

Policy Brief

January 2016
PB-16/01

Managing natural resources: an attempt to clarify the debate

By Yves Jégourel

Summary

Managing natural resources is a matter of great importance, both politically, socially, environmentally and economically. The subject is, though, vast and varied and sufficiently legitimate to clarify the terms of the debate. Since we cannot obviously claim to present a complete and exhaustive picture, this policy brief sets out to identify some of the substantive issues tied to natural resources, from an economist's perspective.

Any subject that is of major importance from a policy-making perspective will involve an overlap in the approaches used. As far as managing natural resources is concerned, it is clear that economists, politicians, environmentalists, any direct and indirect stakeholders or observers each hold -at best- only part of the answer. It obviously entails that they should not only all be involved in reaching the widest possible consensus on what should be done but also, prior to this, in trying to share the same language or, at least, expound the criteria and the mechanisms that underpin their mind-set. Hopefully, this task is rather simple as far as the economical aspect is concerned. At least, that is the way it looks. "Management" is, in one way or another, about prices and quantities. As is often the case when it comes to economics.

Defining and classifying "natural resources"

In this respect, we firstly need to recognize that the notion of "natural resources" encompasses different realities, depending in particular on whether these resources are freely available and exploitable or, conversely, part of a whole agro/industrial process having, all along the supply chain, explicit market prices that prevail over any other

possible implicit prices, whether social, environmental or societal¹. As an example, clean water management is today of crucial importance for most economies and has very little to do with what can be done to make optimal use of mineral or fossil resources that are usually managed along pure economic criteria. By the same token, a clear distinction should secondly be made between non-renewable and renewable resources, bearing in mind that, for the latter, renewal can be jeopardized when removal is excessive. According to the economic theory of natural resources, the former should indeed be considered as stock variables, whereas renewable resources can reasonably be considered as flow variables.

« "Management" is, in one way or another, about prices and quantities. As is often the case when it comes to economics. »

Trying to refine the concept leads thirdly to ponder whether the considered natural resource is extensively traded on an international basis and its price determined on a commodity financial exchange, as are most commodities, from agricultural products (grain and oleaginous, soft

(1) Meaning that the positive and/or negative externalities tied to the production or the use of a given natural resource are somehow taken into account.

commodities, dairy, livestock, etc.) to base and precious metals (copper, aluminium, tin, gold, etc.) or energy. This price-setting criteria has obviously an overriding importance since it will determine the capacity of the sector's players and policy makers to influence prices. Finally, local market dynamics should be distinguished from seaborne markets. Although the integration of commodity markets has unquestionably increased steadily over the last two centuries, driven by technology in the nineteenth century and politics in the late twentieth century (Findlay and O'Rourke, 2001), it has been neither a monotonic nor a monolithic trend. Stabilization programmes aimed at insulating domestic market conditions from international food prices through stock building, subsidized inputs or limits on selling prices have for example been an overriding element of strategy during the last two decades for developing countries, where food security is at the very core of social calm. Nonetheless, the effectiveness of such measures remains a moot point. The existence of various export restrictions, in which we saw a gain in interest when commodity prices went through the roof prior to 2014, are for example acknowledged to have numerous impacts, some of which are adverse. Martin and Anderson (2012) suggest for instance that export restrictions on agricultural commodities adopted by producing countries² to insulate local markets from sky-high international prices³ have not only proven to be ineffective in reaching their objective, but also contributed to greater worldwide price instability.

Table 1: Examples of export restrictions

| | |
|---------------------------------|--|
| Export tax | Dual pricing scheme |
| Export surtax | VAT tax reduction/ withdrawal |
| Fiscal tax | Restriction on customs clearance point for exports |
| Export quota | Qualified exporters list |
| Export prohibition | Domestic market obligation |
| Export licensing requirement | Captive mining |

Source: OECD

(2) Such as Vietnam on rice

Managing production, storage and investment

Once these notional and classification criteria are clarified, it becomes necessary, as straightforward as it may sound, to specify whether the quantities under consideration are designed to be produced, consumed, stored and, since most natural resources are traded internationally, imported and/or exported. At a country level, oil management in Nigeria –which has to export - has indeed nothing in common with what could be done for an importing economy such as Morocco, even for countries from the same side of the market where the “one size fits all” concept does not hold. As brought to the fore by the recent developments in crude oil markets, the Venezuelan view to prevent prices from dropping further could not, for example, be shared by Saudi Arabia, because –to keep it simple- they do not have the same endowment in crude oil and consequently do not share the same timeframe in which to maximize their revenues. It is also crucial to point out that these forms of reliance on natural resources are not mutually exclusive, meaning that some countries – China being one of the best examples – are at the same time huge producers and prominent end-users, and that any disequilibrium in domestic supply and demand would affect exports or imports with presumably significant rippling effects for other players on the market. Managing natural resources implies having to take these endogenous dynamics on board. Now the economics of the situation might suddenly not look quite as easy as they did at the beginning.

« The production and export of unprocessed minerals or agricultural products are indeed often not sufficient per se to capture a sufficient level of added value to spark economic and social development. »

If we focus on the production side, it is well known that natural resources are usually characterized by low price elasticity of supply, economic jargon meaning that production cannot in the short run fully adjust to any variation in demand. Optimally, as stated by Pindyck (2001), any temporary shock will end up in inventory adjustments and, to some extent, in variations in production capacity utilization rates, whereas permanent shocks should entail only long term variation in

(3) Especially during the 2006-2008 food crisis.

production capacities. At this point, it has to be said that introducing more variables into the system makes the global equation increasingly complex because production now implies having invested upfront, sometimes several years earlier, be it for energy, minerals or even agricultural products such as cocoa. Economists have over time developed a suite of decision-making tools, from net present value (NPV) simple arithmetic to so-called “real option” complex calculations ((Brennan and Schwartz, 1985), but it always end up with forming expectations that will turn out to be either right or wrong. In this respect, these instruments are not only imperfect, they are also useless when investment is somehow financially constrained. Having said that, the perennial “what, when, how and by who” questions remain to be addressed: The “what” refers to the fact that a commodity should not be considered per se but within a global industry perspective. “What commodity should be produced?” is the question. This is, once again, not as simple as it may seem (Jégourel, 2015). To illustrate this assertion, it is no secret that one of the most strategic issues for Guinea’s economy is not really about how many tonnes of bauxite should be produced, but rather to what extent this bauxite could be locally refined into alumina, which will in turn be exported. This is obviously not an isolated example as the same goes for Gabonese manganese, Ivorian cocoa beans or Moroccan phosphate. The production and export of unprocessed minerals or agricultural products are indeed often not sufficient per se to capture a sufficient level of added value to spark economic and social development. Downstream integration is therefore the key but this much more dependent upon technological, logistical and financial criteria than it is on political goodwill. This ties in with the “by who” question. To what extent should production be carried out by State-owned enterprises (SoE), multinational firms or even joint ventures with international partners so as to foster the transfer of technology? From this perspective, some academic articles have brought to the fore the fact that public policies towards foreign investors can be highly dependent on the global economic context surrounding commodity markets. As far as oil is concerned, it has specifically been highlighted that the extent to which the so called “majors” (or international oil companies, IOC) can reach oil fields (reflected by the contracts and fiscal conditions imposed by hosting countries) may be inversely correlated to the price of oil. Depressed prices can indeed put a strain on local NOC ability to invest and

incite governments willing to overcome tightly squeezed public spending budgets to grant IOC more favourable investment conditions (Fattouh & Darbouche, 2010). Finally, we have to bear in mind that it is not production that is ultimately at stake, rather the selling process on international markets. This may require developing own trading units, whose purpose would be not only to optimize commodity flows but also to manage the financial risks that arise along the supply chain, namely forex and commodity price risks. The financing of land and maritime transport infrastructures and vessels to convey minerals, oil or gas to ports of departure, to load cargo ships or tankers via sometimes complex processes such as gas liquefaction, and then to unload them at the ports of landing, is also essential.

« Finally, we have to bear in mind that it is not production that is ultimately at stake, rather the selling process on international markets. »

Managing prices and/or quantities in a “game theory” framework

Obviously, price and quantity must be regarded as two different sides of the same coin. In this perspective, very simple rational microeconomic behaviour would lead either to determining the optimal level of production (consumption), maximizing a producer’s (consumer’s) inter-temporal profit (utility) subject to own technological (budget) constraints. Or, conversely and as far as producers are concerned, to managing the quantities available on the market in order to maximize the inter-temporal price of the commodity that is being produced. A firm’s behaviour would naturally depend on how competitive the market structure appears to be, but in very general terms and assuming that no one player can wield real pricing power in the long term⁴, it is simple to consider that the producer will try to maximize output when prices are high, whereas the end-user will be prompted to buy, be it for immediate consumption or storage purposes, when prices are low. In the short run and within an imperfect competitive framework, things do not always go this way. If a given commodity market functions within an oligopoly market structure, which is often the case⁵, the interdependence between

(4) Although some commodity markets could be defined as oligopolies (including the bilateral and collusive sort), we may reasonably assume that no producer (or group of producers) can have a lasting influence on prices, not even the Organization of Petroleum Exporting Countries – OPEC- which is still one of the few, if not the only, cartels existing in the commodity world.

(5) The primary aluminium market is one of the finest illustrations.

firms should indeed be considered. According to the game theory, there are many ways to characterize how each “oligopolist” plays and reacts, from the renowned Cournot, Stackelberg or Bertrand competition models to more recent approaches, such as Klemperer and Meyer (1989). In this respect, falling prices may lead producers with the lowest marginal production cost to maintain or to ramp up their production in order to protect (increase) their market share, to the detriment of competitors. Once again, recent developments in the crude oil markets are a key illustration. However, as strange as it may seem, high prices may not be such good news for producers in the long term. They may indeed favour the entry of new players into the market, operators who regard the promise of a better future as a clear incentive to overcome strong entry barriers. In this respect, an oligopoly where tacit collusion prevails should theoretically manage supply in order to prevent this from happening. In the history of economics, though, no cartel (not even OPEC, whose role as a cartel remains debated) has managed to do this for any length of time.

« However, as strange as it may seem, high prices may not be such good news for producers in the long term. »

Mitigating macroeconomic instability and reducing negative externalities

Commodity markets are characterized by a high level of short-run price uncertainty combined with boom and bust cycles. This consequently begs several questions, from the choice of optimal hedging strategy using financial derivatives to the adoption of precautionary measures to mitigate the impact of structural instability on a given economy. Each has been the subject of copious research and academic articles trying to identify appropriate solutions to tackle these problems. Concerning macroeconomic instability, Frankel has suggested for example linking the interest paid by a commodity exporting country to the prices of the said commodity (Frankel, 2014). Sovereign wealth funds, the first of which was created by Kuwait in 1953, were also established to act as a stabilization tool, but also to allow trans-generational allocation of the non-renewable resources bonanza, another key aspect of managing natural resources. Additionally, it must be said that this task requires that the policy maker manage both the positive and the negative externalities implied by the production and consumption of natural

resources. According to the economic concepts of “Dutch disease” and the wider “natural resources curse” (Frankel, 2010), it is no secret that producing and exporting raw materials may severely harm an economy, but, beyond economics, many externalities and adverse environmental, social and societal effects should also be cited, whether deforestation, land grabbing, pollution, corruption when local institutions are weak, or even civil war. These are all examples which demonstrate, if any such demonstration were needed, that managing natural resources is a key topic to ensure world stability. Over the last decade, much seems to have been done, from the extractive industries transparency initiative (EITI) to the recent COP21, but there is still a long way to go. Economists can usefully contribute to the debate, but the approach should obviously remain global and be a shared worldwide concern.

References

- Arezki R., Mazarei A., Prasad A. (2015), "Sovereign Wealth Funds in the New Era of Oil", IMFdirect, 26 october, available at <http://blog-imfdirect.imf.org/2015/10/26/sovereign-wealth-funds-in-the-new-era-of-oil/>
- Brennan J., Schwartz E. (1985), "Evaluating Natural Resource Investments", *The Journal of Business*, 58(2), pp. 135-157.
- Fattouh B., Darbouche H. (2010), "North African oil and foreign investment in changing market conditions", *Energy Policy*, 38(2), pp. 1119-1129.
- Findlay R., O'Rourke K. (2001), "Commodity Market Integration, 1500-2000", NBER Working Paper n° 8579.
- Frankel J. (2010), "The natural resource curse: a survey", NBER Working Paper, n°15836.
- Frankel J. (2014), "How to Cope with Volatile Commodity Export Prices: Four Proposals", Keynote Address, Commodity Prices and Macroeconomic Policy, Conference of the Central Bank of Chile, Santiago, Oct. 23, 2014.
- Jégourel Y. (2015), "Commodities and Downstream Integration Policies: the Challenges of a Complex Strategy", OCP Policy Paper, n°15/15.
- Klemperer P., Meyer M. (1989), "Supply Function Equilibria in Oligopoly under Uncertainty", *Econometrica*, 57(6), pp. 1243-1277.
- Martin W., Anderson K. (2012), "Export Restrictions and Price Insulation During Commodity Price Booms", *American Journal of Agricultural Economics*, 94(2), pp. 422-27
- Pindyck R. (2001), "The Dynamics of Commodity Spot and Futures Markets: A Primer", *The Energy Journal*, 22(3), pp. 1-29.
- Sugawara N. (2014), "From volatility to stability in expenditure: stabilization funds in resource-rich countries", IMF Working Paper, , n°14/43.
- Van Den Bremer T., Van Der Ploeg F. (2013), "Managing and Harnessing Volatile Oil Windfalls", *IMF Economic Review*, 61(1), pp. 130-167.

About the author, Yves Jégourel

Dr Yves Jégourel is associate professor in finance at the University of Bordeaux (France), and affiliate professor at Toulouse Business School. Y. Jégourel conducts research in commodity economics and financial risk management. His most recent research examines the link between the volatility of the futures market, exchange rate uncertainty and the export of cereals. He is also the head of a master program focused on banking, finance and international trading both at the University of Bordeaux and at Vietnam National University (Hanoi, Vietnam).

Dr. Jégourel has authored several books in the field of finance, including a work studying financial derivatives. He holds a BA from Middlesex University and a MsC and a PhD from the University of Bordeaux, and is a former auditor with the Institute of Higher National Defence Studies (IHEDN).

About the OCP Policy Center

OCP Policy Center is a Moroccan policy-oriented Think Tank whose mission is to contribute to knowledge sharing and to enrich reflection on key economic and international relations issues, considered as essential to the economic and social development of Morocco, and more broadly to the African continent. For this purpose, the Think Tank relies on independent research, a network of partners and leading research associates, in the spirit of an open exchange and debate platform.

The views expressed in this publication are the views of the author.



OCP Policy Center

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

Email : contact@ocppc.ma / Phone : +212 5 37 27 08 60 / Fax : +212 5 37 71 31 54

Website: www.ocppc.ma