

# Is Manufacturing Still a Key to Growth ?

Uri Dadush

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## About the author, Uri Dadush

Uri Dadush is a senior associate in Carnegie's International Economics Program and a Senior visiting fellow at OCP Policy Center. He focuses on trends in the global economy and is currently also tracking developments in the eurozone crisis. Dadush is interested in the impact of the rise of developing countries for financial flows, trade and migration, and the associated economic policy and governance questions. He is the co-author of four recent books and reports: *Inequality in America: Facts, Trends and International Perspective* (Brookings, 2012), *Juggernaut: How Emerging Markets Are Reshaping Globalization* (Carnegie, 2011), *Currency Wars* (Carnegie, 2011), and *Paradigm Lost: The Euro in Crisis* (Carnegie, 2010). He has published over a dozen Carnegie papers and policy briefs as well as numerous journal articles.

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## Abstract

Manufacturing is declining as a share of GDP not only in advanced countries, but in developing countries as well. This new trend, a result of complex forces, should be seen on balance as a reason for development-optimism, not pessimism. In the 21<sup>st</sup> century economy, manufacturing remains important, but poor countries can attract investment, grow rapidly and diversify away from agriculture on the basis of many possible sources of comparative advantage, without artificially promoting manufacturing. At the heart of the modern development process is learning: by adopting techniques and practices from countries at the technology frontier poor countries can boost productivity across all sectors of the economy.

This policy paper takes an eclectic look at the role of manufacturing in today's development process. It draws from the recent econometric literature, reviews the trends in world trade, and examines the comparative advantage of countries that have been successful in transforming their economies in recent years. Among these countries it examines briefly the case of Morocco, an interesting case of a country that has exhibited quite rapid growth and diversification in a troubled region. The paper draws some implications for policy, underscoring the importance of the four Cs: connectivity, capacity, cost and confidence.

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## **Introduction**

The manufacturing sector has been a driver of development across at least the last three centuries. Several countries in East Asia have seen spectacularly rapid development based on manufactured exports in the last fifty years. However, more recently, the manufacturing locomotive has been losing steam, and the share of manufacturing in the GDP of developing countries has been declining.

At the same time, Information and Communication Technologies (ICT) and globalization have opened up large new opportunities to boost productivity and tradability of services, the largest sector of the economy. Since 2000, global service exports, which are high in domestic value added, have tripled from approximately USD 1.5 trillion to around USD 4.7 trillion. Industrial activities other than manufacturing (such as construction and public utilities) and natural resource sectors are also benefiting from technological innovation and exhibiting quite rapid productivity growth in many countries. Boosted by surging demand from China and other emerging economies, exports of natural resources have surged, consolidating their position as the largest source of foreign exchange in many developing countries.

Despite the slowdown in manufacturing, these new trends should be seen on balance as a reason for development-optimism, not pessimism. In the 21<sup>st</sup> century economy, manufacturing remains important, but countries can attract investment, grow rapidly and diversify away from agriculture on the basis of many possible sources of comparative advantage, without artificially promoting manufacturing. At the heart of the modern development process is learning: by adopting techniques and practices from countries at the technology frontier poor countries can boost productivity across all sectors of the economy.

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## **The Deindustrialization Phenomenon**

The mass migration of farm hands to the textile mills of Lancashire in 18<sup>th</sup> century England, to the steel mills of Pittsburgh in 19<sup>th</sup> century United States, and to the smart-phone assemblers of Shenzhen in today's China, are stamped in our minds as emblems of development. And, indeed, the manufacturing sector remains a motor of transformation in some less developed economies today, and it represents an important part of the economy in countries at all levels of income, with essential linkages to the natural resource sector, the non-manufacturing industrial sector, and to the typically much larger service sector. Manufactures are an essential source of foreign exchange for many countries, often provide higher paying jobs than the economy average, and account for a significant share of innovation. In the poorest economies, manufactures often enable the introduction of agricultural laborers to modern organizational and production methods.

However, as has been noted in recent years by academics (for example, by Rodrik, 2013; Timmer and Vries, 2008; Fagerberga and Verspagen, 2002; Park and Shin, 2012; Bergsten, 2011) the share of manufacturing in GDP is shrinking across all countries, low-, middle- and high- income and the process of deindustrialization familiar in high-income countries is occurring earlier and earlier in the development process, while, correspondingly, services are rising in importance sooner.

The share of manufacturing in total value added has fallen most sharply in high-income countries—from over 21 percent of GDP in 1990 to about 14 percent in 2012, on average. But it has also fallen almost as rapidly in middle-income and low-income countries (which include China), from over 20 percent of GDP to 16 percent, and even more rapidly in low-income countries from over 14 percent of GDP to less than 10 percent (Table 2). Only a few countries have seen an increase in the share of manufacturing. Some of these countries, such as Angola and Guinea, had a tiny manufacturing sector at the outset, less than 5 percent share in GDP, or countries such as UAE, Benin, Botswana, Bhutan, Nepal, Uganda, Saudi Arabia and Cuba, whose manufacturing share in GDP was between 5 and 10 percent<sup>1</sup>. On the other hand, two countries- Bangladesh and Vietnam – have built a large manufacturing sector relative to their GDP by consolidating their position in the world market in sectors that depend on very low unit labor costs, such as garments and footwear. China, which has seen remarkable economic growth, increase in market share of global manufactures exports, and rapidly rising wages, did not see an increase in manufacturing’s share of GDP – it remained at almost one third of the economy between 1990 and 2010, though the share of manufacturing appears to have begun a gradual decline since.

**Table 1:** Share of Manufacturing in GDP (Manufacturing, Value Added, Percent of GDP)

|                         | 1990 | 2012 | %Change |
|-------------------------|------|------|---------|
| HIC Average             | 21.1 | 14   | - 33    |
| MIC Average             | 20.3 | 16   | - 20    |
| China                   | 32.7 | 32.5 | -1      |
| MIC Average excl. China | 20.0 | 16.1 | -20     |
| LIC Average             | 14.4 | 9.7  | - -33   |

Source: WDI and Author’s Calculations

Employment in manufacturing is also falling as a share of total employment, and this is happening especially rapidly in several high-income countries. This trend reflects in part high labor productivity growth in manufacturing (Table 2). For the high-income and middle income countries, manufacturing share of employment fell by four percentage points and 1.7 percentage points, respectively.

In China, even though the share of manufacturing in GDP has been fairly constant, the share of employment in manufacturing has risen (though declining more recently) since 1990 and was at 29.5 percent as of 2011, indicating that productivity in manufactures over the whole period was advancing less rapidly than in the rest of the economy. The extent to which this was due to

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<sup>1</sup> Other countries which witnessed an increase in their share of manufacturing had a manufacturing share of value added greater than 10 percent. These countries are: Belize, Dominican Republic, Honduras, Jordan, Sri Lanka, Swaziland, Bangladesh, Mozambique, and Vietnam.

compositional effects (i.e. a move into lower productivity sectors within manufacturing), or to longitudinal effects (reduced relative productivity in existing sectors) is unclear. In recent years, as wages have risen – encouraged by government policies designed to boost consumption and reduce inequality - China appears to be migrating towards higher value added sectors in manufacturing.

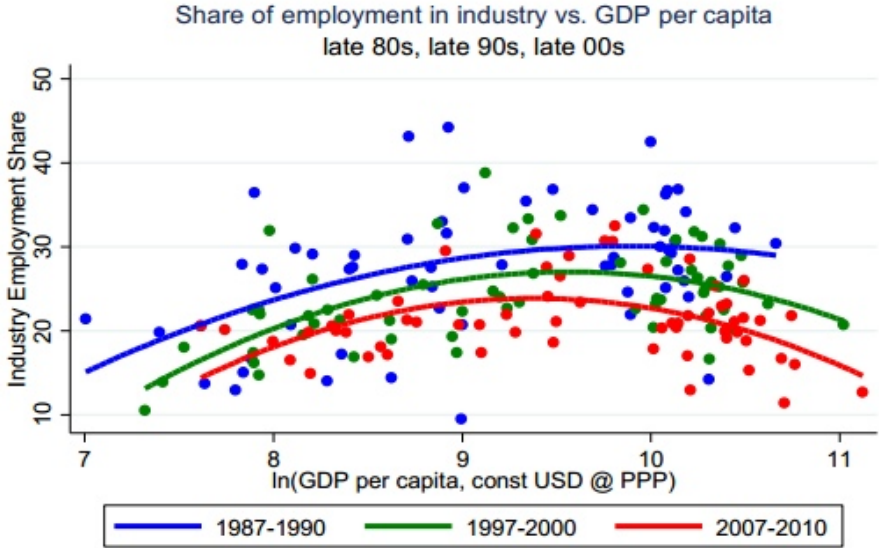
**Table 2:** Share of Manufacturing in Total Employment

|             | 2000    | 2012 |
|-------------|---------|------|
| HIC Average | 18.3    | 14.3 |
| MIC Average | 17.2    | 15.5 |
| LIC Average | No data | 7.9  |

Source: WDI, 2014

Among high-income countries, manufacturing declined most steeply as a share of the workforce in France (5.8 pp), Sweden (6.3 pp), and the UK (4.6 pp). Among middle-income countries, it fell most steeply in Ecuador (4.9 pp), the Philippines (7.1 pp), and, despite the fact that it is often thought of as a manufacturing champion, South Korea (4.7 pp). There is too little data available to draw a conclusion about what has happened to manufacturing employment, on average, in low-income countries. The lower capacity of the manufacturing sector to absorb labor has become a big cause for concern in many developing countries. As can be seen from Figure 1, reproduced from Ghani and O’Connor (2014), the share of employment in the industrial sector across the income spectrum has been declining over time.

**Figure 1:** Share of Employment in Industry



Source: Ghani and O’Connell (2014)

## What Accounts for the Deindustrialization Trend?

The declining share of manufacturing in the GDP of advanced countries is one of the best-established empirical regularities and has been widely studied. Echoing the explanation usually given for the declining share of agriculture, the demand for manufactures exhibits low income elasticity at high levels of income, and conversely the demand for services such as health care, education and entertainments, for example, rises more than proportionately with incomes. Moreover, so the argument goes, the price of manufactures tends to decline relative to that of services because there are fewer opportunities to increase productivity of services, which are typically provided ‘face-to-face’, than in manufactures. Thus, as wages rise across the economy to reflect productivity increases in the manufacturing sector, the relative cost of providing services increases. This phenomenon is often referred to as “Baumol’s cost disease” (Baumol, 1967), but its prevalence has recently been challenged based on data suggesting that productivity is also rising in large parts of the service sector in the United States (Triplett and Bosworth, 2003), the OECD (Wolf, 2005) and in developing countries (Ghani et al., various), a point to which we return below. A third possible reason for deindustrialization in advanced countries is the outsourcing of many labor intensive activities to developing countries, a phenomenon that accelerated with the rise of China and the fall of the Berlin Wall. These three explanations can be seen as complementary or competitive and there is still debate as to which force is most prevalent (Stern, 2003; WTO, 2008).

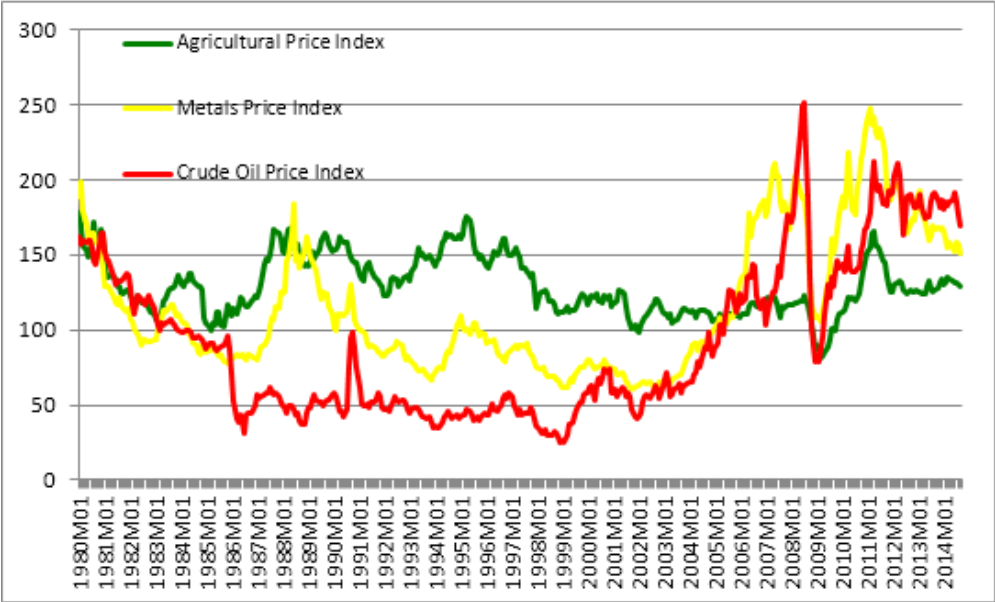
Some part of the rising share of services may also be the result of a statistical artifact, as manufacturers outsource some service activities previously carried out in house; however, as indicated in a recent OECD report, this effect is estimated to be small (Naudé and Szirmai, 2012; OECD, 2014). Moreover, there is plenty of evidence that, if anything, the available statistics actually *overstate* the size of the manufacturing sector relative to that of manufacturing. This is because companies classified under manufacturing actually house very extensive service activities – such as marketing, distribution, finance, and R and D. Anecdotal evidence suggests that such activities – referred to as “indirect costs” by accountants, not unusually, amount to about half of the total cost (and an even higher share of value added) of firms classified under manufacturing in advanced countries; in keeping with the fact that services cost less in developing countries, the proportion of indirect costs may be lower there. For example, the publishing sector is typically classified under manufacturing, yet it consists only minimally of physical value added (printed paper), and even that modest share is declining with the rapid adoption of electronic publishing.

It is striking how large some rapidly expanding service activities have become in comparison to manufacturing. Tourism, for example, is already one of the world’s largest industries, accounting for around 9% of world GDP, but remains among the fastest growing, at around 4.4% per annum in 2012, much faster than world GDP (WTTC, 2013). In the United States, spending on the health-care sector has been on a secular upward trend and now accounts for close to 18% of GDP, approaching double of what Americans spend on manufactures. Both these sectors include some spending on manufactures but are predominantly service activities. Tourism and health-care spending are so large and dynamic that, together, they today likely account for a larger share of the global economy and an even larger share of global economic growth than do manufactures.

The decline of the manufacturing share in the GDP of developing countries, which is occurring at an earlier stage than happened in advanced countries is quite puzzling, since one would expect the income elasticity of demand for manufactures to be greater than one at lower levels of income (when many people are entering the middle class and buying television sets and cars (Ali and Dadush, 2012)). And, as postulated above, one would expect developing countries to be expanding

their production of a large set of labor-intensive manufactures reflecting their labor abundance. We can only speculate on some possible explanations of “premature deindustrialization” (Subramanian, Dani Rodrik, The peril of premature deindustrialization ...). To start with, the surge in primary commodity prices since 2000 has boosted the share of natural resources in many developing economies. Figure 3 below illustrates the striking shift in the trend of commodity prices in recent years, which is often partly attributed to the acceleration of China and other large developing economies, such as India.

**Figure 2:** Commodity Prices [Red Line denotes Oil prices]



Source: IMF Commodities Report & Bureau of Economic Analysis

However, since the deindustrialization phenomenon preceded the surge of commodity prices (See Fig.1 above), and is also observed in many countries that are not large commodity exporters, this is at most a contributing factor and far from the whole story. Moreover, as well as boosting commodity prices China has appropriated a large share of global manufacturing, its share rising from 3 percent of global manufacturing in 1990 to around 20 percent in 2010, overtaking the United States as the world’s top manufacturing country. China’s extraordinarily rapid emergence in global manufacturing helps explain the slowdown in manufacturing in other countries that compete with China. However, China’s manufacturing sector is of approximately the same size as a proportion of China’s GDP as it was in 1990, so the puzzle of the decline in the manufacturing share of GDP across all developing countries remains.

Another possible explanation is that developing countries have seen the demand for services rise relative to when advanced countries were entering their industrialization stage. For example, the spread of medicines and hygiene has sharply increased life expectancy in developing countries (to an age much higher than today’s advanced countries achieved early in their development) and led to increased demand for health-care; large scale government investment has led to a vastly expanded education sector; and international tourism, much of which still originates in advanced countries, has become a mainstay in some developing economies. The growth of foreign direct investment into developing countries, much of which is in services such as finance, insurance, telecommunications,



tourism, transportation, for example, may also have contributed to the trend of an expanding service sector in ways that were not possible when today's advanced countries were undergoing rapid industrialization. Last but not least, ICT innovations, and the spread of the internet and mobile telephony, have created whole new service sectors and dramatically altered the way services are produced and distributed. Given these large shifts in technology, global integration, and government policies, any suggestion that the structural transformation of today's poor countries will retrace that of their richer cousins must be treated with care. In no sector have conditions altered more radically than in services.

## **The Revolution in Services**

Services used to be distinguished from manufacturing by the fact that they could only be consumed as they were produced; a haircut, for example, has to be done face-to-face and it cannot be stored and transported. In a seminal paper, Baumol (1967) concluded that productivity improvements in services are inherently limited since services could not be stored, traded across boundaries, or standardized. As mentioned, Baumol put forward the cost-disease hypothesis which postulates that, as wages rise, services rise as a share of GDP because they become more expensive to produce relative to manufactures which exhibit higher productivity increase. The employment share of services tends to rise for the same reason.<sup>2</sup>

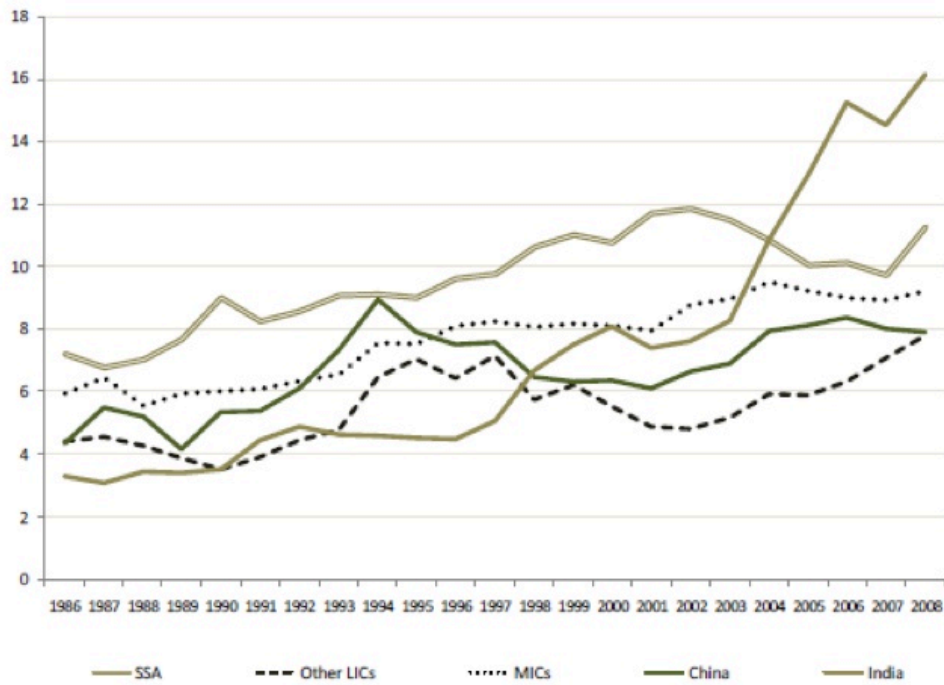
But new technologies are changing this picture, and the image of the service sector as a lead ball chained to the ankle of economies – a sector incapable of technological innovation or participating in international trade - has become vastly outdated (Triplett and Bosworth, 2003, Loungani and Mishra, 2014). Baumol's cost disease may still affect mom and pop restaurants and bed and breakfasts, but the modern service sector, such as telecommunications, financial and business services, now often exhibits faster productivity growth than manufacturing, is growing faster, and – in some developing countries is already larger (OECD, 2014, Chapter 4). For example, modern services represented about one-quarter of GDP in Brazil, Russia, Indonesia and India, and 16% in China. In China and Indonesia, the manufactures sector is larger than modern services, but much smaller in Brazil, India and Russia.

The ICT-driven revolution in services is still young, but in advanced countries it is already enabling the unbundling and remote provision of large parts of the traditional service sector, including retail and wholesale, education, health care, entertainment, and making large parts of it tradable across borders. Some developing countries are not far behind. Already, Ali Baba, the Chinese e-commerce giant recently listed in the New York stock exchange has a market capitalization large than Wal Mart. A recent IMF paper (Anand et al, 2012) provides the following list of service sector exports from developing countries: ICT, business processing services, accounting, business consulting, education, remote access services, medical record transcription, entertainment, production services, design and marketing, construction. Morocco, which we examine briefly below, stands out as a country that exports more services, including tourism and business processing, than manufactures (OECD, 2014).

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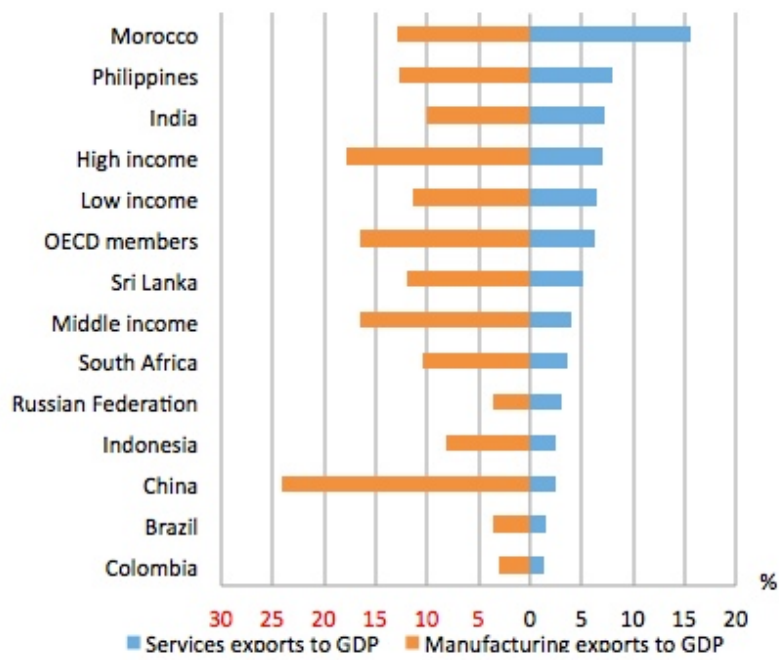
<sup>2</sup> On the other hand, Schettkat and Yocarini (2006) review studies that argue that the shift to services is “real”, the result of higher income-elasticity of demand, and not primarily a price-effect or due to outsourcing of the services sector activities from manufacturing industries.

**Figure 3:** Tradability of Services (Service exports/Service Value Added)



Source: Anand et al, 2012

**Figure 4:** Manufacturing and Service exports as a Share of GDP, 2011



Source: OECD, 201410

Government services, which often involve millions of transactions, and require keeping of extensive records, are not only being vastly streamlined with the use of ICT, but can now be outsourced from capital cities to regions where labor and land are less expensive, and this even includes the establishment of call centers and processing centers abroad. Because of difficulties in measuring productivity of government services, often also encountered in other sectors, such as banking or retailing, productivity growth in services is undoubtedly underreported.

Still, the revolution in services enabled by ICT is so extensive that the typical view of services – value addition that is consumed as it is produced, or that can only be supplied face-to-face – is no longer meaningful. Instead, it is best to think of services as the provision of intangibles. They are distinguished from goods, which can be weighed, felt and seen, but their economic characteristics have become similar since, like goods, services can now be transported (provided remotely), stored (as data, sound or images), and their production can also be more easily subdivided into specialized activities (like software modules or movies filmed in different locations) (see Ghani, Ejaz et Kharaz Homi, 2010. “The Service Revolution”, World Bank).

However, an important difference between services and manufactures is that the latter typically include a smaller share of domestic value added. Standard trade statistics, which measure exports in gross terms rather than as value added, were originally conceived to measure the export and import of goods but, with the increased importance of services, and also of trade in intermediate products (raw materials and parts) they no longer provide an adequate measure of the economic impact of trade. Trade statistics based on value added have only recently become available (Maurer and Degain, 2010, WTO, “Globalization and trade flows: what you see is not what you get”) and they show that services play a much more important role in international trade than was previously understood, while manufacturing plays a lesser role. This is because exports of manufactures incorporate large amounts of domestic services, as well as imported raw materials and components. These statistics show that, on a value added basis, global exports of services – both direct exports and those incorporated in manufactures - are actually larger than exports of manufactures. Measuring trade in value added terms suggests that even countries which exhibit a pronounced comparative advantage in exports of manufactures on a gross basis, may actually be exporting more services than manufactures. For example, the value added incorporated in the export of manufactures which are highly intensive in R and D, such as pharmaceuticals, microprocessors, and smartphones, are almost certainly primarily composed of services. Moreover, input-output tables will only recognize the input of services into manufactured exports insofar as the former are outsourced to firms classified as services. To our knowledge, there is currently no systematic way to identify the service component in manufactures when the services are provided within firms.

## **Manufacturing, Growth and Foreign Exchange**

As we have seen manufacturing is not only a relatively small sector, typically representing 8-12% of GDP in most developing countries – and an even smaller share of employment; it is also declining as a share of GDP. In an accounting sense, the remainder of the economy (composed of private and public services, natural resources, and other industry), is, on average across the developing countries, the source of 8 to 9 times more growth than manufactures. If manufactures were defined strictly as the production of material things, stripping them of the surrounding intangible service activities in firms classified under manufacturing, the share of GDP and its growth of non-manufactures would be even greater, perhaps twice as big. It follows that the view that manufacturing plays the lead role in development stands or falls on the assumption that it generates very large positive externalities, multiplier effect on other sectors through backward and

forward linkages, innovation, learning, and that it also enables the earning of foreign exchange (which in turn can enable import of technologies, etc). Moreover, these externalities are assumed to be greater in manufacturing than in other sectors. One study estimated, for example, that the US manufacturing sector has a higher multiplier effect than the other sectors; for every one USD in manufacturing value added leads to a USD 1.40 additional value added in the other sectors. (WEF, 2012, “The future of manufacturing)

The view that manufacturing is disproportionately a source of positive externalities compared to other sectors is not universally accepted (Romer, 2012"Do Manufacturers Need Special Treatment"), since one can argue that other sectors also generate innovation, have important linkages and, increasingly, can earn foreign exchange. So, when all is said and done, the effect that manufacturing has on the rest of the economy cannot be evaluated a priori: the link between a large manufacturing sector and growth is very much an empirical question. In the following we examine this question from various angles, beginning with the ability of manufactures to earn foreign exchange.

In the eyes of many policy-makers manufactures are special because of their capacity to earn foreign exchange – they represented 54.6% of world exports of goods and services in 2012 measured on a gross basis, though much less than half on a value added basis.<sup>3</sup> Exports of manufactures enable imports of essential raw materials, as well as consumer goods and machines and components that cannot be produced at home. Moreover, the argument goes, export of manufactures enable exports of services. So, is it realistic, in this light, to expect that countries grow rapidly and sustainably without developing a marked comparative advantage in manufactures? The answer, the evidence suggests, is – increasingly - yes.

#### **- Comparative Advantage in Manufacturing**

This section argues that in evaluating the importance of manufactured exports for development it is important to recognize that manufactures are tradable to different degrees and that many of the benefits to be derived from manufactures can be obtained from non-tradable sectors or from manufactures that depend heavily on location-specific advantages.

We begin with a tautology, albeit a useful one: not every country can have a comparative advantage in manufacturing, so manufactures cannot be the answer to everyone’s development challenge at any one point in time. Nor is comparative advantage immutable. As it happens, the vast majority of developing countries (and some advanced countries) show no revealed comparative advantage in manufacturing today – even though it is entirely possible that some will in the future.

The inability to develop a world-beating manufacturing export sectors may be due to factors within the control of policy-makers such as restrictive regulations, or it may be due to factors that cannot be changed quickly, such as inadequate skills, or to structural features, such as small size and geographic distance from markets, or very large natural resource endowments that “crowd out” other sectors. Of the countries for which the World Bank provides data (around 175) 53 countries have a revealed comparative advantage in manufacturing (Table 3) of which 28 are advanced countries and only 25 – mainly based in Asia - are developing countries. This means that about 130

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<sup>3</sup> Data for manufactures exports from WDI, World Bank. Definition: “Manufactures comprise commodities in SITC sections 5 (chemicals), 6 (basic manufactures), 7 (machinery and transport equipment), and 8 (miscellaneous manufactured goods), excluding division 68 (non-ferrous metals).”

developing countries do not have a revealed comparative advantage in manufacturing.<sup>4</sup> To achieve comparative advantage in manufacturing, the country's share of manufactures in total exports of goods and services, expressed in gross terms rather than in value added terms, must exceed the already mentioned world average, 54.6%.

**Table 3:** Countries with an RCA in Manufacturing

| S.No. | 2012 Total exports (USD at current prices) | RCA  | S.No. | 2012 Total exports (USD at current prices) | RCA  | S.No. | 2012 Total exports (USD at current prices) | RCA  |
|-------|--|------|-------|--|------|-------|--|------|
| 1     | Haiti                                      | 1.54 | 12    | Philippines                                | 1.31 | 23    | El Salvador                                | 1.13 |
| 2     | Lesotho                                    | 1.52 | 13    | Romania                                    | 1.26 | 24    | Turkey                                     | 1.13 |
| 3     | Cambodia                                   | 1.51 | 14    | Pakistan                                   | 1.21 | 25    | Jordan                                     | 1.12 |
| 4     | China                                      | 1.51 | 15    | Poland                                     | 1.21 | 26    | Sri Lanka                                  | 1.11 |
| 5     | Bangladesh                                 | 1.50 | 16    | Nepal                                      | 1.18 | 27    | Swaziland                                  | 1.1  |
| 6     | Panama                                     | 1.48 | 17    | Mexico                                     | 1.16 | 28    | Dominica                                   | 1.09 |
| 7     | Botswana                                   | 1.40 | 18    | Tunisia                                    | 1.16 | 29    | Vietnam                                    | 1.07 |
| 8     | Chinese Taipei                             | 1.39 | 19    | FYR Macedonia                              | 1.15 | 30    | French Polynesia                           | 1.06 |
| 9     | Switzerland                                | 1.38 | 20    | United Kingdom                             | 1.15 | 31    | Denmark                                    | 1.02 |
| 10    | Germany                                    | 1.36 | 21    | Thailand                                   | 1.14 | 32    | Georgia                                    | 1.02 |
| 11    | Hungary                                    | 1.34 | 22    | United States                              | 1.14 | 33    | Morocco                                    | 1.02 |

Source: Author's Calculations

Note: The definition of manufacturing used is broader than that used by the OECD (2014) report that is the source of Figure 4.

However, nearly all countries host a significant manufacturing sector, even if they have no revealed comparative advantage in manufacturing, and they therefore derive some of the externalities and linkages often attributed to the sector. Most countries host, for example, viable activities in manufacturing sectors that are difficult to trade – such as cement or furniture that have low value/weight or low value/bulk ratio. Many also host manufactures that are traded and depend on natural resources (such as fertilizers or petrochemicals). The latter represent a large part of the manufacturing exports of developing countries and are also significant in some advanced countries (Argentina, South African, French and Italian wines, for example). Many other manufacturing activities are traded but depend critically on proximity to a large market nearby. Mexico's Maquiladora benefits from proximity and open trade with the United States, while Morocco, for example, is able to export garments to the EU that require very fast turnaround in response to changing fashion, but struggles to compete in other garments sectors.

<sup>4</sup> According to IMF and World Bank data, there are 156 developing countries.

Moreover, nearly all countries host sectors that are not classified as manufacturing but display some of the properties of manufacturing, such as electric and gas utilities, public transportation, and construction. These sectors can, like manufacturing, be the object of technological innovation, storage, economies of scale and modern organization and management, and they can be exposed to international competition and technology through foreign direct investment. In a large sample of developing countries, this non-manufacturing industry sector typically constitutes some 11% of GDP, and is actually bigger than manufacturing in 97 out of 139 developing economies. These sectors, however, tend to be very capital intensive and employ relatively few workers.

Only one part – albeit an important part - of the manufacturing sector can be described as “footloose manufacturing”, largely untied to domestic markets or sources of raw materials and capable of addressing the world market from anywhere in the world – the electronics and machinery sector being one example. Although “footloose manufactures” represent most of world trade in manufactures, they are far from its totality, and , because they include a large part of imported components and raw materials, the headline manufacturing aggregates in trade and national income statistics which as mentioned are in gross and not value added terms, tend to exaggerate their importance. Value added per worker is low in many footloose manufactures, especially in sectors exported by developing countries, such as garments.

As in the past, competitive advantage in footloose manufacturing requires either very low unit labor cost, as in Bangladesh, Cambodia and Viet Nam, or, as found most often in advanced countries, exclusive technologies, branding and product differentiation. Large parts of resource-based exports , which a recent WTO study estimates amount to 20 percent of exports of developing countries, and which typically have high domestic value added, are not strictly “footloose” and nor are they subject to the same intensity of competition, except possibly by countries that have similar endowments (Ruta and Venables, 2012). Clearly, given the increasing intensity and diversity of international competition in footloose manufacturing, attracting investment in that sector depends even more critically on adequate infrastructure and a predictable macroeconomic and legal environment than it does in sectors where competition is essentially local.

As has been often noted, the surge in foreign direct investment and the internationalization of production in finer and finer segments of footloose manufactures (and related services) means that many more opportunities exist today for developing countries to find niches in global value chains. However, the fact that large developing regions remain largely isolated from these processes – notably South America, the Middle East North Africa (MENA), India, Central Asia, Sub-Saharan Africa and that even within the more integrated regions – such as East Asia and Eastern Europe, success is highly variable across countries – is testimony to the challenges of becoming part of these networks. At the same time, globalization and technology have given rise to export opportunities in other sectors, beginning with natural resources.

### **- Role of Natural Resources**

The surge in the demand for natural resources, emanating especially from China, India as well as several other fast growing developing economies has led to high commodity prices and also spurred domestic and foreign direct investment in the resource sector, which had been previously subdued in the wake of an extended period of low prices.

Earnings from the export of commodities (including oil), represent approximately half of developing country exports as of 2012, and are a much larger share of the exports of low-income developing countries. Commodities – defined most broadly – are now larger in the exports of developing countries than manufactures (49 percent commodities as compared to 32 percent of manufactures). Excluding China, commodity exports are three times larger than manufacturing (47 percent of the former as compared to only 16 percent of the latter).

There continues to be deep ambivalence about relying on exports of natural resources, however. Natural resources can crowd out other sectors, eventually become depleted, and – as dramatically demonstrated by the recent collapse of oil prices - their prices are highly volatile. And the Prebisch-Singer hypothesis which presumes that the price of primary commodities is destined to secular decline retains its believers despite the recent boom. Countries with large natural resources are especially vulnerable to civil conflicts, corruption, and state capture by elites, and they also can afford to overlook the disciplines necessary to achieve sustained growth. Resources such as oil and minerals, which generate large concentrated rents and relatively few jobs, are especially problematic, while agriculture-based natural resources tend to generate benefits which are more diffused across the population. (Mavrotas et al., 2011; Paltseva and Roine, 2011)

Yet, history shows that natural resources can also be a boon to economic growth, depending on how they are managed. Among today's advanced countries, Australia, Norway, and before then the United States and Canada have been able to gradually build strong institutions and a high-income economy on abundant natural resource, whereas Argentina – which was once a relatively rich economy, has become stuck as a higher middle-income economy. More recently, countries such as Chile and Botswana, have seen significant progress, while Brazil has performed below expectations, and countries such as Venezuela and Libya have become some of the world's disaster economies. Despite the potential boon of natural resources and the ability to invest proceeds in infrastructure and education, growth in these failing economies has been impeded as much by the absence of effective governance and institutions, as by the volatility and Dutch disease associated with large resource endowments. (Gill et al., 2014; Mavrotas et al., 2011; Paltseva and Roine, 2011)

Natural resources can be managed so as to generate benefits for the wider population, through investments in infrastructure, education, and –as appropriate- in overseas assets to avoid excessive exchange rate appreciation, diversify the portfolio, and to provide for future generations. At the same time, even though an economy with abundant natural resources is unlikely to be a low-cost international production base in footloose manufactures, investments in institutions and domestic capability can provide an environment conducive to investments in services, utilities and other non-tradables, as well as in tradable sectors which depend on the nation's most abundant resources. Eventually such assets can enable the economy to diversify as natural resources decline in importance. Countries as diverse as Australia, Norway, Chile and the United Arab Emirates, have shown that economies can advance on the back of well-managed natural resource sectors and a productive service sector.

### **- Migration and Remittances**

Most countries are not blessed with abundant natural resources, however. And many of these are for any one of the reasons mentioned above, unable to gain a large enough foothold in manufacturing or traded services. Their inability to generate good-paying jobs causes their workers to emigrate, where that is possible. Although migration is an age-old phenomenon, it is only in recent years, that the importance of remittances as a source of foreign exchange and of livelihoods

in many developing countries has been fully recognized. Moreover, remittances have been growing rapidly - though there is little doubt that some of the growth of remittances can be ascribed to the fact that they are better recognized and measured in statistics. According to the World Bank, remittances to developing countries will amount to USD 435 billion in 2014, a growth rate of 5% compared to 2013. Remittance inflows are a major source of foreign currency earnings for many developing countries, and are approximately three times larger than official development assistance as of 2013. Remittance inflows were larger in 2013 than total FDI to developing countries excluding China. (WB, 2014)

According to the World Bank, India, with the world's largest emigrant stock of 14 million people, will remain in the top spot this year, attracting about \$71 billion in remittances. To underscore their importance, as a share of GDP (2013), several countries – all relatively small economies - receive remittances greater than the average contribution of manufactures to GDP across the developing country sample. Thus, the top recipients of remittances in 2013 were Tajikistan (42 percent of GDP), Kyrgyz Republic (32 percent), Nepal (29 percent), Moldova (25 percent), Lesotho and Samoa (24 percent each), Armenia and Haiti (both 21 percent), the Gambia (20 percent) and Liberia (18 percent). A much larger number of small developing economies are recipients of remittances in the 5-15% range of GDP, often comparable in size to their manufacturing sector. To be sure, remittances are not the only benefit that countries at the origin of migration derive, since close links to the diaspora can generate trade, investment and learning opportunities. (World Bank, 2006, Global Economic Prospects). When diaspora-related tourism earnings and investments in real estate and small business investment are added to remittances (where they are not already counted as remittances), there is no doubt that migration provides the lifeline of many small economies – generating many opportunities for backward linkages to other sectors. On the other hand, large developing economies, tend to receive a much smaller share of remittances in GDP, and be much less reliant on their diaspora even when the latter is large in absolute terms.

### **-The Role of the Exchange Rate**

No discussion of the preoccupation with manufactured exports as a source of foreign exchange is complete without reference to macroeconomic policy. Because of improvements in macroeconomic management, in recent years many developing countries have become less tied down by external imbalances and more resilient to external shocks (IMF, Macroeconomic developments in low-income developing countries, October 2014; Macroeconomic policy frameworks for resource-rich developing countries, August 2010; ...). For many, there has been an element of good luck in high commodity prices and favorable international financial conditions. However, lower inflation, more prudent borrowing, increased reliance on domestic sources of finance, and the ability to attract relatively stable foreign direct investment in preference to volatile portfolio flows and bank lending have also contributed to the reduced vulnerability of developing countries to balance of payments shocks.

But perhaps most critical to this outcome has been the adoption of more flexible and competitive exchange rates. To be sure, countries do not become rich by devaluing the exchange rate, and small open economies can be destabilized if exchange rate volatility becomes large, but the ability to maintain a competitive exchange rate and to adjust it as needed shifts the development challenge away from an overwhelming preoccupation with external balance. Instead of looking for ways to artificially boost exports or protect domestic producers from imports, adopting a flexible exchange rate enables policy-makers to focus on the domestic reforms that strengthen the capacity of the economy to grow sustainably.



## Manufacturing and Long-Term Growth

In this section, we review the empirical evidence on the link between manufacturing and growth by examining the experience of different groups of countries. We show that, in recent years, several countries have experienced sustained growth without relying predominantly on manufacturing.

Nicholas Kaldor (1966) was among the first to note that the overall growth of an economy follows closely the growth of the manufacturing sector, based on a panel study on developed countries over the period 1952-54 to 1963-64, and was supported by a number of subsequent studies (Wells and Thirlwall, 2003; Rasiah, 1996; Libanio, ND, Kaldor, 1966, Hansen and Zhang, 1996). Wells and Thirlwall (2003) find that a one percent growth in the manufacturing sector leads to 0.47 percent growth in the GDP for the African economies over the period from 1980-1996. Zalk (2014) concludes that for South Africa, the key driver of growth both directly and indirectly continues to be manufacturing. For Malaysia, Rasiah (1996) finds that the contribution of manufacturing to growth was higher than that of other sectors in the period from 1973-1990. In the period before the 1970s, the author finds that agriculture made the largest contribution to GDP growth. Libanio (ND) also supports Kaldor's laws and concludes that the manufacturing sector is important for economic growth in his study of seven major Latin American countries during the period 1985-2001<sup>5</sup>.

However, a number of recent studies have argued that the contribution of the manufacturing sector to growth is diminishing. These studies find that the services sector contributes more to GDP growth as compared to the manufacturing sector (Timmer and de Vries, 2008; Fagerberg and Verspagen, 2002; Park and Shin, 2012; Bergsten, 2011). Some of these studies acknowledge that the role of manufacturing was stronger in the earlier periods, such as during the period leading up to the first oil shock in 1973. While the share of manufacturing was never more than 30 percent of GDP in the advanced countries even at the peak of their industrialization period, the share of the services sector typically accounts for 2/3rds or more of GDP in advanced countries. Naudé and Szirmai (2012) argue that the structural transformation of economies led by manufacturing no longer remains as relevant as it was until the 20<sup>th</sup> century, and also that the challenges faced by growth through reliance on manufacturing are more daunting than in the past (See also, OECD, 2014; WEF, 2012). Timmer and Vries (2008) analyze 19 Asian and Latin American countries over the period 1950-2005 and conclude that the services sector has been the main contributor of growth to GDP per capita as compared to manufacturing, and that even though both sectors were found to have a significant contribution to overall acceleration of growth, growth of productivity in the service sector was greater than in the manufacturing sector.

Park and Shin (2012) find that the services sector has contributed significantly to the GDP growth of 12 Asian economies and that it has the potential to become the engine of further growth in these economies. The authors find that the real GDP growth rate of the services sector outpaced that of manufacturing by the year 2000 with the difference in the average labor productivity of the two sectors also narrowing sharply by 2000. And as mentioned earlier, these services have been contributing a larger share to total exports as compared to the manufacturing sector (Dasgupta and Singh, 2005). A recent report by OECD (2014) also emphasizes the importance of the services sector to foster growth and boost competitiveness of the middle income countries. In addition, services can also help improve the competitiveness of the manufacturing sector and become an

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<sup>5</sup> Argentina, Brazil, Chile, Columbia, Mexico, Peru and Venezuela

important source of foreign exchange through export earnings. By doing so, this sector can contribute to the overall competitiveness and contribute to the convergence process.

### **- Growth Champions**

The studies mentioned above focused on a wide sample of countries drawn from different regions or across the globe. On the other hand, the Growth Commission – a multi-year World-Bank sponsored study led by prominent academics and experienced policy-makers - examined closely the drivers of growth in 13 countries, where GDP grew at a rate faster than 7 % over 30 years<sup>6</sup>. These economies are: Brazil, Botswana, China, Hong-Kong, Indonesia, Taiwan, Malta, Malaysia, Korea, Oman, Japan, Thailand and Singapore.

A case-by-case review of the composition of growth in these countries suggests that the characterization of the rapid growth process as a movement from agriculture to manufacturing is an oversimplification. Even when it is driven primarily by manufacturing, which is not always the case, rapid growth is accompanied by advances in services and in non-manufacturing industry (construction, utilities) which account for a larger share of growth than manufacturing. Agriculture, on the other hand, accounts for a small share of growth. Manufacturing was most clearly a key driver of growth in countries in East Asia, which practiced import substitution and financial repression early in their growth period. However, manufacturing never accounted for most of the growth even in these countries. Services nearly always accounted for the largest share of growth, and non-manufacturing industry (construction, utilities) also often accounted for a higher share of growth than manufactures.

Natural resources led the growth process in Oman and Botswana, and in Malta a combination of services, non-manufacturing industry and manufactures operated together, with transportation and tourism services probably the most important. Natural resources also played a key role in the early phases in Indonesia, Malaysia and Brazil. In all instances, agriculture was a minor contributor except in Brazil and China in the early phases of their fast growth period. Services soon became the leading sector of growth in economies where manufacturing played the key role at the start, such as Singapore and Hong Kong, and which achieved high-income status very rapidly. Though it is difficult to untangle the chain of causality from these experiences, it is evident that very rapid growth over a long period is impossible without triggering a process of learning, productivity improvement and investment which touches all sectors, not only or even mainly in manufacturing.

However, the debate on the exclusive role of manufacturing in growth is far from resolved. For example, the ADB (2013) recently concluded from an examination of structural change in Asia that no country had reached high-income status (defined as an economy with per capita income more than \$15,000 in 2010) without achieving a considerable manufacturing share in GDP – around 18-20 percent (See also Rodrik, 2013). In contrast, the World Bank recently promoted to high-income status (defined as countries with a GNI per capita of \$12,746 or more) several of which – such as Chile, Russia and Uruguay – are commodity exporters, while others, such as Latvia and Lithuania rely heavily on remittances and services, and less so on manufacturing, while Antigua and Barbuda rely heavily on tourism and financial services. The World Bank has long included the oil exporters of the Gulf (Saudi Arabia, Kuwait, Oman, Qatar, and UAE) as high-income countries, as well as Bahrain, a diversified exporter of resource-based products and of services. Dubai, part of UAE, is

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<sup>6</sup> The countries considered are: Botswana, Brazil, China, Hong-Kong, Indonesia, Japan, Korea, Malaysia, Malta, Oman, Singapore, Taiwan, Thailand.

an interesting example of an economy which used a relatively small and depleting oil endowment to build over 30 years a dynamic high-income economy built on travel, transport, finance, business and tourism services. In contrast to other rapidly developing economies, Dubai soon found itself short of native labor, and immigrants now account for 85-90% of its labor force.

### **- Transforming economies**

The previous section has focused on a small group of growth champions, achieving over 7% a year (around 5% per capita) over 30 years. In these countries, most notably in Asia, manufacturing has tended to play a key role, though not always and certainly not the exclusive role often attributed to it. But, over the span of recorded economic history, instances of such rapid growth over a sustained period are extremely rare. Until the late 18<sup>th</sup> century, the world's annual rise in income per capita was very low – estimated in the 0.1%-0.2% range by some economic historians, and for most of the period after the industrial revolution, may have reached 0.5%-1% a year in today's advanced countries; periods of rapid industrialization were characterized by sustained per capita income growth in the region of 1.3 to 1.8%. So, it is important to understand the role of manufacturing in growth outside the group of exceptional performers identified by the Growth Commission.

We turn our attention to the sectoral composition of growth in a group of countries that did not achieve the hyper-growth studied by the Growth Commission but achieved “transformational” growth– which we define as roughly doubling per capita income over a generation, requiring per capita growth in the range of 2.5% to 3.5% a year over 20-30 years. We focus on the period to 2012, for which the latest data is available, because we are especially interested in how the sectoral composition of growth has evolved in the new era of globalization and ICT. We call growth which doubles per capita income over a generation “transformational”, not only because children can expect to have vastly improved livelihoods relative to their parents, but also because it is empirically associated with a major improvement in a broad range of development indicators. For example, in a sample of 50 countries, doubling of PCI is associated with an increase in the life expectancy from 67 to 73 years. The doubling of PCI is also associated with a dramatic reduction in infant mortality, defined as number of infants dying before reaching the age of one per 1000 live births, from 40 to 14. A doubling of PCI is also associated with a 3 percent increase in percentage of girls to boys enrolled at primary and secondary levels in public and private schools, and increased primary school enrollment from around 80 percent to 88 percent. The association of PCI is much greater with secondary school enrollment, which increases from 61 to 81 percent of the school-age population as PCI doubles.

Table 4 presents a list of 39 countries which have doubled their PCI within the last 20-30 years (including a few developed countries); another 140 countries achieved slower PCI growth (of less than 2.0% on average) while 21 countries achieved even faster growth over the period 1982-2012. The group of 39 includes only a handful of rich countries. Using the latest available year, 2012, as the end period, of the 39 countries that experienced “transformational growth”, only 11 exhibit a revealed comparative advantage in manufacturing, and even among these countries, manufacturing accounted for only 20% of the growth over the period. On average, across the whole sample of 39 countries, manufacturing accounted for just 17% of growth. At the same time, 18 countries showed a revealed comparative advantage in services, and services accounted for 64% of growth across the sample of 39 countries. Across the sample, non-manufacturing industry – such as public utilities and construction - accounted for more growth than manufacturing. The contribution from primary commodities and agriculture was modest, a little less than manufacturing, as over the 20-30 years sample period, spanning 1982-2012, commodity demand and prices underwent cycles of weakness

as well as strength, and real commodity prices were not significantly different in 2012 than they were in 1980.

**Table 4:** Countries which doubled their PCI in 20-30 years

| <b>S.No.</b> | <b>Country</b>                 | <b>GDP per capita (PPP constant 2011 international dollar) (2012)</b> | <b>Time taken to double PCI by 2012</b> |
|--------------|--------------------------------|---|---|
| 1            | Luxembourg                     | 86587.42  | 27                                      |
| 2            | Singapore                      | 74609.19  | 22                                      |
| 3            | Hong Kong SAR, China           | 50271.63  | 26                                      |
| 5            | Ireland                        | 42918.61  | 22                                      |
| 4            | Puerto Rico                    | 33495.11  | 30                                      |
| 6            | Korea, Rep.                    | 31901.07  | 20                                      |
| 7            | Malta                          | 28884.59  | 26                                      |
| 8            | Seychelles                     | 22849.44  | 26                                      |
| 9            | Malaysia                       | 21897.32  | 22                                      |
| 10           | Kazakhstan                     | 21505.65  | 21                                      |
| 11           | Chile                          | 21048.93  | 21                                      |
| 12           | Antigua and Barbuda            | 20385.26  | 29                                      |
| 13           | St. Kitts and Nevis            | 20099.66  | 27                                      |
| 14           | Uruguay                        | 18230.27  | 27                                      |
| 15           | Turkey                         | 18147.60  | 28                                      |
| 16           | Lebanon                        | 16632.87  | 23                                      |
| 17           | Iran, Islamic Rep.             | 16233.53  | 25                                      |
| 18           | Mauritius                      | 16200.12  | 21                                      |
| 19           | Botswana                       | 14454.22  | 25                                      |
| 20           | Thailand                       | 13736.22  | 23                                      |
| 21           | Costa Rica                     | 13157.49  | 28                                      |
| 22           | Grenada                        | 10974.73  | 27                                      |
| 23           | Peru                           | 10912.57  | 20                                      |
| 24           | Egypt, Arab Rep.               | 10685.05  | 29                                      |
| 25           | Tunisia                        | 10551.22  | 25                                      |
| 26           | St. Lucia                      | 10358.59  | 29                                      |
| 27           | St. Vincent and the Grenadines | 10039.35  | 26                                      |
| 28           | Dominica                       | 9829.11   | 28                                      |
| 29           | Indonesia                      | 8855.01   | 23                                      |
| 30           | Belize                         | 8313.48   | 25                                      |
| 31           | Morocco                        | 6778.40   | 30                                      |
| 32           | Ghana                          | 3667.98   | 26                                      |
| 33           | Sudan                          | 3545.12   | 27                                      |
| 34           | Lesotho                        | 2390.262  | 26                                      |
| 35           | Nepal                          | 2118.23   | 30                                      |

|    |               |         |    |
|----|---------------|---------|----|
| 36 | Burkina Faso  | 1527.86 | 29 |
| 37 | Uganda        | 1334.14 | 22 |
| 38 | Argentina     |         | 23 |
| 39 | Liechtenstein |         | 25 |

The preceding analysis shows that countries which achieved transformational growth over the last few years have relied mainly on the expansion of services and of their non-manufacturing sector more generally, and that only about one quarter of the sample exhibited revealed comparative advantage in manufacturing. To test the impact of the manufacturing sector on GDP per capita growth more systematically, the next section presents a regression analysis applied to the most recent period.

### Manufacturing and Growth: A More Formal Analysis

We test a minimal reduced form model, where long-term growth of income per capita depends on: initial income, the initial manufacturing share of GDP, the initial quality of governance, and the change in the terms of trade over the period. The right hand side variables are specified as such because they are believed to affect growth, and also because they are thought to be largely exogenous to the growth process, hopefully avoiding the endogeneity bias which pervades these exercises.

A cross-country regression of GDP per capita growth over the period 2000-2012 against these variables was carried out for 107 countries which included 28 developed countries, 79 developing countries, of which 14 are classified by the United Nations as least developed countries.

Data on the dependent and independent variables was collected from the World Development Indicators of the World Bank. Data on the manufacturing share of value added is the share for the base year (which in this case is 2000). The Governance Indicator in 2000 was taken as a simple average of six component indices, which include Rule of Law, Accountability, etc. Similarly, the GDP PPP in international dollar is also for the year 2000. The terms of trade (TOT) is computed by taking the ratio of the TOT index in 2012 over the TOT index in 2000.

Table 5 presents a description of the variables included in the regression (the governance indicator was dropped as explained below). The average manufacturing share of value added is 16.1 percent though the share is slightly higher in the advanced countries. The average GDP per capita growth across all countries is 2.7%. The terms of trade index, measured as indicated above is only slightly higher in the developing countries than in the advanced countries reflecting the fact that many advanced countries are exporters as well as importers of commodities and many developing countries are net importers of commodities (e.g. China).

**Table 5:** Summary of Variables Used in the Regression Analysis

| Variable                           | All Countries |                    | Developing Countries |                    | Developed Countries |                    |
|------------------------------------|---------------|--------------------|----------------------|--------------------|---------------------|--------------------|
|                                    | Mean          | Standard Deviation | Mean                 | Standard Deviation | Mean                | Standard Deviation |
| Manufacturing Share of Value added | 16.11         | 7.41               | 15.94                | 7.32               | 18.15               | 6.41               |

|   |          |          |        |         |          |          |
|---|----------|----------|--------|---------|----------|----------|
| GDPPC growth  | 2.68     | 2.00     | 3.05   | 1.96    | 1.34     | 1.19     |
| GDP, PPP<br>(International \$)  | 15150.50 | 14668.53 | 8816.5 | 5699.06 | 34402.61 | 14023.17 |
| Terms of Trade<br>Index (Export<br>price index/<br>Import price<br>index) | 1.15     | 0.45     | 1.21   | 0.44    | 0.97     | 0.26     |

Cross section regressions were run for the data which is over the period from 2000-2012. Overall, we find that the manufacturing share of value added is not a significant variable in accounting for GDP per capita growth when all countries are considered, nor is it significant for the advanced countries taken separately. However, the manufacturing share of value added is significant in accounting for the per capita GDP growth of developing countries taken separately, though its effect is very small.

When the terms of trade term is included – the preferred equation – the terms of trade term and initial income are both significant and have the right sign.. Moreover, the manufacturing share of value added is significant in accounting for growth across the whole sample, as well as across the developing country subset but is still not significant for the advanced countries. For developing countries, a one percent in the manufacturing share of value added leads to a 0.51 percent increase in the GDP per capita growth rate. This means that a one percentage point increase in the share of manufacturing value added in GDP raises the growth rate by about .015 %. In other words, raising the manufacturing share of GDP from 15% to 25% adds about 0.15% to the long-term growth rate. Thus, while the exercise suggests that a larger manufacturing sector helps growth – a notable result given the tendency of manufactures to decline as a share of GDP - developing countries would have to achieve a very large increase in their manufacturing share to see an appreciable acceleration of their growth rate.

**Table 7:** Regression results

|                                    | Excluding TOT        |                    |               | Including TOT        |                    |               |
|------------------------------------|----------------------|--------------------|---------------|----------------------|--------------------|---------------|
|                                    | Developing countries | Advanced countries | All countries | Developing countries | Advanced countries | All countries |
| Manufacturing share in Value added | 0.44***              | .206               | 0.18          | 0.51***              | 0.216              | 0.286*        |
| GDP, PPP<br>(International \$)     | -0.30**              | -0.799             | -0.49***      | -0.29**              | -0.800             | -0.45***      |
| Terms of Trade                     |                      |                    |               | 0.823***             | 0.084              | 0.647**       |
| Constant                           | 2.44*                | 7.56               | 4.73***       | 2.04*                | 7.55               | 4.04***       |
| Number of Obs.                     | 65                   | 28                 | 107           | 65                   | 28                 | 106           |

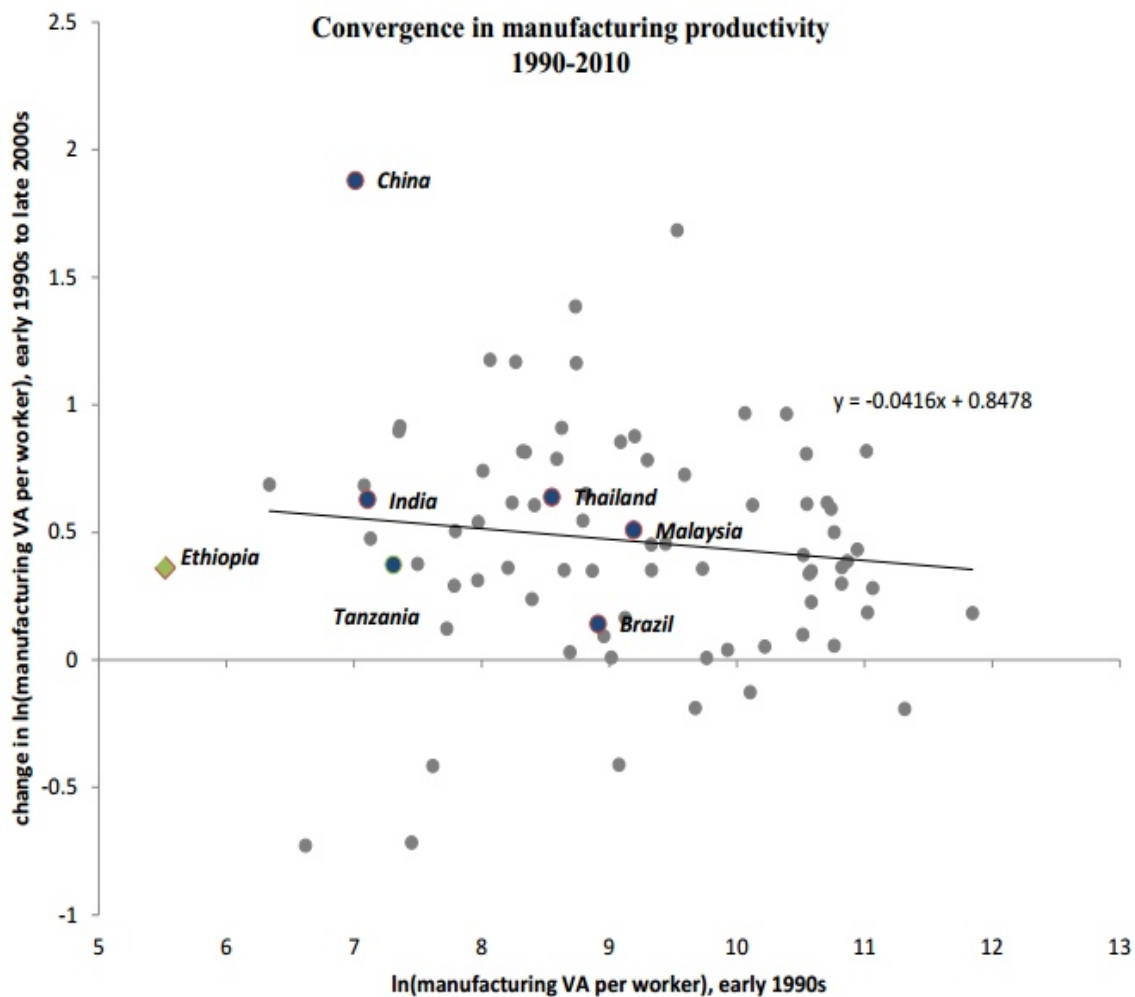
\* Significant at 10% level; \*\* Significant at 5% level; \*\*\* Significant at 1 % level

The regression exercise was also carried out by including the governance indicators provided by the World Bank. However, the variable was highly correlated with the GDP PPP term and was not significant and of the wrong sign, so it was dropped.

In light of the lack of convincing evidence regarding a substantial relationship between manufacturing and growth in the developing country sample, and bearing in mind the limitations of cross-country regression exercises, it is worth reexamining the conceptual argument that manufacturing is essential for growth, and that services are unlikely to serve as the escalator, such as made most recently by Rodrik (See, for example, Project Syndicate, October 2014, for a succinct exposition). Rodrik’s argument rests on four assumptions, each of which is open to question.

First, that services exhibit low productivity growth – which much recent evidence (Ghani and O’Connell, 2014; Loungani and Mishra, 2014; Wolf, 2005; Triplett and Bosworth, 2003) refutes, at least for sizeable parts of the service sector. Figure 5, from Ghani and O’Connell, correlates the growth of productivity of services with productivity of services in the base period and suggests that there is convergence in services productivity, as there is in manufacturing productivity (not shown here).

**Figure 5:** Productivity in Services Sector



Source: Ghani and O’Connell (2014)

Second, that the high growth of developing countries in recent years is due to a favorable external environment, including low interest rates and high commodity prices. In light of the Great Recession and its protracted impact on the growth of trade, this claim, too, is questionable. More importantly, a favorable external environment may explain high growth of demand for services in developing countries but not sustained high productivity growth in services over many years.

Third, that the modern service sector is small and employs few workers. As already discussed, this claim also runs counter to the evidence (eg OECD, 2014).

Fourth, that the service sector is largely non-tradable and that, therefore, its expansion runs into domestic demand constraints and declining (internal) terms of trade unless other sectors - notably manufacturing, which address a world market - are also expanding rapidly. However, as argued above manufactures are not the only other sector that can expand and address world markets: natural resources, tourism, remittances, can also contribute to exports, and services are increasingly tradable.

### **Some Pointers for Development Policy**

The preceding discussion recognizes that manufactures can act as a development lever but also cautions against placing too great an emphasis on it and on manufactures exports. It underscores, instead, the importance of increasing investment and productivity across the broader economy and of recognizing the wide diversity of sectors where developing countries can nowadays find comparative advantage. Services, the economy's largest sector and one rendered more productive, dynamic and tradable by ICT and globalization, has traditionally accounted for the lion's share of growth, and is likely to become even more important in the future. While it is true that manufactures underpin and stimulate the demand for many kinds of services, the converse is also true, and services provide manufactures with essential inputs. Moreover, the same can be said of all other sectors, including those that are important sources of foreign exchange, such as natural resources, remittances, and other highly tradable services, such as tourism, transport, and finance. As we have seen in the case of Malta, Botswana, Dubai, Oman, Latvia, Hong Kong, and Singapore, for example, small developing economies are especially likely to embark on development paths that take advantage of multiple opportunities for diversification that do not depend primarily or durably on manufacturing exports. In any event all economies – large and small, and even those that do not exhibit a revealed comparative advantage in manufactured exports – tend to develop a substantial manufacturing sector and a non-manufacturing industrial sector without requiring artificial inducements.

Furthermore, the evidence presented in this paper suggests that the pessimism often found in developing countries (“we cannot grow unless we compete with China”), not to mention in advanced countries, is misplaced, because – from a long-term development perspective - it focuses on the wrong issue. Modern-day development is not a zero-sum game about competing with China or Germany in manufactures, but is about learning from the state of the art in all sectors of the economy. In most developing economies, the domestic value added in the sector that potentially competes with China or Germany, which we have called “footloose manufacturing” represents just a small part of economic activity, is unlikely to grow much larger, and is in fact in likely relative decline. Moreover, adoption of a flexible and competitive exchange rate can significantly relieve the preoccupation with the external constraint and refocus attention on critical domestic policies that can sustain long-term diversification and growth.



Given the large gap that exists between the productivity of advanced countries and that of developing countries, the capacity to grow rapidly depends critically on learning – the adoption of techniques which the most advanced countries invented and adopted long ago. Globalization and ICT have greatly expanded the channels through which developing countries can learn: trade, foreign direct investment, travel, contacts with the diaspora, remote provision of education and information at very low marginal cost, etc.

These channels open up learning opportunities across all sectors of the economy, not just in manufacturing – for example, by attracting foreign direct investment in previously non-tradable industry and services sectors.

Such learning is facilitated today as it has never been before, but it still does not happen automatically – a reason that while many developing economies are experiencing transformational growth, many others are seeing little progress. For learning to happen, some conditions are necessary, which we can call the four Cs: Connectivity, Capacity, Cost, and Confidence.

Connectivity refers not only to openness to trade and foreign investment, but also to adequate logistics, transport infrastructure, telecommunications, and internet access.

Capacity refers to the ability to absorb new techniques, and relates directly to the quality and quantity of education – the ability to develop marketable skills.

Cost refers to the cost of doing business, including red tape, flexibility and competition in factor markets (including labor market flexibility), as well as adoption of a realistic exchange rate.

Confidence refers to the quality and predictability of the business climate, which essentially determines whether companies choose to invest – an essential prerequisite to learning. There are many contributors to a good business climate, but probably the most important are political and macroeconomic stability, the rule of law, and the contestability of markets.

It is worth noting that just as there is no sure way of achieving success through manufacturing, the same applies to services and natural resources. And achieving success in application of the four Cs will almost certainly boost all sectors in which comparative advantage exists, while failure will penalize all.

## **The Case of Morocco**

Morocco broadly conforms to the trends associated with the economies exhibiting transformational growth described above – most notably the relative decline of its manufacturing sector in which it exhibits only minimal revealed comparative advantage, and the rapid growth of its modern services sector - but it also stands out in its continued reliance on the growth of its agricultural sector. In terms of the four C's, Morocco is well connected, including through its large community of Moroccans abroad, but could do much better on capacity, cost of doing business, and confidence. Looking forward, there is little reason to doubt that Morocco can continue to grow at moderately high growth rates. The collapse of oil prices presents a significant opportunity to correct the country's worrying macroeconomic imbalances.

Having exhibited growth in the vicinity of 4.5% in the new millennium, Morocco has seen notable improvements in social indicators, including reduction in poverty, increased life expectancy, and education of girls (See, for example, World Bank Development Indicators, 2014). In line with

most other developing countries, including those that exhibited transformational growth, Morocco has also seen its manufacturing sector grow, but also decline in relative terms, so that it now accounts for just 11% of employment, slightly lower than in 2000.

However, with its relatively high productivity, the manufacturing sector accounts for about 15% of GDP, and, if exports of semi-manufactures – mainly phosphates derivatives - are included in total manufactures exports, Morocco exhibits, but only just, a revealed comparative advantage in manufactures.

The country stands out for its continued reliance on growth of its agricultural sector, which employs about 40% of the labor force but accounts for just 15% of GDP, a share it has retained since 2000, reflecting a gradual (0.6% a year) decline in employment and rapid growth in labor productivity, surprisingly much faster than in manufacturing. Still, labor productivity in agriculture is very low, about 1/3 lower than in garments and textiles – which are also very low productivity sectors - and in construction, 1/2 of that in hotels and restaurants, and 1/8 that of the modern service sector. Productivity of the Moroccan agricultural sector is a small fraction of that achieved in advanced countries. The implication is that there is still a very large opportunity for Morocco to continue to grow by encouraging migration from the countryside into other sectors.

In particular, the Moroccan services sector appears still underdeveloped, as it accounts for just 40% of employment, the same share as agriculture. The modern services sector (finance, telecommunications, transport and business services) accounted for just 7% of employment in 2012, but employment in the sector has grown at some 5% a year over 2000-2012 while labor productivity has risen at rates slightly lower than in manufacturing (2.6% vs 2.9%). The modern services sector by itself already accounts for a larger share of Moroccan growth and of exports than the manufacturing sector. Other services sectors have generated large growth employment but relatively small gains in worker productivity, such as hotels and restaurants and commerce. The same can be said of the construction sector, which accounts for 10% of all jobs and where employment has risen at over 5% a year, but where there is essentially no growth in labor productivity.

With over 3,000,000 Moroccans residing abroad and over 100,000 a year leaving the country, emigration constitutes a crucial safety valve for containing poverty and unemployment in Morocco. Emigration also accounts for a large part of the country's foreign exchange earnings through remittances to families left behind, tourism, return migration, and investment in real estate and, indirectly through various linkages including trade ties, for value added across the economy. Indeed, in a country where remittances account for 7-8% of GDP and are probably undercounted, tourism (where the diaspora plays a large role but is also partly counted as remittances) is over 6% of GDP, and inward investment by Moroccans abroad in real estate and small business is considerable (also partly counted as remittances), it is likely that the links to the diaspora account for a share of economic activity which is at least half as large as manufacturing or agriculture. Moreover, diaspora-related activities are likely to be expanding rapidly in line with the rapid growth of the stock of Moroccans abroad, including their offspring (Migration Policy Centre (2013)).

Links to the diaspora also contribute to the diversification of Morocco's foreign exchange earnings, which is considerable. For example, tourism and rapidly growing business services exports are already larger than exports of manufactures, and have grown significantly faster since 2000. Within the goods category, exports of agriculture, raw materials and semi-manufactures (in which derivatives of phosphates dominate) are significantly larger than manufactures, a category which correspond roughly to what we have called "footloose manufactures" above. Within footloose manufactures, there has been a large shift from consumer products (mainly garments) to equipment goods.

Morocco is quite well positioned to increase economy-wide productivity by investing and learning from the state-of-the-art. It is well connected, especially to Europe, through large trade, investment and diaspora ties, and its trade has risen as a share of GDP reflecting , in part, trade liberalization. Large investments have been made in transport and communications infrastructure. However, while there have also been large investments in education, Moroccan children score very low on educational attainment tests. So, there is much to do to build the economy's human capacity if the labor force is to be successfully reoriented from bad jobs in agriculture, garments and construction, towards better jobs in higher value added and rapidly growing services and manufacturing sectors.

Although investor confidence in Morocco has been much better sustained than in the troubled region around it, a combination of over-dependence on slow-growing European markets, and widening government budget and balance of payments imbalances, have deterred private investment and have made the economy overly dependent on government spending. As argued by the IMF, the exchange rate has become overvalued in recent years, and the cost of doing business in Morocco is high relative to countries at similar income levels, for this and other reasons.

If properly managed, the recent collapse of oil prices – which could boost Morocco's terms of trade by 3-4% of GDP in 2015 – presents a considerable opportunity to improve the balance of payments, reduce energy subsidies and the government deficit, improve the competitiveness of energy-dependent industries, and boost consumer incomes and demand.

## **Conclusion**

The manufacturing sector has been a central driver of development across centuries, most recently in large parts of East Asia; it remains an essential part of the fabric of modern economic activity in countries across the income spectrum.

While acknowledging these facts, this paper has argued that the importance of manufacturing as a development lever is declining, and, in many countries, likely to be of even less importance as the 21<sup>st</sup> century advances. Globalization and ICT have allowed economies – especially small economies - to specialize more narrowly in specific sectors that serve world markets and which may or may not include manufactures, including services and primary commodities. The paper has shown that, over the last thirty years, many economies have been able to double their per capita income and achieve large improvement in other development indicators without relying principally on manufacturing.

The main policy implication is not that the manufacturing sector should be shunned or ignored, but that the view that a large manufacturing sector oriented towards world markets is essential to a rapid advance in living standards is mistaken. Instead, policy needs to recognize that, in a globalized economy, all sectors can improve by learning from those at the technology frontier, that many possible sources of comparative advantage exist, and that careful macroeconomic management and flexible exchange rates are a preferable way to maintain external balance than interventions in specific sectors.

## Annex: Growth Champions

*Malta (1963-1994)*: The agricultural sector accounted for a negligible share of Malta's growth over its high-growth period, while services contributed 2.4%, industry other than manufactures (construction and utilities) contributed 2%. Manufacturing also made a substantial contribution to GDP growth, though smaller than services and other industry, 1.8%. Due to its location, the country emerged as a major port with the opening of the Suez Canal and remained a refueling point for the ships as trade along the Mediterranean Sea increased. The tourism sector has also contributed to the growth particularly since 1987 and its share has been around 20 percent of GDP. The share of manufacturing has been between 20-25 percent over the period under study with electronics being the most important industry. Food and beverages and clothing have also been important industries for the country (Govt. of Malta, 2002<sup>7</sup>). During the rapid growth period, the factors contributing to growth oscillated between domestic changes, such as those due to policy reforms, and external factors. However, the eventual slowdown was caused mainly by external events, such the decline in demand for electronics and reduction in tourism, especially after the September 11 attacks in the United States. (CBM, 2007<sup>8</sup>; Ebejer, 2006<sup>9</sup>)

*Oman (1960-1999)*: Oman has a rich natural resource base in its oil and natural gas sector and has achieved its growth based on the exports of this sector. Oman also began on its high growth path after reforms were enacted laying emphasis on the export of oil, to be followed by investments in other sectors. The surge of oil prices in the 1970s, along with the increase in oil production helped the country sustain its high growth trajectory. Oil revenues were used to invest in health services and education, develop social services, and invest in physical infrastructure such as transportation, electric power, water supply, and communications. Eventually growth slowed with lower oil prices and accumulating macroeconomic imbalances, leading to a decline in non-oil GDP (Mansur and Treichel, 1999)<sup>10</sup>. Realizing the limited potential of the oil sector, the country has more recently looked to diversify the economy, increase share of private sector investment and attract greater foreign investment.

*Botswana (1960-2005)*: Drawing on its diamond wealth, and adopting sound macroeconomic policies as well developing effective institutions, Botswana has risen to high income status from being one of the poorest countries at the time of its independence in the 1960s (Moholo, 2008<sup>11</sup>). Its per capita GDP increased from US\$ 210 in 1960 to US\$ 3800 by 2005. The average GDP growth rate during this period has been around 10 percent with industry (mainly mining) contributing 6 percent and the services sector contributing around 3 percent to this GDP growth. Tourism plays a significant role. Agriculture contributed a negligible 0.3 percent to growth. More recently, Botswana's recovery from

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<sup>7</sup> Govt of Malta. (2002). "Malta National Report." Submitted by the Govt. of Malta to the World Summit on Sustainable Development.

<sup>8</sup> CBM (2007). "Malta's Economy on the Path of the Euro." Central Bank of Malta. ([http://www.centralbankmalta.org/updates/downloads/pdfs/maltese\\_economy\\_euro.pdf](http://www.centralbankmalta.org/updates/downloads/pdfs/maltese_economy_euro.pdf))

<sup>9</sup> Ebejer, Ivan. (2006). "Malta's growth predicament: from frontrunner to laggard...and back?" ECFIN Country Focus. Vol III, Issue 14 ([http://ec.europa.eu/economy\\_finance/publications/publication11302\\_en.pdf](http://ec.europa.eu/economy_finance/publications/publication11302_en.pdf))

<sup>10</sup> Mansur, Ahsan and Volker Treichel. (1999). "Oman Beyond the Oil Horizon: Policies towards sustainable growth." IMF Occasional Paper 185.

<sup>11</sup> Moholo, Linah. (2008). "Botswana's Economic Policy and Development." Ministry of Foreign Affairs. (<http://www.regjeringen.no/nb/dep/ud/kampanjer/refleks/innspill/afrika/mohohlo.html?id=533479>)

the financial crisis was driven mainly by the services sector, including trade, transport and communication, finance and public services.

*Japan (1950-1983)*: for most of the high growth period, Japan grew at around 10 percent per annum, with manufacturing playing the central role. During this period, its GDP per capita increased from US\$ 3500 to US\$ 22784. The initial “miraculous” growth of Japan in the 1950s was attributed to its post-war recovery and growth. Japan also followed a policy of import substitution and financial repression (ensuring that domestic savings were channeled domestically, both to government and the private sector), and succeeded in building world-class automobiles, electronics and heavy industries. The massive slowdown of the Japanese economy in the 1990s is attributed to the burst of the real estate and stock-market bubble and to imbalances that accumulated during the fast growth period. (Fukao and Kwon, 2005<sup>12</sup>; Amsden, 2007<sup>13</sup>). In trying to revive the economy, the government has built up public debt to be the highest of any nation in the world at over 200 percent of GDP.

*Korea (1960-2001)*: The Korean growth story is similar to that of Japan, and was initially based on import substitution and financial repression, gradually building world-class export sectors in manufacturing, including electronics and cars. Like Japan, Korea suffered a massive financial crisis but recovered relatively rapidly. To help support growth, Korea focused on reforming areas affected by the crisis of 1997 and 2001, boosted the ICT sector further, opened up the economy to external competition and allowed FDI into some of the sectors which had been protected since the 1960s. These factors helped the economy bounce back to its high growth rates (Krueger, 2009<sup>14</sup>). Over the entire growth period, the contribution of industry was the highest at 3.4 percent [manufacturing?], followed by services at 3.2 percent. Contribution of the agricultural sector to GDP growth has been negligible at 0.2 percent.

*Singapore (1967-2002)*: Over the last 50 years, Singapore rose from being a poor economy to be among the richest in the world, with a per capita income higher than that of the United States. Singapore, along with South Korea, Hong Kong and Taiwan, forms the Asian Tigers following the “flying geese” formation in their industrialization, following Japan, in that they moved gradually to higher value-added manufactured exports, from non-durable to durable consumer goods, and onto capital goods. The growth in Singapore has been achieved by its focus on the manufacturing sector. The government realized early on that the country had to shift to high value added capital goods and skill intensive industries. For this purpose, the government setup training centers to improve skills of the local workers by partnering with European and Japanese MNCs (Ying et al., 2007<sup>15</sup>). As with the other East Asian economies, Singapore focused mainly on electronics, transport, textile and engineering industries for its exports and growth. (Yusuf, 2010)<sup>16</sup>. In recent years, Singapore, like

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<sup>12</sup> Fukao, Kyoji and Hyeog Ug Kwon. (2005). “Why Did Japan's TFP Growth Slow Down in the Lost Decade? An Empirical Analysis Based on Firm-Level Data of Manufacturing Firms.” RIETI Discussion paper series 05-E-004.

<sup>13</sup> Amsden, Alice. (2007). “Escape from Empire: The Developing World's Journey through Heaven and Hell.” MIT Press. Chapter 6.

<sup>14</sup> Krueger, Anne. (2009). “Lessons from Asian Financial Experience.” In *Asia and the Global Financial Crisis*. Edited by Reuven Glick and Mark M. Spiegel. Presented at the Asia Economic Policy Conference, California.

<sup>15</sup> Ying, Tan Yin, Alvin Eng and Edward Robinson. “Perspectives on Growth: A Political-Economy Framework.” MAS Staff Paper No. 47. Monetary Authority of Singapore.

<sup>16</sup> Yusuf, Shahid. (2010). “The Past and Future of Export Led Growth.” Growth and Crisis Blog, WBI. World Bank.

Hong Kong has reoriented its economy towards a variety of service activities especially those requiring high skills, such as finance, education and health.

*Indonesia (1966-1997)*: During its high growth period, GDP grew at around 7 percent per annum with the service sector contributing 2.9%, non-manufacturing industry 1.9%, manufacturing 1.2% and agriculture 0.8%. Indonesia is rich in natural resources – especially oil and gas. And in the initial period after independence, the country's growth depended critically on these sectors. But eventually the focus shifted to labor-intensive manufactures and attracting FDI in that sector. Maintaining a competitive real exchange rate and trade liberalization helped the export push (Kartasasmita, 2000).<sup>17</sup> The slowdown of the Indonesian economy was brought about by the AFC which led to a string of bank failures and saw per capita GDP contract by 16 percent. Indonesia was amongst the slowest economies to recover from the AFC, but recently returned to its pre-crisis growth rates, although its macroeconomic imbalances have been widening (Krueger, 2009; Lawrence, 2012<sup>18</sup>).

*Malaysia (1967-1997)*: Growth of Malaysia averaged 8 percent over the rapid growth period, with contribution of services at 4%, manufacturing at 2 percent, industry excluding manufacturing 1.6%, and agriculture 0.5%. Like its neighbors, Malaysia too relied on import substitution in manufacturing in the initial stages, before eventually moving to an export-oriented model. In the 1980s, the government launched a heavy industrialization program based on the Korean model. Even though Malaysia has a rich resource base, most of its exports are non-resource based manufacturing products. Within agriculture, it reoriented its output towards commercial crops (Ariff, 1998)<sup>19</sup> Along with the focus on exports of manufactured products, the country also saw its service sector surge, and services have been a mainstay of the country's expansion since the mid- 1970s (Park and Shin, 2012)<sup>20</sup>.

*China (1961-2005)*: China stands out because of the duration and intensity of its high-growth period which extends from 1961 to this day. The average share of manufacturing over this period was 42 percent while that of services was 29 percent. In the early years of its high growth phase, China was a centrally planned economy, focused on heavy industry. It was only at the end of the 1970s that the focus shifted from capital to labor intensive sectors, first in agriculture and then in export oriented manufacturing village enterprises. China also followed an import substitution model initially, but eventually adopted an open trade stance, consolidated as it joined the World Trade Organization in 2001. Low cost manufacturing products initially dominated exports, which contributed to around 4 percent to the GDP growth. (Keidel, 2007)<sup>21</sup> However, China's rapid growth was pulled as much by domestic demand as by exports, and, in recent years the government's

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<sup>17</sup> Kartasasmita, Ginandjar. (2000). "Globalization and the Economic Crisis: The Indonesian Story." Lecture at the FASID/GSAPS/WIAPS Joint ADMP, Waseda University, October 26, 2000

<sup>18</sup> Lawrence, Phillip. (2012). "Can Greece learn from the story of Indonesia in the Asian financial crisis?" The Conversation. (<http://theconversation.com/can-greece-learn-from-the-story-of-indonesia-in-the-asian-financial-crisis-7513>)

<sup>19</sup> Ariff, Mohamed. (1998). "The Malaysian Economic Experience and its Relevance for the OIC Member Countries." *Islamic Economic Studies*. Vol 6 No. 1 pg 1-41

<sup>20</sup> Park, Donghyun and Kwanho Shin. (2012). "The Services Sector in Asia: Is It an Engine of Growth?" ABD Working Paper Series 12-21.

<sup>21</sup> Keidel, Albert. (2007). "China's Economic Fluctuations and Their Implications for Its Rural Economy." Carnegie Endowment for International Peace.

declared objective is to increase increased reliance on consumption and domestic demand instead of investment and exports, and the services sector – which in China has been relatively small – has recently begun to rise in importance.

*Brazil (1950-1980)*: Brazil was one of the first countries to have achieved the high growth and also among the first ones to lose momentum. During the period of high growth, the per capita income of Brazil increased from around US\$ 960 in 1950 to US \$ 4216 in 1980. Over this period, the contribution of agriculture to GDP growth was around 5 percent, that of manufacturing was slightly over 8 percent and of services was slightly below 8 percent. A large part of the growth for Brazil over this period came from manufacturing. Growth was led by both the manufacturing and the services sector. Prior to the high growth period, Brazil was predominantly an agricultural economy with a large share of coffee exports. The share of agriculture in the GDP value added decreased from 21 percent in 1960 to 11 percent in 1980, while that of manufacturing increased from 30 to 43 percent and services sector share increased slightly. Like several of the successful East Asian countries Brazil adopted an import substitution strategy, but it was unable to eventually transform itself into a competitive exporter of manufactures. The slowdown in Brazil's growth coincided with the oil shock of 1973, which triggered a surge in debt and inflation, and a decline in investment. (Growth Commission, 2008; Adrogué et al., 2006<sup>22</sup>). The period since 1980 has been marked by lower productivity growth as well as lower per capita capital accumulation. However, during 2002-2008, Brazil was able to take advantage of the higher world growth, higher prices for its exports, and an appreciating currency. It did feel the impact of the Global Financial crisis of 2008 (GFC) but the impact was mitigated due to the larger foreign exchange reserves that the country had accumulated which prevented the currency from devaluing. (Cardoso and Teles, 2009)<sup>23</sup>

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<sup>22</sup> Adrogué, Ricardo, Martin Cerisola, and Gaston Gelos. (2006). "Brazil's Long-Term Growth Performance— Trying to Explain the Puzzle." IMF Working paper 282.

<sup>23</sup> Cardoso Eliana and Vladimir Teles. (2009). "A Brief History of Brazil's Growth." OECD. (<http://www.oecd.org/eco/growth/43823436.pdf>)

**Annex: Regressions of Development Indicators against per capita incomes**

|   | All Countries | Low income | Middle Income | High Income |
|---|---------------|------------|---------------|-------------|
| Life Expectancy   | 8.85*         | 14.65*     | 8.50*         | 6.54*       |
| Primary school enrollment                               | 12.57*        | 59.63*     | 7.01*         | 5.16**      |
| Secondary school enrollment                             | 46.21*        | 137.54*    | 49.57*        | 15.98*      |
| Ratio of girls to boys in primary and secondary schools | 6.69*         | 29.84*     | 4.22**        | 1.31        |
| Infant mortality rate                                   | -68.91*       | -72.03*    | -63.42*       | -89.19*     |
| Maternal Mortality Rate                                 | -93.26*       |            | -87.38*       | -41.37      |

\* Significant at 10% level; \*\* Significant at 5% level; \*\*\* Significant at 1 % level



**Annex: Regressions of growth against manufacturing**

reg lngdppcgrth lnmanu lngdpppp

| Source      | SS         | df  | MS         | Number of obs = | 107      |
|-------------|------------|-----|------------|-----------------|----------|
| -----+----- |            |     |            | F( 2, 104) =    | 15.28    |
| Model       | 23.5114149 | 2   | 11.7557074 | Prob > F        | = 0.0000 |
| Residual    | 79.9897509 | 104 | .76913222  | R-squared       | = 0.2272 |
| -----+----- |            |     |            | Adj R-squared = | 0.2123   |
| Total       | 103.501166 | 106 | .976426092 | Root MSE        | = .877   |

| lngdppcgrth | Coef.    | Std. Err. | t     | P> t  | [95% Conf. Interval] |          |
|-------------|----------|-----------|-------|-------|----------------------|----------|
| -----+----- |          |           |       |       |                      |          |
| lnmanu      | .1880576 | .1548394  | 1.21  | 0.227 | -.1189947            | .49511   |
| lngdpppp    | -.498811 | .0903448  | -5.52 | 0.000 | -.677968             | -.319654 |
| _cons       | 4.730475 | .8665244  | 5.46  | 0.000 | 3.012124             | 6.448825 |

. reg lngdppcgrth lnmanu lngdpppp if dcac==1

| Source      | SS         | df | MS         | Number of obs = | 65       |
|-------------|------------|----|------------|-----------------|----------|
| -----+----- |            |    |            | F( 2, 62) =     | 6.65     |
| Model       | 6.42598335 | 2  | 3.21299168 | Prob > F        | = 0.0024 |
| Residual    | 29.9508016 | 62 | .483077446 | R-squared       | = 0.1767 |
| -----+----- |            |    |            | Adj R-squared = | 0.1501   |
| Total       | 36.376785  | 64 | .568387266 | Root MSE        | = .69504 |

| lngdppcgrth | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |           |
|-------------|-----------|-----------|-------|-------|----------------------|-----------|
| -----+----- |           |           |       |       |                      |           |
| lnmanu      | .4436298  | .1543851  | 2.87  | 0.006 | .1350183             | .7522413  |
| lngdpppp    | -.3063063 | .1342864  | -2.28 | 0.026 | -.574741             | -.0378716 |
| _cons       | 2.440099  | 1.259883  | 1.94  | 0.057 | -.0783712            | 4.958569  |

. reg lngdppcgrth lnmanu lngdpppp if dcac==2

| Source      | SS         | df | MS         | Number of obs = | 28       |
|-------------|------------|----|------------|-----------------|----------|
| -----+----- |            |    |            | F( 2, 25) =     | 1.25     |
| Model       | 3.32636774 | 2  | 1.66318387 | Prob > F        | = 0.3030 |
| Residual    | 33.1829614 | 25 | 1.32731846 | R-squared       | = 0.0911 |
| -----+----- |            |    |            | Adj R-squared = | 0.0184   |
| Total       | 36.5093292 | 27 | 1.35219738 | Root MSE        | = 1.1521 |

| lngdppcgrth | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |          |
|-------------|-----------|-----------|-------|-------|----------------------|----------|
| -----+----- |           |           |       |       |                      |          |
| lnmanu      | .2063542  | .5293432  | 0.39  | 0.700 | -.8838486            | 1.296557 |
| lngdpppp    | -.7993973 | .5489972  | -1.46 | 0.158 | -1.930078            | .3312837 |



|          | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |          |
|----------|-----------|-----------|-------|-------|----------------------|----------|
| lnmanu   | .2165439  | .5530562  | 0.39  | 0.699 | -.924908             | 1.357996 |
| lngdpppp | -.8008297 | .5604802  | -1.43 | 0.166 | -1.957604            | .3559446 |
| lntot    | .0841249  | .9796873  | 0.09  | 0.932 | -1.93785             | 2.1061   |
| _cons    | 7.551138  | 6.233252  | 1.21  | 0.238 | -5.313661            | 20.41594 |

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OCP Policy Center

Ryad Business Center – South, 4th  
Floor – Mahaj Erryad - Rabat,  
Morocco

Website: [www.ocppc.ma](http://www.ocppc.ma)

Email : [contact@ocppc.ma](mailto:contact@ocppc.ma)

Phone : +212 5 37 27 08 60

Fax : +212 5 37 71 31 54

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