first stage, on eliminating the key constraints that firms face. As Dinh et al. (2012) note, as local producers increase the scale of their operations, improve the quality of their products, and accumulate experience with technology, management, and marketing, they become better positioned to take advantage of emerging export opportunities. This strategy is feasible because sub-Saharan Africa has two major potential advantages that could help promote competitiveness in light manufacturing. The first is a labor cost advantage. The second is an abundance of natural resources that supply raw materials, such as skins for the footwear industry, hard and soft timber for the furniture industry, land for the agribusiness industry, and so on. Even with its relatively low-skill workforce, sub-Saharan Africa could become competitive in a broad range of light manufacturing sectors. In the apparel sector, for instance, small numbers of managers and technicians can guide hundreds of workers.[55]

55 As noted by Dinh and Clarke (2012), for instance, specialists report that inexperienced workers can learn to operate sewing machines in no more than two weeks.

Over the longer term, upgrading to more complex production will undoubtedly require a more well-trained workforce than is currently available. But the expansion of light industry need not await higher school enrollment and higher-quality schooling. Industrial transformation can begin rapidly by targeting promising sectors with modest skill requirements and then adopting policy measures – such as industry-specific vocational training programs – that may contribute to lowering the cost of acquiring skills and promoting learning-by-doing effects.

In recent years, four factors have been especially influential in opening new markets for Africa's light manufacturing firms. First, more rapid economic growth, accompanied by accelerating urbanization, has expanded the domestic market for manufactures in most countries. Second, foreign investors and bilateral aid agencies are investing in the production of manufactured goods destined for their own markets or other foreign markets. Third, for globally competitive light manufacturing firms in sub-Saharan Africa, the market is the world. In 2005, the United States established new trade preferences under the African Growth and Opportunity Act, granting products from low-income African countries extraordinarily favorable access to the U.S. market; the European Union has done the same through the Cotonou Agreement and the Everything but Arms initiative. These trade preferences are critical to the success of African exporters in the global apparel market because, without the preferences, African exporters in these markets cannot be competitive with more efficient global exporters (World Bank 2011a). Finally, regional integration, by increasing the size of regional markets, provides an opportunity for African exporters to gain experience before expanding into global markets.

Elements Of Success For Developing Countries

In a recent book Dinh et al. (2013) draw five lessons from China and other East Asian countries for growing the light manufacturing sector to create jobs and prosperity. These include the following:

- **Creating A Conducive Environment For Manufacturing**

This environment should involve active government support for private enterprises. Foremost among possible official actions are forceful public endorsements issued by national leaders in favor of economic growth and private sector development as a key government priority. This also includes macroeconomic stability, close public-private cooperation, and incentive-compatible industrial policies.

- **Filling Knowledge And Financial Gaps Through FDI And Networks**

From the start of the opening-up policy of East Asian economies, which reduced barriers to international trade and private foreign investment, domestic industry and markets benefited from an influx of knowledge, capital, and market information from abroad. In many cases, filling the knowledge gap is even more important than filling the financial gap.

- **Using Substitution Policies And Sequencing**

Successful development often occurs despite structural or institutional weaknesses. People can use or invent tools to help cope with the specific binding constraints they face. As the economists Alexander Gerschenkron (1962) and Albert Hirschman (1984) have long emphasized, human ingenuity can devise workable substitutes for the key missing prerequisites to rapid growth. Thus, Japan invented trading companies to economize on the scarce domestic knowledge of foreign languages and foreign expertise.

- **Starting With Simple Goods And Scaling Up Or Cutting Back**

Starting simple is an important means used among East Asian entrepreneurs to overcome the financing constraint. We have documented Ethiopia's cut flower industry, which was launched on only 7 hectares in 2000 (Dinh et al. 2012). The business turned an immediate profit, and, by 2007, the industry had spread to 800 hectares, an enormous increase.

- **Creating Islands Of Success**

Low-income economies need a focused initiative to inject new elements of prosperity and allow for industrialization that does not rely on slowly developing infrastructure or wider structural reform. A positive example of this can be seen in the cut flower example mentioned above. This example from Ethiopia is reminiscent of an initiative in China 15 years earlier, when the government created four small special economic zones as an experiment in the market economy. These zones benefited from supportive policies that allowed competitive private firms to bypass a host of restrictions and controls. The success of the zones helped jump-start China's wider manufacturing sector. Both initiatives, from China and Ethiopia, illustrate a phenomenon not often discussed: reforms in specific industries or specific locations can create islands of success in an otherwise moribund economy. And, with success built upon success, the impact on the general economy can be significant.

None of these policy measures can be initiated and implemented alone by the private sector due to problems of first movers and externalities; hence, there is a need for selective government interventions over and above any economy-wide reforms.

Environmental Considerations Of Light Manufacturing

As shown in this book, light manufacturing has the potential of quickly lifting millions of people out of poverty by providing them with productive jobs and allowing them to earn a decent living and maintain their self-respect and dignity. However, this beneficial economic impact of light manufacturing should not come at the expense of worker safety and environment degradation. The unfortunate event in Bangladesh in May 2013 when an unsafe building housing numerous clothing factories collapsed, killing hundreds of workers, serves to remind us of the importance of worker safety. Similarly, the severe air and water pollution in China and its impact on life expectancy and public health highlight the need to take environmental concerns seriously in economic development. While light manufacturing in general has the least impact on the environment relative to other heavy industries, such as steel and cement, some products, such as tannery products require special waste treatment consistent with environmental protection.

Air pollution from the burning of fossil fuels such as coal and oil not only affects local air quality, but is also causing global warming. To balance economic growth with environmental protection and natural resource conservation, a truly sustainable development strategy should emphasize not only meeting current societal needs, but also factoring in the effect of present growth on future generations. The Brundtland Report defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (WCED 1987, 43) It highlights three fundamental components of sustainable development: environmental protection, economic growth, and social equity.

Promoting sustainable development, which is part of the United Nations Sustainable Development Goals, can help define the extent of economic growth and expansion out of consideration for environmental effects. Strict limits can be imposed through regulations that are designed to protect worker health and safety as well as the natural environment. These regulations should be developed with inputs from all the parties involved, that is, the stakeholders, government agencies, and the general public. In industries known to have an environmental impact, before granting an operating permit, government agencies should require an environmental assessment or a more comprehensive environmental impact statement for a large project. These documents are designed to disclose in advance any significant impacts of the proposed project. They should also contain measures to mitigate any of these significant impacts. Again, the general public should be actively involved throughout the environmental assessment/ environmental impact statement process. Some may view this requirement of environmental review as an impediment to economic growth. But, by disclosing in advance any significant impact, it becomes much easier and cheaper to fix the problems now than it would in the future years. For example, requiring a food processing plant to treat its wastewater before discharging to a nearby river is much easier and less expensive than treating a polluted river later. This is clearly a case where an ounce of prevention is worth more than a pound of cure!

How Did The East Asian Countries Resolve The Binding Constraints

In the language of the big push model shown in Annex 2B of Chapter 2, resolving the six binding constraints is equivalent to either reducing the fixed cost or reducing the slope of the production line (the wage rate), thereby enabling the entrepreneur to modernize production. This section discusses how this has been accomplished in practice in Asian countries.

• General Solutions: Industrial Parks, Industrial Clusters, And Trading Companies

The system of plug-and-play industrial parks, industrial clusters, and trading companies oriented toward SMEs is an important aspect of China's competitiveness in light manufacturing (Dinh et al. 2013). These policy tools have been used extensively in East Asia and have resolved binding constraints in light manufacturing simultaneously: industrial land, input industries, finance, trade logistics, worker skills, and entrepreneurial skills.

Many studies have documented the contributions of the special economic zones in China's coastal provinces as platforms for attracting export-driven FDI and as a testing ground for key reforms. China's smaller industrial parks are less well-known, but they, too, have contributed substantially to the nation's astonishing industrial development. Many city and county governments have emulated the large economic zones of central and provincial governments. Local governments develop industrial parks to spur local growth and increase tax revenues, achievements that enhance their promotional prospects (Li and Zhou 2005). The parks have enabled many Chinese SMEs to grow from family operations focused on domestic markets into global powerhouses.

China's successful industrial parks provide enterprises with security, good basic infrastructure (roads, energy, water, sewers), streamlined government regulations (through government service centers), and affordable industrial land. They also offer technical training, low-cost standardized factory shells that allow entrepreneurs to plug and play, and free and decent worker housing next to plants. By helping small enterprises grow into medium and large enterprises, China has avoided the shortage of medium firms – the missing middle – faced by most sub-Saharan African countries. More advanced industrial parks offer market analysis, accounting, import and export information, and management advice as well as help firms recruit and train workers. For example, parks in or near the Yangzi River Delta place a strong emphasis on helping firms to get business licenses and hire workers. Parks may also have facilities to address environmental challenges.

Plug-and-play industrial parks have greatly reduced the start-up costs and risks among SMEs that have sufficient scale, capital, and growth prospects to take advantage of larger facilities during a phase in their development when they are unable to obtain bank loans. They have also facilitated industrial clusters, generating substantial spillovers and economies of scale and scope among Chinese industries. The clusters are likewise fostered by government support for input and output markets. China's parks focus on specific industries, such as leather and textiles in Nanchang, furniture in Ji'an, and electronics in Ganzhou (Sonobe, Hu, and Otsuka 2002; Sonobe and Otsuka 2006; Zeng 2008).

China's experience shows that trading companies can facilitate exports and help overcome the constraints that manufacturers often face in the early stages of industrialization. These trading intermediaries help manufacturers explore new markets and enhance their competitiveness through product and technology upgrading. The collaboration of producers with trading companies has yielded lower transaction costs, more market information, and financial benefits.

- **Specific Solutions**

The Availability, Cost And Quality Of Inputs

Access to inputs in China has been made easy for enterprises through trade reforms. Tariff-free imports of inputs began in the special economic zones, where the legal framework for export processing was first established in 1979. By 1987, this practice had been expanded so that it applied throughout China, not merely in the zones.

Access To Industrial Land

Industrial parks supply access to land (see above).

Access To Finance

Our study shows that the initial start-up investment by entrepreneurs in China and Vietnam has been sourced mainly through personal savings or financing supplied by family, business colleagues, friends, and so on. This has been greatly facilitated by the low level of start-up investment. Financial institutions are central in the growth from small to medium firms: bank loans have been used for investment, to build new factories, to buy new machinery or more land, or for working capital when firms receive large orders. There is evidence that financial institutions have been important in the development of manufacturing in China, but not at the genesis stage. The corollary among other developing countries is that help from a financial sector is not necessary in starting an enterprise, but it can be important when small enterprises make the transition to medium enterprises.

Trade Logistics

In light manufacturing, Chinese government support for domestic start-ups is typically small and may amount to little more than providing infrastructure in the same way other countries have done.

Entrepreneurial Capabilities

The first generation of Chinese entrepreneurs in the post-reform era had generally received no formal training in business development or management. They acquired entrepreneurial skills through imitation and by learning from failures. Most entrepreneurs learn their businesses through three sources: prior work experience in the production of the same products, work as traders in the same industry, and networks and contacts established through former jobs in state-owned enterprises in the same light manufacturing sectors. This demonstrates that light manufacturing can flourish even if entrepreneurs lack formal education. Many successful manufacturers began by capitalizing on a particular skill or experience and then developing the skill or gaining more experience through learning by doing.

Worker Skills

Local governments help recruit workers for industrial parks and provide free training if needed. They also facilitate technological upgrading through one-off financial grants. The experience of East Asian countries in transitioning from middle- to high-income status also provides important lessons for sub-Saharan Africa. These countries have successfully relied on a growth strategy based on low wages and technology imitation. However, once the pool of underemployed rural workers started to shrink and wages began to rise, competitiveness deteriorated, and the productivity gains associated with sectoral reallocation and technology catch-up began to disappear. Rising wages made labor-intensive manufacturing exports less competitive on world markets. At that point, some countries (most importantly Korea) were able to switch from imitation as the main source of productivity growth to broad-based, home-grown innovation.

Conclusion

For many low-income countries, the pursuit of sustained economic growth can only begin through the development of light manufacturing, which requires steadfast government support. The appropriate kind of government support can help foster a turnaround to a development growth path. In many cases, subsidies or other government interventions can be counterproductive, creating economic distortions. More helpful is an effort to note the economic chokepoints and remove or ease the most serious constraints.

The reward for the adoption of such actions can be substantial. The transformation can be rapid. The case of Wenzhou, China, shows that sensible, systematic reform can more than double the average per capita income of rural households in as little as 5–10 years. Whether it is buttons in Qiaotou, China, or cut flowers in Ethiopia, positive changes can occur quickly if all the pieces are allowed to fall into place. East Asia's experience may thus encourage the hope that today's low-income sub-Saharan African countries can find their own paths to better lives among their citizens and that development can accelerate there despite the long odds.

Resource-Rich Low-income Countries[56]

Following the critiques of the traditional policy advice to the resource-rich low-income countries in Chapter 4, this section presents an approach that takes into account both the exhaustible nature of, and the unemployment problems caused by, natural resources. This approach represents a departure from the traditional, neoclassical approach and is consistent with the recent modified permanent income approach proposed by Collier et al. (2010). This approach focuses on job creation, which can resolve the tension between domestic pressures for consumption spending on the one hand and the country's long term growth objective on the other. It also resolves the political economy issue of leaders trying to commit spending before the next ones come along. Many leaders may feel that job creation is a way to consolidate their power and may even enthusiastically support it.

Countries at varying stages of development have different economic structures because of distinct factor endowments. For countries at early stages of development, factor endowments typically reflect a scarcity of capital and an abundance of labor or natural resources. Accordingly, production activities tend to be labor- or resource-intensive — mostly involving subsistence agriculture, animal husbandry, fishing, and mining — and rely on conventional technologies to produce well-established products. Except for mining and plantations, such production has limited economies of scale. Firms are usually small and market transactions often informal, limited to local markets and familiar people. According to new structural economics[57], the hard and soft infrastructure required to facilitate such production and market transactions is limited and relatively simple. In developing countries with abundant unskilled labor and resources but scarce human and physical capital, only labor- and resource-intensive industries will have comparative advantages in open, competitive markets (Heckscher and Ohlin 1991; Lin 2003).

Economic diversification and the acceleration of income growth are the main features of modern economic growth and, hence, employment creation (Kuznets 1966; Maddison 2007). A low-income country with abundant labor or natural resources and scarce capital will have a comparative advantage and be competitive in labor- or resource-intensive industries. Similarly, a high-income country with abundant capital and scarce labor will have a comparative advantage and be competitive in capital-intensive industries. Thus a country's optimal industrial structure is endogenously determined by its endowment structure. For a developing country to reach the income levels of advanced countries, it

56 For a fuller exposition, see Dinh and Lin (2014).

57 See Dinh and Lin (2014).

must upgrade its industrial structure to the same relative capital intensity of advanced countries. But to do so, it must first close its endowment gap with advanced countries by exploiting its comparative advantages at each stage of development.

Resource-rich countries need to follow diversification strategies that are consistent with the country's latent (and evolving) comparative advantage. Chile, one of the Pacific Rim countries, successfully targeted industries that were consistent with its comparative advantage determined by its natural endowment, as well as industries that were already mature in more advanced countries. While free-market reforms introduced in the early 1970s brought many benefits to the country, they were slowly accompanied by market failures (Diaz-Alejandro 1986). In recognition of these problems, the government has supported private sector growth through a number of policy instruments, including the provision of agricultural public goods by a state institution (Servicio Agricola Granadero); guarantees for loans to small enterprises; a semi-public entrepreneurial institution (Fundacion Chile) responsible for the development of the salmon industry; the simplified drawback mechanism, which provided subsidies to new exports; the various programs of the national development agency (Corporacion de Fomento de la Produccion, CORFO); and the National Council on Innovation for Competitiveness.

Managing natural resources for a developing country should follow the development strategy of the country, which depends on the initial condition, the endowment structure, and the resulting comparative advantages in production. Resource-rich low-income countries, except a few small states, tend to have large unemployment or under-employment because the sector that generates growth and revenue is capital-intensive, or because the requirement to work in this sector tends to be beyond the capability of the domestic labor force.

If the resource-rich country has a small population, it could focus on growing the activities that are tradable. For instance, if the country is also blessed with beautiful scenery, developing the tourism sector should provide a long term foundation for growth when natural resources run out. Similarly, if the country is endowed with good geographical location, it could develop services such as air transport (this is what the UAE has done successfully). And if the country is endowed with skilled labor, it could develop into advanced, high technology industries or services.

For countries that are endowed with unskilled labor and are at the beginning of the industrialization process, the strategy is to focus on private sector jobs in labor-intensive, simple light manufacturing. In an economy with a large surplus of unskilled labor, job creation will be maximized if the economy is first opened up for FDI- induced assembly types. Later on, when the education system is improved, policies can focus more on how to raise the value added through encouragement of forward and backward linkages between foreign-invested enterprises and domestic ones. It should be noted that in these economies, even though there are natural resources, the downstream industries associated with those resources tend to be capital intensive and require high technology only available from abroad. Hence, there is little domestic, high–value added employment created in these sectors.

How do we know job creation will be maximized through jobs in assembly? As this book makes clear, sustained economic growth requires workers to move from lower-productivity to higher-productivity activities. This means workers should move from agriculture to industry or services. For a developing country, a relevant issue is the way to create these high-productivity activities. In an early stage, it is essential to create many jobs in medium-productivity activities; high-productivity activities would lead to slower job creation or even a loss of jobs. If an economy is able to draw in FDI and expand employment in industry by drawing workers from agriculture, the presence of marginal workers will lower the average productivity (Roy 1951; Young 2014). Timmer et al. (2012) point out that the less productivity rises in industry and services, the faster structural transformation can occur. If productivity in industry and services remains constant, the path to structural transformation becomes shorter. Jobs in assembly are associated with steady rates of productivity. Moreover, as Taylor and Rada (2006) note, for job creation to be sustained, productivity growth must be positive so per capita incomes rise, but demand growth must be stronger. Jobs in assembly typically involve global demand, which would satisfy this condition. The next stage of the development process would then entail moving workers to higher-value added jobs through skill improvement and training.

For firms to spontaneously enter industries and choose technologies consistent with their economy's comparative advantages, the price system must reflect the relative scarcity of factors in the country's endowment. This approach, based on following comparative advantages, may seem slow and frustrating in countries with major poverty challenges. But in reality, it is the fastest way to accumulate capital and upgrade the endowment structure—and the upgrading of industrial structure can be accelerated by the availability of technologies and industries already developed by more advanced countries. At each stage of their development, firms in developing countries can acquire the technologies and enter into industries appropriate for their endowment structures, rather than having to reinvent the wheel (Gerschenkron 1962; Krugman 1979). In other words, they may join global value chains as explained throughout this book. This possibility for using available technologies and entering existing industries is what has allowed some East Asian economies to sustain annual GDP growth rates of 8-10 percent.

The fact that wages remain high in a high unemployment country means that structural impediments in the labor market exist and need to be removed. Structural reforms in the labor market therefore need to be taken urgently. The failure of resource-based countries to industrialize can be seen in this context. For industrialization to take place, the availability of natural resources prevent the wage wedge between the backward sector (such as agriculture) and the modern sector (for example, manufacturing) from taking place. Such a wedge is necessary to bring entrepreneur to invest in the modern domestic sector with increasing returns to scale, thereby creating the big push needed for industrialization (Murphy, Shleifer, and Vishny 1989). Often high wages are set by the minimum wage (either industrial or agricultural).

A number of countries have tried different ways to overcome this problem of high wages. In Mauritius, enterprises located in the industrial zones are exempted from the minimum wage laws. Some Latin American countries are trying to do the same thing by setting industrial parks in remote areas so as to bypass the minimum wage laws. In other words, with a combination of appropriate policies such as clusters and flexible policy adjustment, the issue of high wages can be overcome, as the case of South Sudan in this book makes clear.

Similarly, neoclassical economics indicates that the exchange rate should reflect market conditions. But this, in the context of a resource-rich low-income country, means the exchange rate will be over-valued and consequently growth and job creation will suffer. McMillan and Rodrik (2011) and Rodrik (2008) suggest that undervalued exchange rates helps facilitate the structural transformation, especially if the tradable sector generates positive externalities such as learning and technology diffusion for the rest of the economy. One could argue that a rate conducive to reducing the effect of the Dutch Disease is an exchange rate net of the resource effects, that is, excluding the exports and imports related to natural resources. This rate would be similar to, but not equal to the rate that would result from a complete sterilization policy or one in which the net proceeds from resource extraction are fully invested abroad. This is because the latter consists of government revenue and not the complete export proceeds. In the case of South Sudan discussed below, this is the black market rate.

One could also favor local producers by allowing them to import raw material and intermediate goods needed for production at an official rate while the rest of imports, along with exports should go through the market exchange rate. This is consistent with temporary subsidy or tax relief for non-mineral tradable (export) sectors that are affected by deteriorating competitiveness arising from a natural resources boom. This policy is particularly important for those industries that are characterized by learning by doing and other knowledge transmission effects (van Wijnbergen 1986).

As a country climbs the industrial and technological ladder, many other changes occur. The technology used by its firms becomes more sophisticated and capital requirements increase, as do the scale of production and the size of markets. Market transactions increasingly take place at arm's length. Thus a flexible, smooth industrial and technological upgrading requires simultaneous improvements in educational, financial, and legal institutions and in hard infrastructure so that firms in newly upgraded industries can produce sufficient amounts to achieve economies of scale and become the lowest-cost producers (Harrison and Rodríguez-Clare, 2010). Clearly, individual firms cannot internalize all these changes cost-effectively, and it is often impossible to achieve spontaneous coordination among many firms to meet these new challenges. Changes in infrastructure require collective action, or at least coordination, between providers of infrastructure services (which could be public, private or public-private partnerships) and industrial firms. For this reason it falls to government to introduce such changes or to coordinate them proactively. This brings us to the need to be selective in public spending. As explained above, this requires governments to resolve the waiting time and absorptive capacity problems through step-wise and selective investment in infrastructure and education. Natural resource revenues can be used to finance useful investment projects such as infrastructure and education, or to reduce government debt. This will help minimize wasting natural resource wealth with short term interests and objectives but make it last for future generations as well. The government can deploy this resource revenue to expand public investment in infrastructure, improve human capital, and build strong social safety nets.

One way low-income countries can resolve both waiting time and absorptive capacity problems is through a step-wise approach whereby all resources are invested into identifying and facilitating a specific sector to be used to spearhead the entire economy. In the same way, investment in human capital should be devoted to producing the right kind of workers to supply the industry, not to an advanced training system which produces graduates who cannot find the right jobs and thus have to migrate abroad. One might envisage a situation in which, during the first 10 years after resources have been discovered and exploited, the focus of public investment in infrastructure is on building roads, ports, and electricity for the industrial parks needed to produce light manufacturing goods (for the domestic market and exports). Public investment in education during this period should be focused on improving the enrollment and quality of primary education and low-level vocational education. In the following 10 years, the emphasis of public investment should be shifted to higher value added products while the education system should focus more on secondary and tertiary education. In this way, the investment program aims to create both a demand for and supply of workers.

Traditionally, public finance purists always call for transparency in the budget process and therefore the avoidance of special funds. But as discussed above, revenues from exhaustible natural resources should be treated differently than, say, income taxes, because they have a different function: to replace these resources when they run out.

The proceeds from resource windfall should go into one single fund, to avoid multiple issues (Collier et al. 2010). Hamilton and Ley (2013) point out that a natural resource fund, combined with an effective public investment management system, could address the main problems facing natural resource–rich countries, that is, the Dutch Disease, revenue volatility, political economy issues, and so on.

Fiscal policies dealing with the collection of government revenue from natural resources have been discussed (Collier et al. 2010; Hamilton and Ley 2013). The World Bank (2006) calls for using tax instruments in the right way, that is, to preserve the incentives and address equity issues between the government and foreign companies. Administrative costs and the capacity of tax administration are also important issues (Collier et al. 2010).

But, as illustrated in the South Sudan case (see Chapter 4, Annex 4A), the needs in a low-income country are so vast that without setting priority, the fund will be wasted. Instead of using the proceeds of the natural resource fund on general infrastructure or education or urban development, the government should use these proceeds to (1) provide all the necessary incentives to bring FDI into the tradable sectors in the country, such as light manufacturing, and focus on exempting from import taxes all inputs for the domestic production of simple light manufacturing goods, regardless of whether these goods are eventually destined for export or for import substitution; (2) set up plug-and-play industrial parks, including the construction of infrastructure such as electricity services, roads, and water supply, together with all financial assistance to help successful SMEs expand; and (3) invest in training and education to provide skilled workers for the light manufacturing sectors (see above). As the economy progresses, more efforts will be devoted by the government and the associated public spending to raise the value added content of the manufactured goods.

As Collier et al. (2010) argue, both the consumption and the investment increases associated with a natural resource windfall should rise gradually. This allows absorptive capacity to expand, given the bottlenecks in investment, especially in nontradable sectors where imports cannot be used to relieve supply constraints in the short run. Another reason is that the volatility in export receipts can be accommodated. In the worst case, cuts in investment can be made without affecting the entire economy. This can be done through a step-wise approach as explained above.

The proposed approach aims to help low-income countries in general, and those rich in natural resources in particular, create a diversification development strategy. It does so by identifying concrete packages of specific, feasible, and inexpensive policy initiatives that can maximize a country's opportunity to jump-start its growth in production, employment, and exports in the tradable sectors. Focusing on specific industries highlights the constraints that exist and provides valuable information from which we may base targeted recommendations.

The proposed approach relies on identifying the possible opportunities in the tradable sectors and then identifying the binding constraints in each sector before using the proceeds of the natural resource fund and other government policies to alleviate these constraints. Setting such a priority has made the exercise more manageable, the policy actions more precise, and the sequencing more appropriate. The approach builds on the work of Hausmann, Rodrik, and Velasco (2005), who visualize development as a continuous process of specifying the binding constraints that limit growth, formulating and implementing policies to relax the constraints, securing modest improvements in performance, and then renewing growth by identifying and pushing against the factors limiting expansion in the new environment. It is also consistent with the new structural economics approach, which views economic development as a process that requires the continuous introduction of new and better technologies in existing industries and the upgrading of labor- and resource-intensive industries to new, more capital-intensive industries.

Identifying Opportunities in Tradable Sectors: How can a country or a region determine whether its products reflect its comparative advantages? If a country's products are being successfully exported to global markets or are beating out imports in domestic markets with no government help, the country is sure to have a comparative advantage in those products. Similarly, if, without the recipient government's heavy subsidies, an industry producing exports is attracting a growing amount of FDI, the country has a comparative advantage in those goods, too. Foreign direct investors have a keen sense of what countries can produce to compete internationally.

For existing products, the concept of RCA following Balassa (1965) can be used to pinpoint industries in which increased production could accelerate industrialization. This is a traditional method based on a country's trade data as reported in the UN Comtrade database. Another method, domestic resource cost, can also be used, but would require more detailed data.

The RCA based on trade data can be determined either quantitatively using the Balassa index or qualitatively by inspection of detailed import data. The Balassa index is an index that shows the relative advantage or disadvantage of a country in exporting a commodity as revealed by its actual export patterns relative to those of all other countries in the world. It is defined as follows:

$$RCA = (Eij / Eiw) / (Ewj / Ewn)$$

Where Eij refers to exports of commodity j by country i; w is the set of countries; and n is the set of all commodities. A country has an RCA in commodity j if the RCA is greater than 1 and a comparative disadvantage in commodity j if the RCA is less than 1.

Another method that also relies on trade data is a careful review of a country's imports to identify sectors that require only small investments, have limited economies of scale, and could thus benefit from domestic manufacturing. In this case, imports are used as a proxy for domestic demand, and therefore the issue is whether domestic supply is capable of producing such competitive products.

For new products, the concept of latent comparative advantage, as introduced in Lin (2009), can be used to identify new industries that are likely to be consistent with a country's comparative advantages. The most precise way to apply this concept is found in Lin and Monga (2011): the Growth Identification and Facilitation Framework. Drawing on the experiences of successful and failed industrial policies and applying the theories of comparative advantage and the benefit of backwardness, the Lin-Monga framework proposes a six-step process for identifying industries in which developing countries may have latent comparative advantages and for creating the conditions and removing the constraints that impede the emergence of these industries.

• The Case Of Low-income Nations With Future Natural Resource Windfalls

Before concluding this section, it may be worthwhile to discuss the case of a number of African nations including Ghana, Kenya, Mozambique, Tanzania, and Uganda that are expecting resource windfalls from fuel discoveries. A number of national and regional policies to address the resource curse have been discussed in the last few years. These policies may be theoretically relevant and thoughtfully constructed, but their pragmatic implementation in low-income African nations has yet to be demonstrated.

The situation of a predicted future windfall is unique in that an additional number of unknowns are introduced (Page and Tarp 2017). These include the timing and gross amount of the resource windfall. Recent experience has shown that estimates are incorrectly skewed to an earlier, larger revenue stream. This is a dangerous error, as borrowing and infrastructure may exceed the revenue gained by the windfall. For example, Uganda possesses a large amount of oil that has yet to be extracted. But analysis from Henstridge and Page (2012) shows that, even with production beginning in 2015, it will take over a decade until revenue reaches near 5 percent of GDP. Meanwhile, the macroeconomic risks of the boom are great: slow diversification, impaired structural change, uncontrolled overspending, and building external debt (Henstridge and Page 2012). These issues are all interdependent on the timing and sizing of the boom, and a mismanaged prediction of the boom can exacerbate all risks.

For these countries, it would seem the case for a new approach as proposed in this chapter is a fortiori needed. The effects of the Dutch Disease can be allayed if early actions are taken. A portion of the revenue can be used to support infrastructure and human capital. Investments into this area can promote diversification, one of the areas adversely affected by the Dutch Disease. It is important to consider, however, that infrastructure projects must be carefully analyzed before implementation. Infrastructure related to trade will serve the dual purpose of supporting exports of the natural resource and diversification.

Investing in skills can also promote other sectors. Lack of human capital and skills in Uganda is being shown to be a constraint on performance in firms. The World Bank reports that 47 percent of companies experience a moderate, major, or severe constraint to business (World Bank 2007). Lack of skills in the area of production limits the quality and quantity of exports and reduces competitiveness in these sectors. This may not be the case in all nations with resource windfalls. Careful consideration on diversifying sectors through education and improving skills must be considered. Here, debt management becomes particularly important. The initial investment of infrastructure and skills is large, thus the uncertainty in future windfall revenue can drive the country to a debt overhang situation (see above). The main issue is that excessive debt impairs future ability to borrow. The opportunity of natural resource revenue to drive growth is a high risk, high reward situation and calls for a careful, well-thought out development strategy.

Policies For Middle-income Countries

Chapter 5 shows that, in terms of economic history, the middle-income trap is not really a trap, but a normal transition period from the low- to the high-income groups. During the 1,600 years prior to the industrial revolution, every country had low- income status. The Netherlands was the first country to reach lower-middle-income status, in 1700. It then took the Netherlands 128 years to reach upper-middle-income status. In today’s parlance, the Netherlands would have been considered caught in the middle-income trap. By contrast, the countries that have become high-income in the last 65 years took 32 years to transition from the low- to the high-income category. Few countries have been able to accomplish the transition to high-income status in the last half century. Between 1950 and 2015, only four economies have been able to transition from lower-middle-income status to high-income status, and they are all in East Asia: Hong Kong, Korea, Singapore, and Taiwan. The causes for the slow transition have been identified by Agénor (2016) as follows: diminishing marginal capital productivity, a distorted incentive system, and a lack of finance.

Policies For The Old-Timers

As noted in Chapter 5, the most important development feature of these countries is the failure to shift the export structure from the dominance of raw materials, agriculture goods to manufacturing goods and within the latter, to machinery and equipment and electronics. Correspondingly, this failure also results in the failure to shift the end use of exports from raw materials and consumer goods (typically associated with low-income economies) to capital goods and intermediate goods.

What are the policies to address this failure? Part of the problem is that wages in these countries are already high and it would be difficult to move into manufacturing areas where they did not have a comparative advantage before. Still there are some sensible policies that these countries could adopt:

- Focus on developing the technical capabilities and R&D in high-technology industries associated with natural resources. Australia, a developed country, exports natural resources such as mining as much as any other developing country. But it also exports software used in computer-operated mining machines. (Policies to adopt and innovate technology are addressed below.)
- Focus on creating jobs in services with high value added or with potential to raise value added such as banking, finance, and insurance, health care, and especially those services with potential for exports.

Policies for The Newcomers To The Middle-income Trap

Unlike other countries, these newcomers were considered stars in economic performance at some points in the past decades. It is difficult for these countries to escape the middle-income trap because the same mechanism that led them out of low-income status in the shortest time possible is also the one that hold them back. In particular, the fragmentation of production and consumption as reflected in the global value chain make breaking away difficult (see Chapter 1).

Under this arrangement, if left by itself, the market will not help the country upgrade the industrial structure nor raise the domestic value addition in exports to move to high-income status. And this is for three reasons:

First, the decision to produce or to import a component used in the final assembly stage is not up to a country, but left to the lead firm. Because it is a big market, China could use its domestic size to lean on a lead firm to ask for more and more components to be made in China. But, in other countries, this may not be so easy.

Second, there is an entry cost to breaking into the global value chain because the global value chain is so efficient. (This is shown analytically in Chapter 2, Annex 2A.)

This entry cost is often high in developing countries and cannot be internalized by a single firm.

Third, the decision to produce a component in any particular country may not have anything to do with the strategy of economic development of that country, be it through the traditional unbalanced growth advocated by Hirschman (1988) or the big push described by Rosenstein-Rodan (1943). Or simply to maximize backward and forward linkages in the economy (using the input-output matrix). Instead, the decision is based on profit maximization viewed from abroad.

Thus, a number of policies that were useful at the beginning stage of industrialization are no longer relevant for these middle-income countries: policies to promote FDI without sector differentiation or without quality regard, policies to leave to market forces to move up the value addition, and policies to minimize risks.

A typical policy package for a country in the middle-income trap usually involves strengthening R&D, technology absorption, upgrade worker's skill levels, enhance competition, and expand investment in soft and hard infrastructure (ADB 2015). Such a strategy, while not incorrect, risks under-implementation as the burden of policy reforms is onerous and assumes a capable bureaucracy. To accelerate the escape from the middle-income trap, this book proposes a number of targeted interventions aimed at hitting the constraints that are most binding: the dualism in production and exports, policies to promote the number of SMEs instead of the size of SMEs, policies to strengthen the links between SMEs and large enterprises, and policies to promote innovations, trading companies, and clusters.

• Dualism In Production

The structure of production and exports in these middle-income countries is characterized by the side-by-side existence of a vast number of micro, small, and medium enterprises (SMEs) producing mainly for the domestic market and a modern, mostly foreign-owned sector consisting of a small number of large enterprises producing mainly for the international market, mostly in vertically integrated production (see Chapter 2).

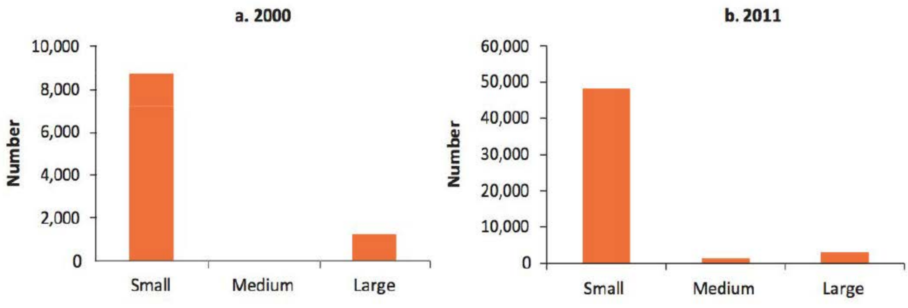
A large number of small domestic firms in Thailand and Vietnam engage in low-productivity activities. The vast majority of firms are small, and many are owned and operated by households, mostly in the informal sector. In Vietnam, about 35 percent of urban workers are active in the informal sector. In many countries in the region, wages in the informal sector are far lower than wages in the formal sector. The implications of this gap are clear. Low wages in Vietnam are a signal of the low productivity of the labor force employed in agriculture and in the urban informal sector.

In Thailand, over 99 percent of firms are SMEs, accounting for about 36 percent of GDP and three-quarters of enterprise-based employment (ADB 2015). The most recent available data (from 2008) suggest that there are only 4,158 larger enterprises; medium-sized firms are relatively few as well, numbering 12,073. The remaining 99.3 percent of enterprises are classified as small and there are 2.8 million of them. However, SMEs' contribution to output and employment is much weaker relative to their huge numbers, accounting for just over 36 percent of GDP in 2011. This was less than large enterprises (46 percent), but more than agricultural enterprises (13 percent) and other enterprise forms (5 percent). The SME share of output has also fallen marginally—but persistently—in recent years, from 39 percent in 2007.

In Vietnam, at the end of 2010, according to an estimate of the Vietnamese Chamber of Commerce and Industry, there were 1 million household businesses in the semi-informal sector that were registered and paid taxes at the district level and another 3 million household enterprises that were not registered in any way, compared with about 544,000 formal sector firms (including private firms, state-owned enterprises, and foreign-invested enterprises), of which only about 65 percent were active (Pham 2012).

Growth in Vietnamese manufacturing value added thus has come from the sheer number of micro and small enterprises rather than from a growing number of medium and large firms (Figure 7.1). Each year, a great many enterprises disappear, while as many or even more enter into production. Few of these micro and small enterprises ever reach medium size, creating a missing middle phenomenon common in developing countries.

Figure 7.1. Size Distribution of Manufacturing Firms, Vietnam, 2000 and 2011



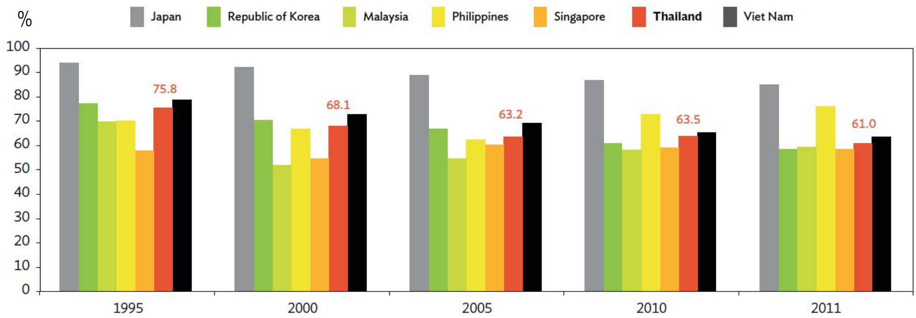
Source: 2013 data of Statistics (database), General Statistics Office of Vietnam, Hanoi, http://www.gso.gov.vn/Default_en.aspx?tabid=766.

The problem with this pattern of growth is that these micro and small enterprises are engaged in low-productivity domestic production activities and have no access to modern technology and knowledge. This is why overall labor productivity is lower in

Malaysia, Thailand, or Vietnam than in Korea or Taiwan, although the workers from the former group in foreign-invested companies are as productive as any workers in the world. There is little value chain integration in the production process. The large firms producing for export generally obtain raw materials and intermediate goods from abroad, while domestic firms buy from a variety of sources, including traders. There are few interactions between these two types of firms, unlike in Korea and Taiwan, where subcontracting between large and small firms is common.

As a result of this production structure (a large number of small household enterprises producing for the domestic market operate alongside a small number of modern, foreign-invested enterprises producing for export, with few links between the two types), the rapid economic growth among newcomers has not resulted in or been accompanied by an improvement in the ratio of value added to exports (Figure 7.2).

Figure 7.2. Domestic Value Added in Gross Exports, Selected Countries, 1995–2011



Source: OECD.iLibrary. OECD.Stat. http://www.oecd-ilibrary.org/economics/data/oecd-stat_data-00285-en (accessed August 2015).

Source: ADB 2015.

This structure of production, which may have been suitable when a middle-income country began to open up, is unlikely to sustain future industrial growth and, more importantly, will not support the country's effort to become industrialized. Many of the foreign-invested industries would likely move production elsewhere should real wages rise in middle-income countries, wiping out all these countries' hard-earned gains over the last two decades. For domestic industries, the lack of economies of scale and the insufficient competition from imports mean that they are not motivated to adopt new production methods and technologies.

Existing industrial policies appear to support the birth, but not the growth of SMEs. Unlike Korea and Taiwan, middle-income countries such as Malaysia, Thailand, and Vietnam have not attempted to make small enterprises become middle enterprises and the latter to become large enterprises. Recent advances in the theory of the firm have shown that productivity growth is fastest in middle and large enterprises and that new technology and new expertise are more likely to be adopted by these enterprises. The dearth of large domestic enterprises in these countries means that the numerous micro and small enterprises have not been able to benefit from subcontracting by large enterprises, which, likewise, do not draw on the competitive production of smaller enterprises.

To raise the value added of their goods, middle-income countries need to integrate large informal domestic enterprises into the economy and global trade and also integrate the supply chain of the assembly activities of large formal firms into the economy by investing in the upstream production of the goods in which these countries have a comparative advantage in production and in which they have already established market share, such as agribusiness, garments, and wood. Unlike downstream activities, however, the production of the associated raw materials and intermediate goods is capital intensive and technology driven, and it requires skilled labor. Inviting FDI into these areas and reforming education and vocational systems are the best means to reach this goal. For this reason, the government should undertake a complete review of the incentives for FDI so as to focus on upstream production and on bringing in capital and technical expertise, while improving labor and entrepreneurial skills. More efficient organization can yield huge savings in transport costs in industries that are far from ports and require land transport of high-volume, heavy materials. The commercialization of domestic inputs, such as timber, bamboo, and leather, can save time, as well as foreign exchange, and can increase the capacity of domestic producers to respond quickly to shifts in demand.

One explanation for the near absence of large domestic firms in manufacturing in Vietnam revolves around the skills required to organize and manage medium and large firms. Sutton and Kellow (2010) point out that, in Ethiopia, the capabilities of small entrepreneurs are not adequate for graduating to medium manufacturers, who need in-depth industry knowledge and experience in managing a certain scale of operation. Söderbom (2011, 7) finds that, in Ethiopia, "a worker in a firm with 50 or more employees produces as much value added in just over an hour as does a worker in a microenterprise in a (10-hour) day."

Another explanation may be that successful countries such as Taiwan facilitate the process whereby small enterprises grow into medium and large firms (see the policy section on direct and indirect exporters below). Firm size in poor countries is positively associated with the stock of capital, machinery, and land, though information on land is sparse (Fafchamps and Quinn 2012). This association may explain why firms in China's industrial parks can overcome hurdles and gain access to these factors, exploit scale economies through modern technology that facilitates assembly line production, and grow into larger firms.

Fafchamps and Quinn (2012) confirm this hypothesis. The vast majority of informal firm owners in Vietnam do not have access to land to expand the scale of production. So, while they do not need finance to start up, they cannot easily grow to the size of other East Asian firms. The lack of land ownership precludes, of course, the use of land as collateral to obtain financing to purchase more advanced machinery and increase productivity. Clearly, government attention to the land issue among informal firms is crucial to any efforts to jump-start manufacturing in Vietnam.

The Role Of Government

While virtually everyone now agrees that the government role is critical in helping a country transition from an imitation to innovation state, unfortunately there is no hard and fast rule on what this role should be. Middle-income countries seem to alternate between a strong, dominant role such as China and Vietnam, and a hands-off approach such as in Argentina and Brazil.

There are a number of reasons why too strong a role of government can be inimical to innovations. In Vietnam, the preponderance of state-owned enterprises discourages private sector firms from growing. Even in Thailand, the ADB pointed out the need for public institution reforms (ADB 2015). Second, innovations feed on freedom of thinking and of experimenting with new ideas. Universities need complete freedom in research even though the guidance from the joint government-business organizations can be useful to minimize wastage of resources. Third, as Baumol (2002) points out, competition is the key to innovation. Competition stimulates innovation, and innovation stimulates competition. Empirical work supporting this point was cited in Chung (2010). Furthermore, through trade, innovation such as reductions in transportation costs and speed increases global trade and further stimulates global competition.

Yet, as the experience of Korea shows, innovation cannot take place without the government play a catalytic role in setting up the necessary institutions including the government research institutes and the science, technology, and innovation initiatives. A major difference between Korea’s industrialization experience and that of the newcomers such as Malaysia and Thailand is in the way domestic firms absorb technology. Rather than through FDI as the latter did, Korea and Taiwan relied on foreign loans at the beginning and focused on developing the domestic capabilities first, selectively restricting FDI and actively encouraging technology imports in other forms (Suh 2015). It is said that this approach is slower but surer than letting technology be transferred through FDI. Chung (2010) notes two major lessons from the Korean experiences. First, human resource is the key to science and technology development and thus to economic growth. Second, nothing can better motivate private businesses to invest in technology development than market competition.

At the same time, Korea started to set up institutions to move away from the imitation stage as soon as the economy started to take off (Table 7.1)

Table 7.1. A Stylized History of Science and Technology Innovation Policies, Republic of Korea

Stage	Event
Imitation	Foundation of Korea Institute of Science and Technology (1966); establishment of Ministry of Science and Technology (1967), Science and Technology Promotion Act (1967)
1960s	Establishment of global research laboratories in machinery, shipbuilding, chemicals, marine science, and electronics
1970s	Tax credit for R&D investment (1974); development of human resources in R&D (Korea Advanced Institute of Science & Technology)
Transformation	National Research and Development Program (1982)
1980s	Establishment of Daedeck Science Town; promotion of research at private firms through financial and tax incentives to stimulate R&D investments and a cut in the tax on technology-based start-ups (1982); tax credit for technology and manpower development expenditures
Innovation	Promotion of university-based research at science research centers
1990s onward	Five-year plan for innovation (1997); establishment of the National Science and Technology Council (1999); launch of Science and Technology Vision 2025 (1999); first National Technology Roadmap (2001); reorganization of the Ministry of Science and Technology (2004); deputy prime minister: establishment of the Office of Science, Technology, and Innovation; launch of the Ministry of Education, Science, and Technology {2008)

Source: OECD 2011, based on Hong 2005.

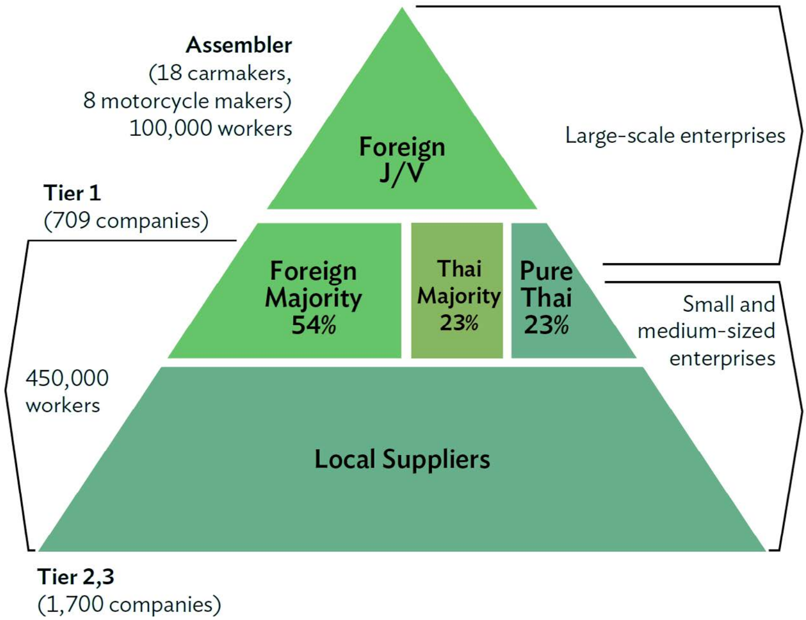
Ultimately, the success of middle-income countries in promoting innovation depends on the current human capital base of these countries, the available government research institutes and universities, and the ability of the business sector to adopt technological change. Evidence from both Korea and Taiwan seems to indicate that the larger the firm size, the easier it is for firms to adopt foreign technology, in part because it is more likely to take risks (Liu, Tsu, and Hammitt 2000; Suh 2015).

Foreign-Owned Enterprises

In Malaysia, Thailand, and Vietnam, most of the largest or most important companies are foreign owned. These enterprises capitalize on these countries' labor cost advantage, in conjunction with (directly) imported inputs, to produce goods and export them across the globe. Thus, in Thailand, the 12th largest carmaker in the world and a leading producer of hard disk drives, most of Tier 1 suppliers are foreign firms

(ADB 2015). Figure 7.2, shows the structure of Thailand's automobile industry in 2014. The ADB report concludes that after several decades, there is little technology transfer to local firms.

Figure 7.3 Thailand Structure of Automobile Industry in 2014



J/V= joint venture

Source: ADB 2015.

In Vietnam, more than half of Vietnamese exports are produced by foreign-owned enterprises. These firms are not integrated into the rest of the economy, to which they transfer little knowledge or technology. Over 2000–2011, the number of foreign-owned enterprises increased sixfold, generating more employment in the domestic economy (Table 7.2).

Table 7.2. Size of Enterprises, by Type, Vietnam, 2005–2011

	Private SMEs		State-owned enterprises		Foreign-invested firms	
Indicator, average	**2005**	**2011**	**2005**	**2011**	**2005**	**2011**
Net turnover per enterprise, US$, millions	6,089	17,842	77,214	825,624	106,201	225,534
Employees per enterprise, number	27	21	363	510	267	283
Turnover per employee, US$, millions	225.3	834.4	212.9	1,619.6	397.4	796.7

Source: Dinh 2013.

Foreign-owned enterprises are having much greater success than domestic producers, highlighting the need for Vietnamese firms to harness the expertise to produce goods at the same level of productivity and rapid pace. This also under- scores the issue of employment generation, which will shift to other countries if Vietnam loses its wage competitiveness.

Private Sector SMEs

In Vietnam, the number of private sector SMEs continues to grow, but, in terms of productivity, they still lag behind state-owned enterprises and foreign-invested firms. This is evident in the average turnover per employee (Dinh 2013). The sheer size of state-owned enterprises and foreign-invested firms relative to SMEs is also noteworthy. The missing middle is an obstacle to the competition of SMEs with such large and powerful corporations and to the full realization of the potential of SMEs.

The lack of medium enterprises has proven challenging in the efforts of private SMEs to bridge the missing middle and grow into larger corporations or create international brands. The majority of firms have fewer than 20 employees, mainly family members who assume multiple, ill-defined roles. These family firms embody a survival mentality rather than a focus on productivity and growth.

This is not to say that SMEs should be discouraged. Vietnam can grow according to a model in which SMEs represent the backbone of the economy (as in Taiwan, China) or a model in which large companies are the dominant players (as in Korea). No matter which model is followed, the key issue is to raise the productivity of micro, small, and household enterprises by integrating them into the value chain of the domestic economy and the international economy. Only then can the country achieve significant and sustainable economic growth.

The Weak Links Across Domestic SMEs, Foreign-Owned Enterprises, And State-Owned Enterprises

In seeking to meet their business needs, foreign-invested enterprises and state-owned enterprises avoid relying on small private sector enterprises. The transfer of technology and knowledge between foreign-invested enterprises and domestic enterprises is negligible. Larger enterprises do not depend on inputs produced by their smaller domestic counterparts. Instead, they import raw materials, while domestic firms buy from a variety of sources, including trading companies. In Vietnam, state-owned enterprises, which are supposed to play a leading role in key industries (for example, in logistics, machinery and equipment, and chemicals), are unable to provide key inputs to manufacturing enterprises in the five sectors.

This fragmentation and lack of interaction are problematic because they limit the ability to source inputs, new technologies, expertise, and so on domestically, preventing the economy from becoming more productive. Additionally, time, effort, and foreign exchange could be saved by greater integration among firms, which would also spur other economic benefits and greater local growth.

In the middle-income countries, few SMEs seek start-up capital from banks. Even if they do, their requests are rarely granted. Instead, SMEs rely on their own savings or other informal sources, such as the savings of family members and friends. In contrast, in advanced economies, banks play an important role in helping those SMEs that have survived the first few years to expand, especially through assistance in the purchase of capital equipment or land.

Would policy interventions help address this dual industrial structure? As explained in one of our previous volumes, the priorities and sequencing of policy interventions should follow four criteria (see Dinh et al. 2012). First, policy interventions should be undertaken only if a market failure—existence of a pure public good, externalities, noncompetitive markets resulting from policy distortions, information asymmetries, or coordination problems—prevents the private market from adequately playing its role. Second, these interventions should focus on sectors and subsectors that demonstrate the most potential for comparative advantage and job growth. Third, they should be cost effective in the short and long runs, with limited fiscal impact. Fourth, implementation capacity and the implications for governance and the political economy of the reforms should be thoroughly assessed.

The weak links between domestic SMEs and foreign-invested enterprises in middle-income countries reflect the high costs of transactions among manufacturing firms, as well as between firms and traders. These transaction costs arise because of asymmetric information and imperfect contract enforcement and result in adverse selection and delays; underinvestment in public goods such as roads, electricity, and communications; and imperfect credit markets.

- **Policy Lessons**

A number of authors have reviewed the successful East Asian experience with a view to help middle-income countries, especially the newcomers, escape the middle-income trap. Tran (2013) stresses two key areas: (1) a shift in the policy focus to investment in human capital (such as higher education, R&D) and in advanced infrastructure (such as telecommunications), and (2) the establishment of high-quality institutions to foster an innovative private sector capable of competing in the global market.

On the first area, Tran notes that R&D expenditures in Malaysia and Thailand in 2006 amounted to less than 1 percent of GDP (0.64 percent and 0.25 percent, respectively) compared with 3.0 percent in Korea in the same year and 1.0 percent for Korea in the early 1980s. Tran looks at the number of patents granted and the number of graduates in engineering and technical training and concludes that there is a large gap between the countries of the Association of Southeast Asian Nations today and Korea in the 1980s. He also notes that the international competitive position of the former seems to have weakened, as reflected in the ratio of productivity to wages.

On the high-quality institutions, Tran notes that Malaysia requires measures to strengthen contract enforcement and voice accountability, while Thailand's position is weaker than Malaysia in many areas. In Vietnam. Tran stresses the need to have institutional reforms to develop factor markets and to ensure competition in the use of these factors.

Ohno (2009) believes that the East Asian experience shows that to get to the high-income level, or to pass through the middle-income trap, a country's domestic capability has to have three components: industrial human resource; supporting industries, and logistics. He called for technical and vocational education and training to be integrated with a country's industrial strategy with specific goals and time tables.

Hollweg, Sturgeon, and Taglioni (2017) propose specific measures to strengthen the capability of domestic Vietnamese firms. In the short term, this entails forming an interministerial committee to (1) identify top domestic suppliers through transparent and competitive criteria and procedures. (2) request key global firms to produce lists of components they would like to source locally, and (3) match local suppliers with specific global firms one-on-one and request global firms to provide detailed hands-on-instructions to fulfill requirements. In the longer term, they suggest (1) policy interventions in favor of competitiveness and skill building among domestic private sector firms, (2) tapping into tier-1 suppliers once their capabilities are established to form tier-2 suppliers, and (3) creating a fund to support investment in facilities and investments by domestic firms for up to five years through performance-based financing with yearly targets to improve operations and just-in-time delivery of parts, components, and materials. They also recommend efforts to support domestic firms in developing and marketing their own brands on global markets.

The remainder of this chapter will discuss a number of policy instruments which, historically, the East Asian economies (including Japan, Korea, Singapore, and Taiwan) have relied on to promote industrial development: equal treatment for direct and indirect exporters, the establishment of trading companies as a means to increase exports and reduce transaction costs, and the use of industrial parks and industrial clusters (cluster-based industrial development) to reduce transaction costs and enhance competitiveness. These policies are not exhaustive and can be combined.

Equal Treatment For Direct And Indirect Exporters

East Asian economies (including Japan, Korea, Singapore, and Taiwan) integrated domestic producers with formal exporters by providing the same incentives for direct exporters and indirect exporters. Rhee (1985) provides an excellent detailed discussion of these policies. He distinguishes two types of indirect exporters: (1) indirect exporters who supply intermediate inputs to final stage (or next stage) export manufacturers and (2) indirect exporters who supply finished export products to trading companies that export directly (or sell to other trading companies). Indirect exporters are usually manufacturers, but they can also be pure traders. The policy instruments used to equalize incentives include (1) flexible and realistic exchange rates, (2) free trade in inputs and outputs, (3) competitive financial and money markets, (4) competitive primary input markets, and (5) nondiscriminatory domestic taxes. For example, earlier in its industrialization process, Korea exempted import duties and taxes on intermediate inputs among all exporters, direct or indirect and inside or outside the free trade zones and bonded manufacturing warehouses. To achieve this goal while still maintaining an import protection system on the rest of the economy, it used a set of input coefficients to calculate the needed imports of intermediate inputs. When this is combined with automatic import licensing and free access to foreign exchange among both direct and indirect exporters, industrial producers creating export value added are able to choose freely between imported and domestic inputs (at world market prices), irrespective of whether their production occurs at the final stage or some earlier stage.

Given their imperfect financial and capital markets during the earlier stages of industrialization, the East Asian economies also provided guaranteed automatic access to financing at the same interest rates for all export activities among both direct and indirect exporters. In Korea, the financing for indirect exporters was accomplished through the domestic letter of credit system (Rhee 1985). In this system, when an exporter has an export letter of credit, this induces his/her bank to open a second, similar credit account on behalf of the exporter, with the input-supplying indirect exporter or output-supplying indirect exporter as the beneficiary. Rhee (1985, 112–13) states as follows:

> "Thus, the indirect exporter gains access to all export incentives based on the receipt of the domestic L/C [letter of credit], just as the final exporter gains such access based on the receipt of an export L/C (or other evidence of an export order)."

Another policy used by Korea to encourage indirect exporters was to provide preshipment working capital loans (usually for less than 90 days) designed to meet the financing needs for production or sales activities. Post-shipment finance (granted for up to 180 days) was also available, covering the financing needs between shipment time and payment.

Encouraging The Establishment And Expansion Of Trading Companies

The term trading companies in this book refers to private enterprises that facilitate international trade and industrialization through several channels, including the achievement of economies of scale and scope in overseas distribution by subcontracting and leveraging knowledge about foreign markets and export processes across multiple client firms and products; reducing transaction, search, negotiation, and information costs; introducing new trends and machinery, resulting in the manufacture of products that are competitive in international markets; providing access to finance; organizing production lines; and undertaking quality control. In Japan, examples are companies such as Mitsubishi and Sumitomo.

Historically, such intermediaries have played a major, often unrecognized role in facilitating trade. The long list of countries that have relied on trading companies to improve trade deficits includes Japan; Korea; Taiwan; and even the United States. The rationale for using trading companies varies. Companies may choose to export directly or indirectly based on productivity. Productive firms that can afford to establish their own distribution networks export directly; less productive firms may export indirectly through intermediaries, while the least productive firms target the domestic market. Ahn, Khandelwal, and Wei (2011) provide a theoretical model for the role of intermediaries in facilitating trade. Using firm-level data in China to supply empirical evidence for their predictions, they show that Chinese firms that export indirectly are more likely to export directly later on. These predictions are in line with the business literature on trading companies that has relied on transaction cost theory to analyze these issues.

In a review of Taiwan's industrialization experience, Hamilton and Kao (2008) note the importance of trading companies, beginning with the success of Japanese trading companies in the late 1960s that encouraged Japanese manufacturers to relocate abroad in search of cheaper labor. Both Korea and Taiwan benefited from Japanese investment in the early 1970s and the late 1960s, respectively. It is estimated that over half of Taiwan's exports from the late 1960s through most of the 1970s were brokered by Japanese general trading companies. Subsequently, this role was taken over by Taiwanese trading companies. Between 1972 and 1985, the number of types of items exported from Taiwan to the United States rose from 2,100 to 8,400 (Hamilton and Kao 2008). Hamilton and Kao state that, after the Japanese traders, the American buyers and the local trading companies collaborated in the early 1970s through the 1980s to build up this export base. They point out that the number of trading companies in Taiwan rose from 2,777 in 1973 to 55,000 in 1985. Another striking fact is that, once a market of suppliers had been established and the trade fairs started to operate, these trading companies began fading away.

The benefits of trading firms vary with the products traded and the volume of the trade (Roehl 1983, cited in Jones 2000). For some standardized products and bulk commodities, the use of export intermediation might be more beneficial than internalization because trading companies can reduce the transaction costs of both buyers and sellers. However, firms are more likely to choose direct trade if the volume of trade is high, supply and demand are stable, specification is more complex, and quality assurance is difficult (Jones 2000). Also, Ahn, Khandelwal, and Wei (2011) find that intermediary firms in China focus more on particular countries, while direct exporters tend to focus on particular products. This lends support to the view that intermediaries are a means to overcome the market-specific costs related to international trade. Trading companies would strengthen the links in middle-income countries between domestic companies and export markets, including foreign-invested enterprises.

Trading companies offer a plethora of benefits for the local economy. They are a great source of revenue for industrial zones. They contribute to tax revenue and, by serving manufacturers in the zones, especially SMEs, help develop manufacturing, which also increases tax revenue.

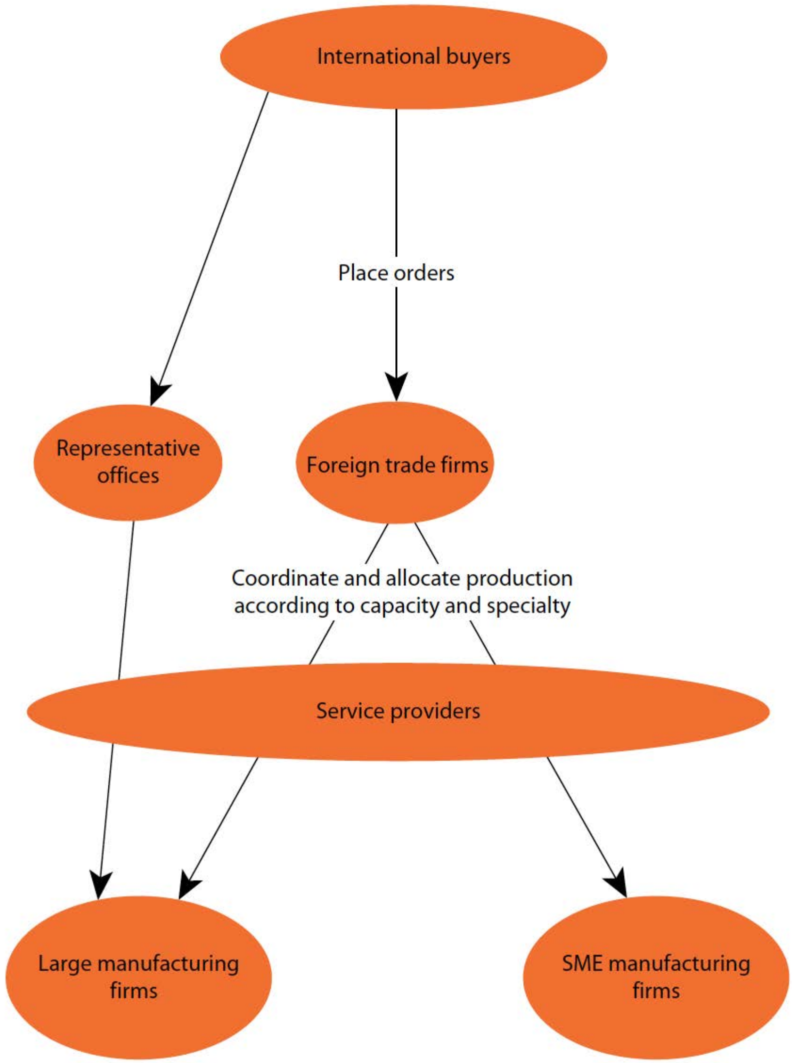
As in Japan, Korea, and other East Asian countries, China's experience shows that trading intermediaries are important not only in facilitating trade, but also in overcoming the major constraints that manufacturers face in the initial stages of industrialization. These constraints include problems in the access to cost and quality of inputs; in the access to industrial land; in the access to financing; and in trade logistics, entrepreneurial skills, and worker skills (Dinh et al. 2013). Trading companies help smaller and larger manufacturers to explore new markets and enhance their competitiveness through constant product and technology upgrades. They propose options—including facilitating independent export or import by manufacturers, along with guidance in successfully negotiating the fierce competition in many dimensions—that support manufacturing ventures ranging from small start-ups to large, sophisticated producers in many industries. The collaboration of producers with trading companies has yielded many advantages, such as lower transaction costs, the availability of more market information, and financial benefits. Trading companies can help small enterprises integrate with larger companies and gain access to foreign markets, expertise, technology, and ideas. Chinese manufacturers have profited from these services and increased their exports dramatically over the past 20 years. Such growth would not have been possible without the liberalization of foreign trade and the contributions of trading companies.

Trading companies have made important contributions to China's economic success. These companies perform a crucial function by matching importers with local manufacturers, facilitating communication among firms, and assisting in the shipment of goods from suppliers to buyers. Operating at a critical juncture of the market, the companies have become vital go-betweens in the booming world of processing trade. Maintaining a network of suppliers, they help firms find missing markets and provide diverse domestic firms with enhanced access to imports of materials and components. They also assist firms in control- ling costs and enhancing quality and variety. Moreover, their relationship with intermediaries forces domestic producers to improve to compete effectively with imports.

Foreign traders in China began as domestic firms in processing trade under favorable terms. These activities represented a major pathway for firms to become involved in international trade. As time passed, the firms evolved into trading companies as the incentives for companies and governments changed. This led to better performance among trading companies, particularly after the Chinese government ended state monopolies through a series of gradual reforms and allowed private companies to conduct foreign trade. Pilot reforms were first implemented in special zones and then extended to coastal regions and, finally, throughout the country. The end of the state monopoly on trading companies facilitated the entry of private producers and traders. As reforms continued, China eliminated mandatory export targets and import plans, allowing market forces to determine production. Tariff reductions also boosted processed exports.

In China today, firms specializing in trade are heterogeneous. Three main types of firms provide intermediary trade services in China: foreign trade companies (also referred to as trading companies), service providers (service-specific agencies), and the offices of representatives. Most of the trading companies and agencies are private or foreign owned (often subsidiaries of trading companies in Hong Kong or in Taiwan), while state-owned trading companies are responsible for trade in regulated commodities, such as steel, acrylic acid, and timber. Figure 7.3 depicts how local manufacturers link with foreign buyers and describes the services provided by trading companies.

Figure 7.4. How Foreign Buyers and Local Manufacturers Connect, China



Source: Dinh et al (2013)

In China, foreign trade companies are involved exclusively in trade. They are divided into two types based on mode of operation: the buy-and-sell model and the agency model. The first type includes conventional trading firms that purchase commodities from input suppliers or manufacturers, sell them to manufacturers or groups of overseas buyers, and profit from the difference in the purchase price and the selling price (the buyout operational model). The second type includes trading companies that earn commissions by providing information on market demand for manufacturing companies, assist in negotiations between suppliers and buyers, and supervise the delivery of goods. The commission ranges from 0.8 to 3.0 percent of the market value of the goods. This process does not require a large amount of capital and is therefore the major business model for small and medium trading firms.

Trading firms provide three core functions that facilitate trade and have helped China become an export powerhouse. First, trading firms usually maintain a network of manufacturers and subcontract orders based on the capacity and technology of these manufacturers. If required, they search for new production units and help the units already in their networks expand production. Second, trading firms identify potential foreign buyers for the products of their manufacturing clients. They then connect the two parties and help with the negotiations and the development of the products. Third, in some cases, to cope with rapidly growing markets and globalization, trading companies expand their services to include production chain services—along the lines of the well-known model of Everich in Shenzhen, Guangdong Province, and Li & Fung in Hong Kong—and production and management consultancy to reduce production costs and enhance manufacturer competitiveness.

Service providers (service-specific agencies) offer services to manufacturing companies that help ease customs clearance procedures, payment collection, and foreign exchange settlements. They are often exporters, making extra profits by taking advantage of their access to export certificates and foreign exchange accounts. They do not provide the comprehensive services of foreign trade companies; rather, the suppliers and the buyers establish their own contacts (directly or through a foreign trade firm) and then hire the agency to furnish the logistics.

Many large overseas buyers have set up subsidiaries in China to produce goods for their parent companies and for other clients. Such offices offer services similar to those of foreign trade companies, but focus on the interests of their parent companies. They identify manufacturers and distribute orders according to the needs of their parent companies and the capacity and specialty of the manufacturers.

Industrial Parks: Vehicles To Integrate Domestic SMEs Into The Economy

While providing important short-term investment, employment, and foreign exchange benefits, industrial parks could also help middle-income countries in the pursuit of strategic long-run objectives, including technology and skill transfers, the multiplier effects on regional development, and the expansion of upstream and downstream industrial links. Industrial parks offer the quickest route to profits and technology acquisition in an environment in which sweeping economy-wide reforms are not feasible because of either financial constraints or political issues (the persistence of contrary ideologies or the entrenched interests of officials and bureaucracies associated with the plan system).

Until now, the purpose of industrial parks in Vietnam has been to encourage FDI rather than to help promote domestic manufacturing firms to grow. In contrast, in China, the system of plug-and-play industrial parks oriented toward SMEs plays a key role in encouraging the development of domestic manufacturing (Dinh et al. 2013). This policy tool has been used extensively in East Asia and has helped simultaneously resolve the main binding constraints in manufacturing: the lack of access to industrial land; the shortage of input industries; and deficiencies in finance, trade logistics, worker skills, managerial skills, and infrastructure. The parks have enabled many Chinese SMEs to grow from family operations focused on domestic markets into global powerhouses.

Successful industrial parks in China provide enterprises with security, good basic infrastructure (roads, energy, water, sewerage), streamlined government regulations (through government service centers), and affordable industrial land. They also offer technical training, low-cost standardized factory shells that allow entrepreneurs to plug and play, and free and decent worker housing next to plants. By helping small enterprises grow into medium and large enterprises, China has avoided the shortage of medium firms—the missing middle—faced by most developing countries. More advanced industrial parks offer services in market analysis, accounting, import and export information, and management advice and help firms recruit and train workers. For example, parks in or near the Yangzi River Delta place a strong emphasis on assisting firms in obtaining business licenses and in hiring workers. Parks may also include facilities to address environmental challenges.

Plug-and-play industrial parks have greatly reduced the start-up costs and risks among SMEs that have sufficient scale, capital, and growth prospects to take advantage of larger facilities during a phase in their development when they are unable to acquire bank loans. They have also facilitated industrial clusters, generating substantial spillovers and economies of scale and scope among Chinese industries. The clusters likewise benefit from the government support for input and output markets. China's parks focus on specific industries, such as leather and textiles in Nanchang, furniture in Ji'an, and electronics in Ganzhou (Sonobe, Hu, and Otsuka 2002; Sonobe and Otsuka 2006; Zeng 2010).

Industrial parks could help Vietnam circumvent several constraints on the development and competitiveness of domestic firms, including the shortages in inputs, industrial land, finance, trade logistics, and entrepreneurial and worker skills.

If domestic input markets are underdeveloped and inputs must be imported, import tariffs raise costs. Yet, the removal of the tariffs on all the inputs used in domestic production, while improving the global competiveness of local producers, could have an adverse impact on government revenue and could face opposition from incumbent suppliers. Singapore has used industrial parks to avoid these disadvantages by limiting any allowed tariff exemptions to inputs that are imported, processed, and then reexported as part of the final output produced within the parks. China has also sought to accelerate technology transfers by allowing duty-free imports of industrial machinery for export-oriented firms in special zones and industrial parks.

Manufacturing requires access to affordable land. In China in the early 1980s, industrial land with efficient infrastructure was in short supply even in the better developed coastal regions. To circumvent this constraint, local officials provided fully serviced land in industrial parks, sometimes with plug-and-play factory shells that allowed entrepreneurs to commence production without having to build factories. Eventually, local governments facilitated access to industrial land throughout the domestic economy. Government entities gradually developed policies that enabled smaller firms to expand organically or through industrial parks that eased the constraints in land and infrastructure.

In general, the expansion of industrialization and urbanization reduce the land available for production and commerce. Relocating enterprises to industrial parks or economic development zones is a major channel for supplying new land for manufacturing. Industrial parks, normally developed by local governments, offer roads, utility connections, and standardized workshops. By convincing firms to move into industrial parks, local governments also hope to group firms in the same sector so as to reap the benefits of agglomeration and clustering (see below).

In China as well as in Vietnam, state-owned banks lend largely to borrowers with strong ties to the public sector and discriminate against small privately owned firms of the type found in manufacturing clusters. By moving these small firms to industrial parks, local governments can allow them to use land as collateral to obtain funds for developing manufacturing. In China, local officials have also used their networks and influence to assist firms in gaining access to external finance.

By locating industrial parks in coastal areas with access to domestic transport and port facilities and with long histories of international trade, exporters in middle-income countries could enjoy enhanced trade logistics. As the volume of manufactured exports expands, investments in export-related transport and port facilities become more attractive. Industrial park administrations could also streamline the customs formalities faced by entrepreneurs.

At the moment, there is a missing link between infrastructure planning and trade in middle-income countries. SMEs in these countries would greatly benefit from government policies to facilitate trade and logistics in three areas: transport infrastructure and logistics services, regulatory procedures for exports and imports, and supply chains. The successful implementation of the policies recommended in the Bank report would go a long way toward helping industrial parks and clusters and the manufacturing sector grow.

Industrial parks provide permanent space for overseas and local investors, thus attracting entrepreneurs with the managerial and technical skills needed to run successful businesses. As local industries grow, so do the local pool of experienced workers and the availability of ancillary services and goods, including domestic supplies of material inputs. These developments reinforce one another and raise the productivity of local industry.

Encouraging Organic Clusters

Another way to help SMEs grow (rather than merely establishing them, as most middle-income countries have done until now) is to encourage clusters. An industrial cluster usually features a group of enterprises and institutions that share a specific kind of business activity in a limited geographical area. Industrial clusters are common in developing countries among SMEs producing similar or related products. Examples include shoe, garment, furniture, woodworking, and metalwork clusters. In Vietnam, the tradition of clusters has existed for thousands of years, but the growth of clusters has never been subject to any policy of explicit promotion, as it is in China and other countries.

The advantages of clusters are many. Clustering contributes to industrial development by mitigating market failures, including the lack of markets and technology information, information asymmetry, moral hazard, and imperfect contract enforcement (Sonobe, Suzuki, and Otsuka 2011). Because of their geographic proximity, firms can trade intermediate goods and services with other firms in the cluster more easily, resulting in lower transaction and monitoring costs. Moreover, information and technology exchange is facilitated so that enterprises can learn from each other (information spillovers). Clusters foster the emergence of labor markets for specialized skills, making it easier to find workers with desired skills. Clusters can likewise help attract customers, suppliers, and traders.

The advantages of clustering are more apparent among SMEs than among larger companies because it is more difficult and costly for SMEs to (1) absorb new technologies, materials, and ideas in production, management, and marketing; (2) test new practices; (3) integrate production processes; (4) find good transacting partners (suppliers, traders, and so on); (5) monitor parts and materials suppliers; (6) find good, well-skilled workers; (7) find customers; (8) ensure the collection of payments; and (9) punish betrayers or cheaters (Sonobe 2007).

Studies such as Cooke's (2002) have also shown that clusters are key to knowledge economies or the new economies. Cooke discusses military market–led clusters, such as Silicon Valley or the Telecom Corridor in Richardson, Texas, that employ 40,000 workers in 600 firms in information and communication technology, as well as civilian market–led clusters such as the biotechnology hub in Boston, where there are over 130 biotechnology firms employing 17,000 workers. Underpinning the former cluster and stimulated by it is one of the most sophisticated hard infrastructures in the United States in the form of fiber optics, synchronous optical network rings, and so on. The science base for the latter cluster is exceptionally strong, with links to educational institutions such as MIT, Harvard, Boston University, and Massachusetts General Hospital. Basic research funding amounted to US$770 million each year (Cooke 2002).

Empirical studies have shown that industries participating in a successful cluster register higher employment and wage growth and more manufacturing establishments and patents. Healthy cluster environments are often also associated with more new industries. Once a few firms in an industry form a cluster in a local community, the entry costs for other firms become lower because of positive external economies (Fujita, Krugman, and Mori 1999). The development of effective transfers of information and technology within clusters creates opportunities for the emergence of other industries and clusters.

A cluster strategy can help overcome typical constraints on business development and growth in low-income economies (inputs, industrial land, finance, trade logistics, entrepreneurial skills, and worker skills). The solutions offered by a cluster strategy are unique to each country. Firms in clusters may grow in different ways to break free of the constraints. One example is worker skills. In a cluster, as people engage with one another, knowledge is quickly diffused through the local community. A worker who encounters technical difficulties can often find the solution by discussing the difficulties with others in the cluster. Workers can also move to other firms in the cluster within the same industry, expanding their professional learning. Besides such incidental learning opportunities in clusters, local government can build formal vocational schools or collaborate with universities to provide training programs targeting specific industries.

Cluster growth and upgrading have been largely an outcome of market mechanisms because entrepreneurs in clusters have creatively mobilized knowledge, resources, and capital in and outside local communities based on comparative advantage. However, the creation of industrial clusters in developing countries with a small knowledge pool, inadequate infrastructure, and limited technological expertise and labor skills has required active government involvement.

Unlike the Chinese central government's 1980s strategy of building national champions, cluster-based industrialization in today's China emphasizes locally grown entrepreneurship. Entrepreneurs, rather than governments, establish clusters. At the initial stages of cluster formation, when production is concentrated in home workshops, little intervention by the government occurs on the concept that the wrong kind of intervention can snuff out promising advances. Once clusters begin to expand, the public sector can undertake a more active involvement to develop general infrastructure (roads, utilities, land) and facilities that meet the specific requirements of the emerging clusters (market structures, financial institutions, training programs, quality control mechanisms, and so on).

Cooke (2002) looks at some of the policy lessons of countries that have built successful clusters, such as Finland and Germany, as well as countries with decaying clusters, such as the United Kingdom, to draw policy conclusions. He notes that Finland's national strategy to build knowledge-based clusters in telecommunications, medical technology, and so on seems to work because of the policy link between university research, the R&D laboratories of large companies such as Nokia, their suppliers, and start-up firms spinning out of university research. Similarly, the success of Germany's BioRegio cluster building strategy was promoted from a strong science and financial base rather from a ground zero position. Thus, the three lessons derived for building clusters are (1) failing clusters show stubborn resistance to change, (2) unsuccessful clusters operate under stressful conditions, and (3) successful clusters thrive on scientific knowledge.

Policy measures to improve the competitiveness of middle-income countries must address both the problems of the numerous small, informal, mostly household firms producing for the domestic market and the problems faced by a relatively small number of large, foreign-invested enterprises producing for export. Among small firms, the main issue is to discover ways to nurture growth into larger firms that can achieve greater productivity. This will require improvements in labor skills and technology and in the number, quality, and variety of the products able to compete with imports. Policies to reduce the role of state-owned enterprises, provide equal treatment for direct and indirect exporters, promote trading companies, encourage clustering and subcontracting, attract FDI to upstream activities, use industrial zones to integrate supply chains, and promote skill training are important in this respect.

Among larger formal enterprises, the main issue is to find ways to move up the value addition of the goods produced by increasing the variety and quality of production. Trade facilitation and logistics are critical for these enterprises. The transformation of skills, the transfer of technology, and the building of managerial capacity that are now most effective in foreign-invested enterprises should be applied to domestic enterprises. From a foreign producer's standpoint, it does not matter whether the raw materials and intermediate goods are procured in middle-income countries or somewhere else, as long as they are of good quality and price competitive and can be delivered quickly. It is therefore entirely up to policy makers and the private sector in middle-income countries to make this transformation possible.

So far, the economic growth of middle-income countries has been based on low-cost, low-skilled labor, combined with capital from abroad. Together with rising agricultural output because of the improvement in agricultural productivity, this model has succeeded in creating a large number of jobs in labor-intensive sectors geared toward producing exportable goods. However, as middle-income countries advance to a higher per capita income category, this model needs to be modified to help domestic producers gain more value added.

Policies For High-income Countries

The discussion in Chapter 6 makes clear that the U.S. economy is moving in a direction in which productivity will continue to mount, but the job market will become bimodal, that is, well-paying jobs will coexist with low-paying jobs. The number of highly productive jobs will be fewer because of the process of automation and computerization. Indeed, many of the new jobs will be in slowly moving low-productivity services.

Moreover, it has been reported that as many as three-quarters of the jobs in the next 30 years do not even exist today. Under the circumstances it would be impossible to predict what kind of jobs will be needed for the U.S. economy and therefore what to be done in terms of policy design and implementation right now. Given this uncertainty, our discussion here will focus on a few key issues that are of fundamental importance for the U.S. economy.

Income Inequality

It is clear that the Western world has been experiencing widening inequality because of rising capital income, while labor income has remained low and stagnant (Milanović

2016; Piketty 2013). The wage bifurcation discussed above means the inequality will likely widen further. What will be the impact on the social fabric and what are the political and cultural implications?

The fact that automation-generated jobs are not being filled by displaced workers is evident in microstudies. For example, it is widely known that the U.S. economy has witnessed a steady drop in the share of the population working in middle-skilled jobs. According to a study by Cortes, Jaimovich, and Siuhas (2016), this drop has been caused by the disappearance of routine occupations, driven by changes in the propensity to work in these jobs by individuals in a small set of demographic groups. For example, 94 percent of the fall in routine manual employment is accounted for by male high school dropouts of all ages and male high school graduates under the age of 50. These groups are shrinking as a share of the population (from nearly a quarter of the U.S. population in 1979 to less than 15 percent by 2014), and their reduction in the population share has implied an important reduction in the overall share in routine manual employment, even holding fixed the propensity to work in routine manual jobs.

More importantly, individuals within these key groups have experienced dramatic reductions in the propensity to work in routine manual jobs. Thus, the relevant share has fallen from 60 percent among less well educated young men in 1979 to one-third in 2015. The results indicate that the dramatic decline in the probability of routine manual employment is offset primarily by increases in nonemployment and, to a lesser extent, increases in nonroutine manual employment. Clearly, individuals in these demographic groups have not benefited from the increase in employment in high-paying, nonroutine cognitive occupations observed in the aggregate.

This implies that, for high-income countries such as the United States, policy makers should focus on more direct support, both financial and training, to workers who are being displaced by automation and robotization or competition from abroad. An education system based on both elitist and mass training may remain a reasonable way, but the cost for higher training and college education needs to be greatly reduced.[58] Reduction of income inequality either through a universal income scheme or earned income credit seems inevitable. Over time, this approach, together with the emergence of a sharing economy may result in a reconfigured society in which democracy could still be maintained.

58 On May 8, 2015, Jeffrey Sparshott of the Wall Street Journal reported that the college class of 2015 was the most indebted ever, as the average graduate with student-loan debt will have to pay back about US$35,000.

The Sharing Economy

We have seen from the above that an industrialized country such as the United States would head to a situation where the middle skilled jobs are likely to be sharply reduced, or even eliminated, leaving a society with higher and lower occupations, and its resulting worsening income inequality. Some people think this may lead to a welfare state or a socialist regime, or one in which a small class bankrolls the rest of the society.

But the nature of capitalism may be more dynamic than commonly thought. Since the turn of the 21st century, the U.S. economy is moving toward a sharing society,whereby many goods and services are shared rather than owned downright. Instead of taking a taxi, one can take Uber, where the riding service is provided by someone like yourself. Instead of buying a condominium on the beach for your vacation, you lease someone's residence, through the Airbnb service. As mentioned in chapter 1, prior to the industrial revolution, each individual is his or her own firm, working independently and use the market to exchange goods and services. At that time, in the words of Sundararajan (2016, 4), "a significant percentage of economic exchange was peer to peer, embedded in community, and interwined in different ways with social relations." In Sundararajan's view, because the nature and modality of this kind of sharing behavior already existed prior to the industrial revolution, the evolution to the new sharing society was easier. He notes, as follows:

"You can get space in a bus using the Didi Kuaidi app in China, or hail an auto-rickshaw using the Ola platform in India. You can get access to someone's car for a few hours or a few days through the peer-to-peer rental platforms Getaround . . . in the United States . . . . You can get a meal with others at someone's dining table through social dining platforms, like EatWith in Barcelona, Feastly in New York, or VizEat in Paris, that allow people from who enjoy cooking to have others visit their home and join a lunch or dinner." Sundararajan (2016, 3)

There seem to be a number of economic and social features related to this sharing economy. First there seems to be an opportunity to exploit inefficiencies in the consumption of a good or service, for example, cars that are driven for fewer than 24 hours a day, or residences left empty when not in use. Second, there is an element of trust involved. Unlike an owner-occupied vehicle or condominium, a shared activity involves a level of trust high enough to let a stranger use or to be used your own property. Third, perhaps to reduce the trust problem, a shared activity involves a community, unlike the existing society where a good or service is exchanged without regard to membership of a community. Thus it does not matter who you are, if you have money you can buy any good or service in a market economy. In a shared economy, you have to also belong to a community, although this community is no longer bounded by physical characteristic (such as a neighborhood) and could extend to the entire world such as Facebook.

How does the emerging shared economy impact the labor market? For one thing, many people are earning extra income through the sharing economy but it is not clear they will consider these means of earning a living jobs. There are certainly fewer reliable benefits and higher uncertainty on the next job. But there is also the added convenience of more flexibility and ability to avoid the routine of a nine to five jobs. The prospect of a society where 95 percent of the labor force are working to serve the 5 percent top income earners are becoming more reality. Personal services such as Luxe that serves to valet park your car anywhere anytime, wash your clothes (Washio), or walk your dogs (Wag) will continue to spring up. Sundararajan called this sharing economy crowd-based capitalism, where the supply of capital and labor comes from crowds or individuals as opposed to traditional capitalism where such input supplies come corporate or organizations such as firms. Moreover, there is a blurring line between personal and professional service, between fully employment and casual labor, and between work and leisure.

Ganski (2010) notes that there are five features that distinguish the sharing economy from the traditional one:

- The shareability of products and services within a community;
- Reliance on advanced digital networks;
- Immediacy (goods can be shared whenever and wherever);
- Advertising being replaced by social media platforms; and
- Global in scale.

Stephany (2015) defines the sharing economy as one which gets its value "in taking underutilized assets and making them accessible online to a community, leading to a reduced need for ownership of these assets."(quoted in Ganski). Will the sharing economy accelerate or decelerate GDP growth? On the one hand, a fuller utilization of capital (for instance, cars or real estate) raises the productivity in the economy and increase GDP. Furthermore, the digital economy, by offering a wider variety and higher quality of choices, can raise income and wealth beyond what official statistics show. Sundararajan cited the example on variety and quality that Amazon offers internet users in on-line purchase. It is not clear, though, that the existing supply-side economies of scale through organizations such as firms, corporate can be replaced by the new sharing economy. GDP can also increase on account of demand-side economies of scale defined as the increase in a product value as its use grows. On the other hand, it is not clear that personal income the way traditionally defined (in terms of GNI or GNP per capita) necessarily rises as more and more people will be opting out of working for institutions (for example, taxi drivers switching to Uber drivers). One thing will be clear: the Internal

Revenue Service will face challenges in verifying individual income tax returns in this sharing economy.

Some of the issues affecting the labor market include whether workers are considered contractors or employees. The pessimists, such as Robert Reich, called the sharing economy the sharing the scraps economy and clarified by adding that the big money goes to corporations and owners of software, while the scraps go to the on-demand workers. In that case, work will be defined by low wages, the elimination of benefits, and high levels of job insecurity. The optimists believe the sharing economy will lead to jobs with greater flexibility, innovation, and creativity. Workers will then be in control of their destiny.

Blinder and Krueger found that the proportion of jobs that are offshore-able vary by industry, with higher fraction in finance and insurance and lower fractions in accommodation and food services and the shift toward service offshoring is as dramatic as the shift from manufacturing to services since 1960. Brynjolfsson and McAfee predicted the automation will lead to a situation where consumers will have many choices but many workers will be rendered obsolete.

Sundararajan believes that the digitized economy is expected to help workers earning more per hours but this conclusion depends on whether the service can only be provided locally or not. If the service can be provided globally, the impact on workers in developed countries can be exactly the opposite. On the other hand, new marketplaces can help reduce the issue of information asymmetry such as Akerlof's (1970) market for lemons. There are also other features of the digitized economy: the tendency to be generalists rather than specialists, the immediacy of labor supply, the task based economy, and the visibility of work.

It may be that the only way to have an equitable society is to have a social safety net provided by a minimum guaranteed income either directly or through the earned income credit. Also the use of ratings as a device to weed out the bad providers needs to be taken with caution.

It looks like hollowing of America is here to stay. What does the future America look like? What are the policies to minimize the impact on democracy? That is the subject of future research which I hope take up in my next book.

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Jobs, Industrialization, and Globalization

After many decades of expansion, incomes and standards of living have never been better in many parts of the world. Yet, in the developed economies, there is anxiety over the loss of manufacturing jobs that once absorbed a large share of the labor force and created a middle class that formed the core of democracy. The vast majority of middle- income countries have not yet been able to make the transition to the high-income group despite decades of growth. Progress among low-income countries, particularly sub-Saharan African countries, in achieving productivity growth and structural transformation has been slow, and deindustrialization has occurred in some.

Jobs, Industrialization, and Globalization examines the development problems pertinent to each of these groups of countries and explores solutions. The book's structural analysis reveals that, among the low- and middle-income countries, industrialization remains the major route, if not the only route, to creating jobs and raising incomes, while acquiring the necessary investment in human capital to reach the next stage of modernization. Among the low-income countries, it pays to shift resources from low- to high-productivity sectors and to create jobs in light manufacturing so that idle or laid-off workers can move there. Among the middle-income countries, global competition makes shifting production away from raw materials and commodities to manufactured goods essential; yet, the vertically specialized industrialization regime—the global value chains—is generating new challenges along the path to industrialization and requires a reappraisal of government policies. Among the advanced countries, such as the United States, modern industrialization involves shedding unskilled labor at an accelerating pace, partly because of automation and partly because of rising competition from abroad. More importantly, the future of modern manufacturing revolves around new technology, and there are many uncertainties. These countries require policy reform to protect workers and to keep a viable middle class that may serve as a foundation for democracy and prosperity.

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