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MOZAMBIQUE'S NATURAL RESOURCE BOOM

What is Dutch Disease, How Has It Affected Other Economies, and How Can It be Managed?

DRAFT BACKGROUND NOTE

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Contents

Acronyms	iv
1. Introduction	1
2. Natural Resource Boom & Dutch Disease: What It Is and How It Works	3
3. Natural Resource Boom Experiences Elsewhere	7
Indonesia (1974-1979)	9
Nigeria (1974-1979)	13
Angola (2002-2008)	18
Chile (2007-2010)	23
4. Policy Options to Consider	30
5. Conclusion: Establishing a Natural Resource Boom Dashboard	35

Illustrations

Figures

Figure 1: Real Global Grain Prices, 1970-Present	9
Figure 2: Real 2010 Global Crude Oil Prices	13
Figure 3: Nigeria's GDP and GDP Per Capita Indices	14
Figure 4: Real Effective Exchange Rate Appreciation in Angola	19
Figure 5: Angolan Manufacturing as Share of GDP	20
Figure 6: Real World Copper Prices	23
Figure 7: Nominal and Real Exchange Rates, Chilean Peso, 1990-2006	24
Figure 8: Real Effective Exchange Rate, Chilean Peso, 1996-2012	25

Tables

Table 1: Comparative Economic Indicators for Sample Countries	8
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Acronyms

BCG	Bevan, Collier, and Gunning
EIA	U.S. Energy Information Administration
EIU	Economist Intelligence Unit
GDP	Gross Domestic Product
ILO	International Labor Organization
OPEC	Organization of Petroleum Exporting Countries
REER	Real effective exchange rate
RER	Real exchange rate
SPEED	Support Program for Economic and Enterprise Development
USAID	United States Agency for International Development

DRAFT

1. Introduction

Natural resource booms can sometimes lead to undesirable macroeconomic and sectoral economic impacts, stemming from a chain of events commonly referred to as “Dutch disease.”

The term “Dutch disease” originated in a 1977 article that appeared in the British news magazine, *The Economist*. The article discussed a natural gas boom that took place in the Netherlands and its macroeconomic impact on the country's manufacturing sector. Natural gas was first discovered in the Netherlands in 1959; exports of gas and export values grew in the 1960s and especially 1970s, when global petroleum prices rose significantly. As natural gas revenues grew, the value of the country's currency, the guilder, strengthened by 16.4 percent in six years. On the other hand, domestic industrial production stagnated, the share of employment in manufacturing fell 16 percent in seven years, and unemployment rose. As defined by *The Economist*, “this contrast – between external health and internal ailments – is the symptom of ‘the Dutch disease.’”

The effects of natural resource booms differ from country to country, depending on many variables, including: the source and magnitude of the boom, the country's overall political economy and the balance of power between importers and exporters, and between rural and urban interests; capacities of government institutions to manage the economy; decisions made on government saving, spending, and investing the natural resource revenue windfall; and the behavior of global markets for the booming natural resources and for traditional export commodities.

The purpose of this note is to lay out in layperson's language a conceptual framework for this chain of events, compare and contrast a sample of countries' experiences with its economic effects, identify the tools used by countries to manage these effects, and suggest a simple set of indicators that Mozambique could track in order to monitor natural resource boom effects in the years to come.

Original Dutch Disease Reference

Economist, The. 1977. “The Dutch disease.” *The Economist* (26 November): 82-83.

2. Natural Resource Boom & Dutch Disease: What It Is and How It Works

The phenomenon of Dutch disease occurs whenever an outside shock to the economy sharply raises foreign exchange revenues into the economy. While it is commonly associated with natural resource booms, the economics literature has documented Dutch disease resulting from large increases in foreign aid or sharp rises in prices of an existing export commodity. The occurrence of such an exogenous shock sets in motion a linked set of economic phenomena:

- **Foreign exchange earnings rise.** Those foreign exchange revenues may be converted, wholly or in part, into local currency. Under a regime of floating exchange rates, the nominal value of the currency appreciates. Or, if an economy operates a fixed exchange rate regime, foreign exchange revenue inflows leads to a rise in the money supply and therefore inflation (Ebrahim-zadeh 2003; Frankel 2010, p 19).

Mozambique's exchange rate regime is characterized "de jure and de facto" as a floating exchange rate arrangement (IMF 2013, 100). Thus, for example, the value of the metical, expressed in dollars or rands or euros received for one metical, would rise, as detailed in the box below.

In 2014 the metical trades at roughly 30 meticais to one U.S. dollar, in other words, one metical is worth \$US 0.0333. If the value of the metical strengthens, one metical will buy more foreign currency. For example, if the metical's value rose by 50 percent, one metical would buy \$US 0.05 (0.0333×1.50), requiring only 20 meticais to buy one U.S. dollar.

- An appreciation of the nominal currency value, or increased domestic money supply and inflation leads to **appreciation of the real exchange rate** (RER). The real exchange rate is effectively the value of the currency, adjusted for different inflation rates in different currencies, and is estimated by adjusting the nominal exchange rate by the ratio of foreign to domestic price levels (or inflation rates). If Mozambique's inflation rate exceeds that of the United States, the bilateral RER is said to appreciate, or become overvalued. Because countries typically trade with more than one partner, using more than one currency, economists prefer to consider the *real effective exchange rate* (REER), which is an average of bilateral RERs weighted by how much trade the country does in each of these currencies.
- With the rise in natural resource exports, **some domestic incomes rise.** *Private* incomes rise as firms or workers benefiting from the boom sell or earn more through increased local spending, higher wages, etc. *Governments*, too, gain an increase in public revenues, usually through some form of taxation of exports (e.g., capital gains tax, export tax, income tax,...). This rise in public revenues may be offset in a developing country, wholly or partially, by a decline in official development assistance from foreign donors.
- Increased private and public revenues lead to **increased savings or spending**, or both. When increased revenue is spent (the so-called "spending effect"), it can be spent on

imports or domestic goods. Often, countries are eager for those revenues to be spent in the domestic market to stimulate linkages of domestic suppliers of building materials, transport and logistics, hospitality and foods, and labor to the mining sector. However, such increased demand may push up domestic prices. Since prices of tradable goods (i.e., goods exchanged in international trade) are determined in world markets, the only prices affected by increased domestic spending are those of “non-tradables,” whose prices are set in the domestic market (such as labor, land, real estate, construction services, transport & logistics services,...).

- As the nominal currency value increases or as the RER appreciates, **relative domestic prices shift**. The relative prices of tradables (importable or exportable goods) fall, in meticaïs terms, and those of non-tradables rise.
- The rise in relative prices of non-tradables to tradables makes it cheaper to import than produce the same goods domestically. Also, the foreign prices of exports rise, making it more expensive abroad to buy exports, thus reducing demand for exports. This shift in relative price levels thus brings a **loss of economic competitiveness** in traditional tradables sectors, concurrent with the boom in the natural resources and non-tradables (especially services) sectors.

For example, if the world price of cotton lint is \$US2.00 per kilogram arrived in Asia, at the current exchange rate of 30 meticaïs per dollar, a Mozambican exporter would receive 60 meticaïs per kilogram sent to that market. However, if the meticaïs *strengthens*, as in the example above, to 20 MT/\$, that same ton of lint in Asia would only return 40 meticaïs. Thus the incentive to export, from a domestic currency cost point of view, will fall.

Conversely, if a ton of Thai rice costs \$US500 per ton in Bangkok, it will cost 15,000 meticaïs (plus the costs of freight, insurance, and Mozambican port charges and import duties) to import that ton of rice, at the 30 MT/\$ exchange rate. Were the meticaïs to *strengthen* to 20 MT/\$, that same tone of rice would cost 10,000 meticaïs instead. Thus the incentive to import, from a domestic currency cost point of view, will rise.

- As relative prices shift away from tradables and toward non-tradables, **domestic resources (labor, capital) may be re-allocated** away from traditional tradables sectors, such as agriculture, tourism, and manufacturing, and into the boom activities and the non-tradables activities associated with the natural resource boom, such as construction, hospitality, and other services (the so-called “re-allocation effect”). The extent to which this occurs depends on the structure of the labor and capital markets, but if severe, this domestic resource reallocation can lead to de-industrialization or a decline in agriculture.

Economists continue to debate whether Dutch disease is really a “disease” or not. If the natural resource boom reflects the “new normal” for the foreseeable future, that is, the natural resource reserves are expected to be exploited over the long term, then this rise in real exchange rates is not an issue and the shifts in exchange rates, relative prices, and re-allocated resources represent

new equilibria for the economy.¹ For a country that has enormous oil supplies likely to last many generations, it may be perfectly reasonable to structure the economy around oil. But for countries where the reserves are not so large or are unknown, this would be a risky strategy. If, for example, exploitation of the natural resource is likely to be exhausted within a more limited timeframe – say, one generation, or twenty years – then the costs of these economic impacts are a heavy burden on the domestic economy.

A couple of additional caveats are in order. First, the reallocation away from exports may incur other costs to the economy. For example, many economists believe that manufacturing yields positive externalities for an economy, such as learning by exporting, productivity enhancements, job creation, etc. Second, the distributional effects of Dutch disease are not insignificant. Winners are likely to be those with the skills and mobility demanded of the booming natural resource and non-tradables sectors, while losers are those whose incentives to produce decline, i.e., low-skill workers in agriculture, tourism, and manufacturing. Winners could also be urban consumers whose consumption baskets include a higher share of imported goods, or low value-added manufacturers who import a significant amount of semi-finished raw materials and inputs. Winners may also be differentiated by gender, depending on the affected sectors and the gender composition of their labor forces, or depending on the distribution of skills or other labor market attributes between men and women and the likely shifts in demand for labor created by the booming economy (Jalbert and Collier 2014).

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¹ Magud and Sosa (2010) examine comparative experiences and find no negative impact of Dutch disease (real effective exchange rate appreciation) on total economic growth.

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3. Natural Resource Boom

Experiences Elsewhere

SPEED and CTA are exploring the potential impacts of Mozambique's natural resource boom on the Mozambican economy. Impacts are anticipated on the nominal value of the metical, relative prices of non-tradables to tradables (i.e., the real exchange rate), incentives to work and produce in booming vs non-booming sectors, and possible implications for de-industrialization, tourism, and agriculture.

To simulate the possible impact of the natural resource boom in Mozambique in the agriculture value chain economic profitability analyses, a 50 percent appreciation of the metical/dollar rate of exchange, from 30 MT/\$ to 20 MT/\$, is used as a "worst-case scenario." In the manufacturing study, which was based on qualitative assessments of cost drivers, rather than quantitative profitability analysis per se, SPEED researchers asked firms to speculate how they would react if the ER strengthened from 30 to 25 or even 20. **The tourism sector study ... UPDATE WHEN TOURISM STUDY AVAILABLE**

No one is suggesting that such a rise in the value of the metical will happen. However, the risks are real:

- In Nigeria, as a result of the world oil market boom in the early and late 1970s, the real exchange rate appreciated by nearly 120 percent over the period 1970-81 (Bevan, Collier, Gunning 1999, 52).
- Soaring world coffee prices in the mid 1970s led to real appreciation of nearly 40 percent in Colombia (Ebrahim-zadeh 2003).
- The oil boom of the 2000s increased revenues in the net oil-exporting CFA zone countries, which in turn led to appreciation of 30 percent (Treviño 2011).
- Biggs (2011) found 30 percent real appreciation of the metical relative to the U.S. dollar over the period 2000-2011, as Mozambique's inflation rates exceeded those in the United States in that time period.

In order to be able to compare experiences of countries that have been through this experience, we sought examples in the literature to compare and contrast according to impacts experienced on several key Dutch disease indicators:

- Nominal and real effective exchange rates;
- Inflation rates;
- Government spending (ideally, one would want to track overall changes in spending, as well as changes in spending on infrastructure, education, and health);
- Wages (by skill level, if possible) and employment, in aggregate and by broad sectors, absolute numbers and shares by sector;

- Production, exports, and imports by traditional tradables (non-extractives industry exports in agriculture and industry).
- Government policies used to mitigate the natural resource boom effects.

Sufficient information was found to provide overviews of experiences with, and management of, natural resource booms in four countries: Indonesia, Nigeria, Angola, and Chile. These four exemplify a range of macroeconomic, sectoral, and management experiences. Though Angola, Indonesia, and Nigeria have each produced and exported petroleum for decades, the petroleum booms hit at different times, i.e., in the 1970s for Indonesia and Nigeria and in the 2000s in Angola. Chile has mined and exported copper for decades; today it must cope with volatility in global copper prices and thus revenues derived from the copper sector.

As seen in the table below, relative to these four, Mozambique is the poorest and least diversified economy, with the highest shares of agriculture in gross domestic product (GDP) and total employment and the second lowest share of exports to GDP. Nevertheless these stories present interesting examples of both countries that have managed their natural resource booms well (Chile, Indonesia) and countries whose economies have struggled in the wake of natural resource booms (Angola, Nigeria).

Table 1: Comparative Economic Indicators for Sample Countries

Country (Boom Period)	GNI per capita, 2012	Poverty Headcount, vs National Poverty Line	Agriculture as % GDP, 2012	Agriculture as % Total Employment	Total Exports as % GDP, 2012
Indonesia (1974-1979)	3,420	12.0 (2012)	14.5	35.1 (2012)	24.3
Nigeria (1974-1979)	2,460	46.0 (2010)	22.1	44.6 (2004)	31.4
Angola (2002-2008)	4,510	36.6 (2008)	9.9	<i>N/a</i>	59.5
Chile (2007-2010)	14,290	14.4 (2011)	3.4	10.3 (2011)	34.2
Mozambique	510	54.7 (2009)	30.3	80.5 (2003)	29.5

Source: World Development Indicators, accessed October 15, 2014

The first two examples presented, Indonesia and Nigeria, were compared and contrasted in a study by Bevan, Collier, and Gunning (hereafter, BCG) (1999) for the World Bank, which provides much of the information for the first two sections.

Their stories are quite similar and yet quite distinct. Both increased oil production in the 1960s, prior to the first global oil boom, and both exported crude oil at significantly higher unit prices in the 1970s and 80s. Yet their priorities for use of the windfall, and the political economy backdrop against which those priorities were shaped, were quite different. By the late 1980s, Indonesia's living standards had risen to triple those of Nigeria's, which fell absolutely, while poverty rates fell in Indonesia and rose in Nigeria (BCG 1999, 377). Although Nigeria's public expenditure increases provided significant new resources for universal primary education, Indonesia's emphasis on key consumer subsidies (rice, kerosene) and efforts to improve the productivity of a key good produced by poor Indonesian farmers led to the more favorable equity outcome. Moreover, Indonesia intervened directly in foreign exchange markets, devaluing when necessary

to counter strong real appreciation, thereby minimizing the effect of the boom on the non-food tradables sector, whereas Nigeria tolerated massive appreciation of its currency.

BCG suggest that Indonesia's policymaking was guided by a military that understood its mandate to be broad, including poverty alleviation, whereas Nigeria's policymaking was guided by a military with a much more narrowly defined agenda that did not include poverty alleviation (BCG 1999, 419). This also eventually led to two different positions regarding confidence in markets. Whereas Indonesia embraced non-oil exports, with a large constituency tied to them, Nigeria was much more preoccupied with import-substitution and self-sufficiency.

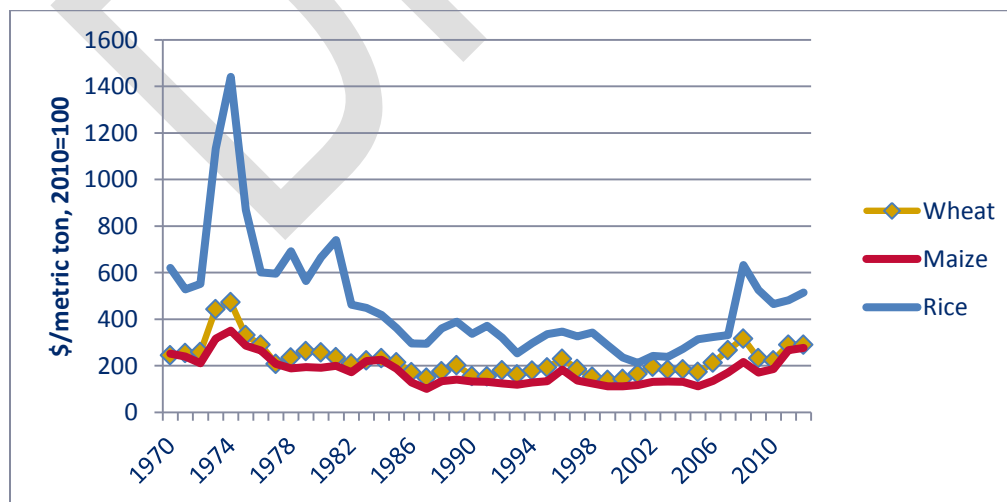
More detailed summaries of each country's experience are presented below.

INDONESIA (1974-1979)

Oil was first discovered in northern Sumatra in the late 1800s. During Indonesia's peak of production, 1962 to 2009, oil was exported and Indonesia belonged to the Organization of Petroleum Exporting Countries (OPEC). It resigned from OPEC as production declined and domestic demand began to exceed exportable supplies (EIA 2014).

The first oil boom facing Indonesia occurred in the mid 1970s, 1973-79. Not only did world prices rise significantly (Indonesia doubled its petroleum export price in early 1974, following similar increases announced by Arab OPEC members in 1973), but Indonesia's volumes of exports were also growing substantially as new production came online. In 1975 petroleum represented nearly 75 percent of total exports (Usui 1997). Oil-related revenues are estimated to have risen from \$620 million in 1973 to \$7.1 billion in 1979 (BCG 1999, 244). Moreover, as seen above in the more recent case of Chile's copper price boom in the 2000s, other non-oil commodity prices were also affected by the 1970s commodity boom, and Indonesia's export volumes of timber and coffee were also on the rise. A second oil price boom from 1979 into the 1980s again benefitted Indonesia.

Figure 1: Real Global Grain Prices, 1970-Present



Note: Nominal prices corrected by the World Bank MUV Index, 2010=100

Source: World Bank Commodity Price "Pink Sheet," accessed October 2014

Export commodities were not the only ones whose world prices were rising. At the same time, Indonesia's rice market experienced substantial upheaval. After four years of domestic price stability, a poor harvest, weak stock management by Indonesia's national food logistics agency known as BULOG, and world food grain market disruption (the world price of rice soared, nearly tripling in real terms from 1971 to 1974; see Figure 1) led to significant domestic rice price increases.

Just as the world oil boom was unfolding, mismanagement by Indonesia's state oil company, Pertamina, brought about a severe fiscal crisis (BCG 1999, 251-253). The diversified conglomerate launched an ambitious program to build an integrated steel complex, including power plant, natural gas pipelines, and railway. To service short-term bonds it sold to finance the program, Pertamina re-routed a substantial sum of taxes it had collected from foreign companies on behalf of the Indonesian government, wiping out the government's expected budget surplus for 1974/75. The crisis led to significant restructuring of personnel, governance, tax collection (thereafter, directly by government, rather than indirectly by Pertamina), and existing contracts. BCG credit this crisis with a) halting Indonesia's support for semi-autonomous state enterprises, and b) creating a mood of fiscal austerity among government leaders at a time when they might otherwise have been tempted to spend down the oil windfall revenues more rapidly. It also provided an opening for a cadre of Indonesian technocrats, trained in economics in the United States in the 1960s, to influence policymaking.

Indonesia and Dutch Disease

What impact did rising oil export revenues have on Indonesia's nominal and real exchange rates, domestic price levels, and government spending? What impacts were noted in terms of export agriculture and industry?

Indonesia maintained a fixed exchange rate regime, tied to the U.S. dollar, from August 1971 to November 1978, i.e., during the first oil boom. The rate was said to be fixed at a level that "made competing imports more attractive (BCG 1999, 254). The price of tradables fell relative to non-tradables, although percentage changes are not indicated. However, government spending did not rise significantly, growing from 9.1 to 10.7 percent, 1972 to 1978. Public investment, while it did not rise substantially overall, was targeted to tradables sectors. Irrigated agriculture received support. Agriculture grew less rapidly than before, but it did continue to expand, while manufacturing expanded under the influence of public investments in state-supported industries, such as fertilizer and cement.

Though Indonesia's foreign exchange reserves were still substantial, policymakers believed by late 1978 that the commodity boom was easing. Policy advisors, aware of inflation rates in Indonesia that were higher than rates abroad, had urged devaluation (Arndt 1978). Moreover, although agricultural exports continued to grow (3.6 percent per year, 1972 to 1977), its growth was slowing and analysts believed that agricultural competitiveness was negatively affected by

the exchange rate regime. An unexpected, sharp devaluation² and delinking of the rupiah from the U.S. dollar took place in November 1978. According to BCG, the motivation was “to make the economy more export oriented and to increase employment through the stimulus given to the production of tradables” (BCG 1999, 256). By 1981, however, “the real exchange rate improvement that devaluation afforded had been eroded” (BCG 1999, 267).

Devaluation also raised inflationary expectations, fought with the introduction of domestic price controls, which led industrial producers to cut back on production (Warr 1980). Such caution regarding inflation led to more conservative spending responses during the second oil boom, and foreign exchange reserves grew. Nevertheless, real government expenditures grew by 25 percent yearly after 1979. The 1980/81 budget, for example, increased civil servants' wages by 50 percent (BCG 1999, 262). Commodity subsidies (primarily on fuel oil, rice, and fertilizer) rose five-fold 1978/79 to 1981/82 in order to maintain domestic price stability in the face of once-again rising world prices. “The fuel subsidy alone was equivalent to 40 percent of the oil windfall” (BCG 1999, 263).

Nevertheless, in their assessment of the impact of the oil booms on the Indonesian economy, BCG concluded, “There is no prima facie evidence of Dutch disease” (BCG 1999, 304). They point to continued growth of agriculture and manufacturing throughout the oil booms. They also note that growth of services (i.e., non-tradables) did not exceed growth of traditional tradables sectors of the economy.

Agriculture

As the primary staple grain in Indonesia, any disruption to domestic rice markets in Indonesia threatens political stability as well. To bring order back to the rice market the government launched multiple initiatives: expanded distribution of improved inputs for rice production, successful and broad-based dissemination of a new high-yielding and fertilizer-responsive rice variety, increase in rice support prices to farmers, investing in improved rice extension programs, establishment of village cooperatives to buy rice, import of large quantities of rice to bring down the domestic price, and subsidization of rice consumption. The fact that Indonesian policymakers kept domestic consumer prices reasonably stable during this period was a credit to their management, however, that stability came at a high cost to the public budget: “Subsidies on imported food and fertilizer ... were to be a major use of the [oil] windfall income” (BCG 1999, 246).

Encouraged by a hefty subsidy in the fertilizer price, equivalent to 80 percent of the cost of imported fertilizer, the rate of annual growth in fertilizer application to food production more than doubled from 11.6 percent 1969-76 to 24.4 percent 1977-81 (BCG 1999, 263). In a short period (1979 to 1981) the size of the rice harvest grew 22 percent.

² The rupiah went from \$1=Rp 415 to \$1=625, a 33 percent drop in value.

Manufacturing

Indonesia sought to increase manufacturing production during the boom years as well. A 32 percent nominal increase in the government budget (14 percent in real terms) in 1981/82 provided resources for increased spending not only on wages and food/agriculture, but also in promotion of industrial policies that favored the provision of subsidized capital and energy and trade protection to support public enterprises.

Government Policies to Manage Dutch Disease

Two sets of policies pursued by Indonesia during the 1970s and 80s are given credit for Indonesia's success in managing potential Dutch disease pressures of recurring oil booms. Through its move from fixed to managed floating exchange rates after 1978 and its active pursuit of rice self-sufficiency, Indonesia managed to avoid the worst effects of real exchange rate appreciation on its agricultural sector. In fact, widespread promotion of rice productivity helped to ensure a pro-poor, pro-rural sector approach that promoted structural transformation and economic growth in Indonesia.

In addition, the 1970s Pertamina crisis inserted a strong measure of fiscal conservatism into policy making just as the potential temptations of the first oil boom's windfall became apparent. Reserves were allowed to grow, and government spending was increased slowly. Repayment of Pertamina's debt also provided a counter-inflationary spending use of oil revenues (BCG 1999, 389). Moreover, public spending focused on improving the productivity of traditional tradable sectors, which otherwise may have been harmed by RER appreciation.

Success was aided substantially by several exogenous factors. One, the rise in influence of Indonesian technocrats trained in the West brought economic analytic capabilities to decision makers. Successfully implementing the kinds of policies pursued depended to a large extent on the technical competence and capacity of the government. Two, along with oil Indonesia's well-established export agriculture was able to benefit from the commodity price booms of the 1970s and 80s, which counterbalanced negative RER impacts. Three, skyrocketing world rice prices also afforded a degree of protection to domestic rice producers and, again, counterbalanced real exchange rate appreciation.

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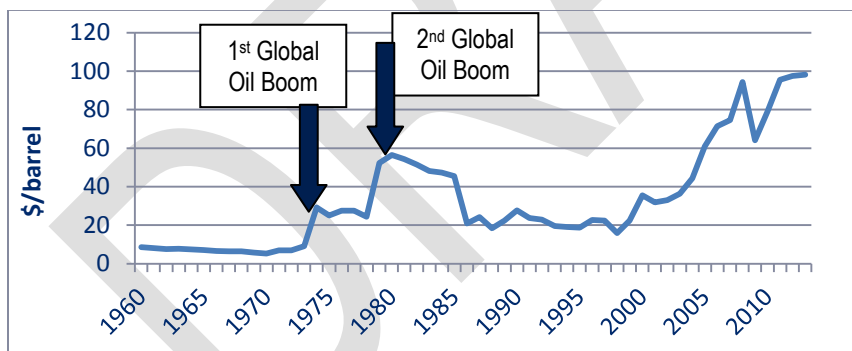
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NIGERIA (1974-1979)

Nigeria is Africa's largest oil producer (African countries supply 10-12 percent of the world's oil), and also a significant exporter of liquefied natural gas (EIA 2013). Oil exports from Nigeria began in 1958, prior to independence, and rapidly became an important source of foreign exchange and government revenue. Economic growth in Nigeria was strong in the early 1960s, about 5 percent per year, especially in oil, public utilities, manufacturing, and social sectors. However, by the late 1960s growth of the agricultural sector – Nigeria was an exporter in the 1950s and 60s of *inter alia* cocoa, palm kernels, rubber, and groundnuts – was beginning to slow. Manufacturing in the early 1960s, largely the processing of agricultural goods for export, began to shift to import-substitution of intermediate goods with low domestic value-added and high import content, encouraged by trade protection in the form of both tariffs and quantitative restrictions (BCG 1999, 31). Private foreign investment rose rapidly until 1967, but then eased off as concerns rose about political instability. High foreign exchange reserves encouraged little discipline with regard to government spending (BCG 1999, 27).

Figure 2: Real 2010 Global Crude Oil Prices



Source: World Bank Commodity Price "Pink Sheet," accessed October 2014

Nigeria's civil war involved the 1967 secession of the eastern region of the country known as Biafra in an attempt to gain control over Nigeria's oil economy. It ended in 1970 and was followed by a post-war economic boom, even before oil prices rose spectacularly in 1973. Between 1973 and 1974 ("the first global oil boom"), the nominal international crude oil price³

³ From the World Bank's commodity price database, the global crude oil price is an average of the spot prices for crude oil in Brent (North Sea), Dubai (Middle East), and Texas (United States).

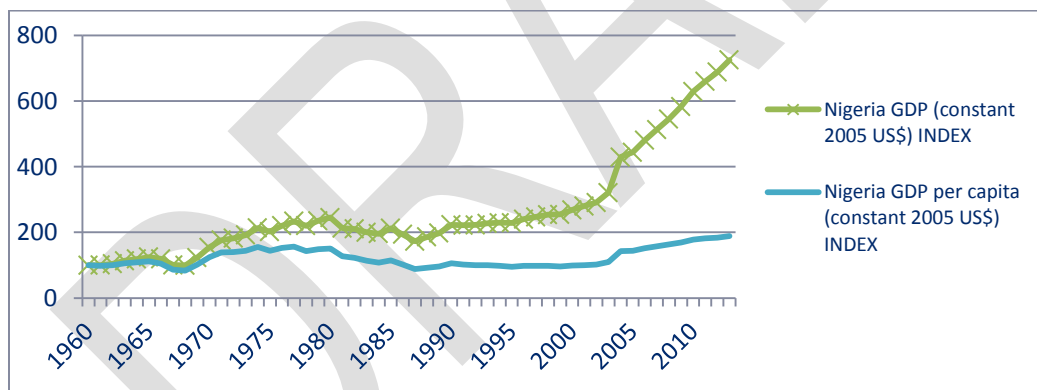
rose from \$2.81 to \$10.97 per barrel, while between 1978 and 1979 (“the second oil boom”) international price more than doubled; 2010 *real* price trends are tracked in Figure 2.

Nigeria and Dutch Disease

Bevan, Collier, and Gunning estimate that Nigeria earned windfall revenues owing to the two oil booms, 1974-81, equivalent to “almost double annual GDP just prior to the boom” (1999, 46). According to Gelb et al. (1988), the importance of the mineral sector rose from 1 percent of GDP in 1960 to nearly 30 percent in the late 1970s. Petroleum accounted for over 90 percent of exports from 1974 into the mid 1980s. Oil revenues to the federal government “rose fivefold to form more than 80 percent of total revenue” (BCG 1999, 46). Revenue increases were also due to increased production, increased public ownership in the sector, and an increase in the taxes and royalties exacted from oil companies.

In the face of average annual inflation of 20 percent in the late 1970s and 1980s, the government made no adjustment of the naira’s nominal value to realign its REER, appreciation of which rose from parity in 1970-72 to 129 in 1974-78, 163 in 1979-81, 194 in 1982-83, and 287 in 1984 (Gelb et al. 1988, 247-248). Instead it sought to hold back the rising tide of imports through expanded use of quantitative restrictions. This created significant rents for those agencies, companies, and individuals with access to foreign exchange and/or imports at the official exchange rate and significant burdens on competitiveness for all others (Gelb et al. 1988, 228).⁴

Figure 3: Nigeria’s GDP and GDP Per Capita Indices



Note: Index of constant 2005 values in US\$, with 1960 as base year

Source: World Bank World Development Indicators, accessed October 2014

Nigeria’s non-oil economic growth was not favorably impacted by the oil windfall. Non-mining sector GDP growth was around 5 percent per year during the boom period 1972-81 and actually contracted by nearly 6 percent per year in 1982-84. Both total real GDP and real GDP per capita

⁴ As one example of the extent to which foreign exchange and trade distortions play out in agriculture, Benin, which shares a nearly 800 kilometers-long border with Nigeria, imports substantial amounts of rice destined for (mostly informal) cross-border export into Nigeria, particularly when Nigeria’s efforts to protect domestic production are stepped up through increased import duties and quantitative restrictions. A recent report on this decades-long phenomenon is available at Oryza.com (2014).

decreased over the 1980s; real per capita GDP only began to grow in the mid 2000s (Figure 3). Gelb et al. suggest that the poor growth record in the early 1980s was caused by a number of factors: 1) the high share of government investment in physical and social infrastructure combined with the failure of that investment to stimulate further growth; 2) poor investment quality; 3) disruptive effects of investment cutbacks after the second oil boom; and 4) inefficiencies caused by foreign exchange market distortions, felt particularly in the manufacturing sector (Gelb et al. 1988, 249-251). A series of real agricultural GDP indices shows a drop that began just before the first oil boom (1971/72) and did not recover until 1990 (BCG 1999, 112).

Labor

Labor markets in Nigeria were directly affected by the oil booms. Prior to these, agriculture employed roughly 70 percent of the workforce (Gelb et al. 1988, 227); by 1983 that figure was halved, though it rose again somewhat to over 40 percent by the late 1980s (ILO).⁵

During the 1970s, government intervened in the labor market in several ways. It dramatically increased public sector recruitment, tripling the civil service between 1973 and 1981 (BCG 1999, 65). As already mentioned, public sector wages were doubled in 1974/75. And a national minimum wage was introduced in 1978 at a level above the market wage for unskilled labor.

Researchers noted substantial gaps between rural and urban wages in the early 1970s (as much as 80 percent); the gap all but disappeared by the 1980s (Gelb et al. 1988, 255-256), which encouraged significant rural-urban migration. BCG suggest that rural labor was attracted out of food production, despite rising food prices, by the promise of increased opportunity owing to the expansion of public sector employment (BCG 1999, 386). Nigeria's poor performance in food production is attributed in part to the migration of labor out of agriculture into the rapidly growing construction sector (Gelb et al. 1988, 253).

By the 1980s, the economic boom collapsed, with negative impacts on urban employment. Nigeria's "deep recession [in 1980-87] generated layoffs, return migration to rural areas, unemployment, and large reductions in real wages" (BCG 1999, 125). The layoffs (or "retrenchment" in Nigeria) were felt primarily in the private sector, as the public sector continued to recruit workers, in part to stem the effects of the private sector contraction. However, retrenchment did not lead to complete loss of livelihoods, on average, due to reverse migration of many retrenched urban workers back into agriculture. However, unemployment rates were higher among younger, better educated workers who preferred not to seek work back in agriculture.

Agriculture

Nigeria neglected export agriculture after independence, preferring to offer incentives that favored "indigenization" of Nigeria's industry. "All through the 1970s government policies affecting agriculture were contradictory ... [although] there was consistency in that the strategy

⁵ Oyejide (1986, 9) states that 59 percent of the labor force was still engaged in agriculture in 1982.

for improving production relied primarily on the public sector” (Gelb et al. 1988, 245). Public expenditures were largely directed to large-scale, mechanized agriculture on parastatal farms, particularly in the south. Gelb et al. suggest that the political landscape of Nigeria at the time left no constituency to advocate on behalf of programs to improve productivity of smallholder agriculture. “At a time when GDP was growing by more than 7 percent a year, resources shifted away from agriculture,” leading to a 2 percent drop in food production and a 17 percent decline in export agriculture by the mid-1970s (Oyejide 1986, 9).

By the late 1970s this decline in competitiveness led to a drop in agricultural exports and substantial food imports. Agriculture’s share of exports fell from 89 percent in 1960 to 2.4 percent in 1982 (Oyejide 1986, 36-37). To a large extent, the food imports are difficult to “see” because the quantitative restrictions on imports led to significant informal trade not recorded in the official statistics. Nevertheless, BCG argue that by the late 1970s policymakers were increasingly sensitive to the issue of food imports and the need to correct lack of competitiveness in agriculture through the promotion of self-reliance or self-sufficiency (BCG 1999, 171-172). However, government’s preferred policy approach to agriculture – support for large, parastatal farms to promote “modern” agriculture –was ineffective at raising Nigeria’s food production.

Manufacturing

Relative to agriculture, Nigeria’s manufacturing sector was far less adversely affected by Dutch disease. “In contrast to agricultural policy, industrial policy was lavish” (BCG 1999, 174). Because industrialization was seen by government as a more desirable development outcome, it received significantly more support through trade, exchange rate, and sectoral investment policies. Yet even this bias in incentives failed to jumpstart Nigeria’s manufacturing sector. Growth of manufacturing never took off during the boom period, as hoped.

Government Policies to Manage Natural Resource Volatility

Nigeria’s government was motivated by a strong sense of national sovereignty and a belief that industrialization, not export agriculture, was the key to Nigeria’s modernization (Gelb et al. 1988, 258). Industrialization was to be accomplished through strategic import-substitution initiatives. Devaluation of the naira was therefore *not* considered to be a viable option to manage the RER appreciation, for example.

Fiscal Policies

BCG note the series of choices facing Nigeria at the time, which is applicable to all countries finding themselves in similar scenarios: whether to retain all the income or share it (or some portion of it) with the private sector, whether to spend or save, which assets to use for saving, (and presumably how and on what to spend those revenues not saved). Citing analysis by Gelb et al. (1988), the portion spent by the Nigerian government on consumption and investment “preempted more than the entire oil windfall” (BCG 1999, 47).

Under pressure to distribute oil windfall benefits across a poor nation, Nigeria’s government opted to spend. By 1975 government current and capital expenditures exceeded total revenues, creating negative fiscal balances of nearly 14 percent of GDP by 1983 (Gelb et al. 1988, 240). Public sector wages doubled, on average, with even higher rates of increase given to lower grade

civil servants. Spending on other non-tradables sectors, such as the development of transportation and communications infrastructure in predominantly urban areas, and increases in education budgets, from 3.9 to 18.2 percent of budgets over the period 1973/74 to 1975/76, further contributed to domestic inflation. Public investments were also made in manufacturing sectors, while investment in agriculture lagged (Gelb et al. 1988, 244-245). Once launched, such high spending was difficult to curtail in the aftermath of the booms, and fiscal deficits continued into the 1980s, averaging 12.3 percent of non-mining GDP 1981-84 and creating further inflationary pressures (Gelb et al. 1988, 242).

After the second oil boom, Nigeria ramped up borrowing (financed largely through Central Bank borrowing) and drew down international reserves significantly to maintain spending increases. This led to international capital markets' crises of confidence in Nigeria's creditworthiness, which in turn led to the beginning of protracted stabilization and structural adjustment discussions with the IMF and World Bank, respectively. Nigeria's economic contraction after the easing of the second oil boom was the most severe of the six countries studied by Gelb et al.

Policies to Promote Diversification

Although Nigeria sought to promote diversification into non-oil manufacturing, its efforts did not materialize during the 1970s/80s. Bevan, Collier, and Gunning, writing from the perspective of the late 1990s, summarize Nigeria's Dutch disease legacy as follows:

The savings out of the windfall income failed to efficiently transform the boom into a permanent income increase. One reason was that the attempt to raise the domestic level of investment quickly (as opposed to accumulating foreign assets) lowered the efficiency of investment. In addition, much of what appeared as investment in the national accounts in fact represented kickbacks. Also, there was a genuine shift toward more capital-intensive projects..., the steel industry being a prime example. Finally, it should be noted that the national accounts statistics do not pick up what may well be the boom's most important legacy: the effect of the government's massive investment in education, especially in primary education. (BCG 1999, 186-187)

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ANGOLA (2002-2008)

Before independence, Angola was known as a powerhouse of agricultural production. It was the world's fourth largest producer of coffee and also a significant producer of rubber, tobacco, sisal, and bananas for export. Angola was largely self-sufficient in food products and also enjoyed a thriving fishing industry (African Business Magazine 2012). A large and diverse manufacturing sector employed 200,000 people, producing consumer products such as beer, sugar, wheat flour, cooking oil, and soft drinks as well as textiles, soap, paint, plastic, and glues (Macau Trade and Investment Promotion Institute 2014).

Petroleum was first exploited commercially in 1956 by the Portuguese. Independence in 1975 was followed by more than 25 years of civil war; a peace accord was signed in 2002. During this time, agriculture and much non-natural resource based industry collapsed, although oil exploration continued as a coastal enclave. Following the peace accord, crude oil production increased rapidly, from 750,000-1 million barrels per day prior to 2002 to over 2 million barrels per day in 2008 (Consultancy Africa Intelligence 2011). Today, Angola is the second largest African oil producer behind Nigeria.

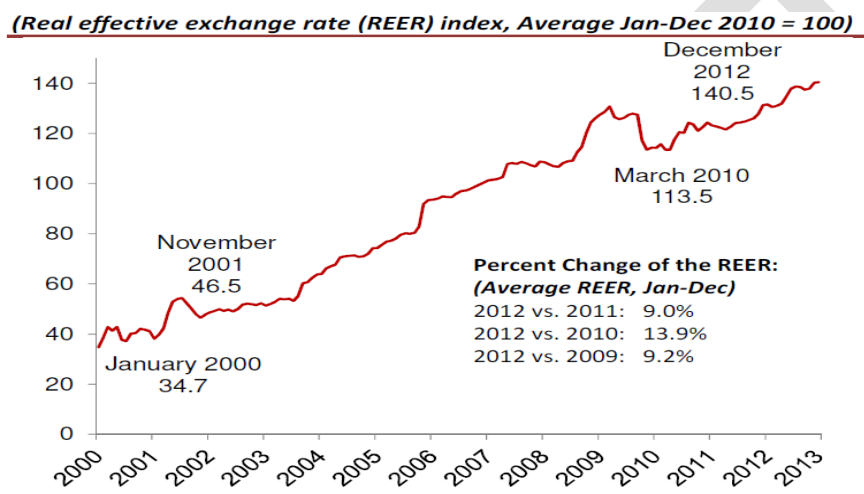
Combined with the collapse of agriculture and destruction of much of the country's internal infrastructure, oil became by far the most important component of the country's GDP, exports, and government revenue. For example, revenues derived from non-renewable resources accounted for 84 percent of total government revenue over the period 1996-2003 (Kyle 2010). In 2013 oil still made up over 96 percent of exports; diamonds were the next largest category at 1.7 percent, gas and refined oil products accounted for 1.3 percent, and "other exports" (which would include any agricultural and industrial production) are virtually non-existent, only 0.4 percent (World Bank 2014). This structure of exports makes Angola today the "least export-diverse country in Africa" (World Bank 2013).

Angola and Dutch Disease

After repeated bouts of boom and bust and periods of hyperinflation during the war, Angola's macroeconomic situation was regularized in the post-war period and inflation brought under control. The nominal exchange rate had depreciated during the war period, remained relatively stable through 2007, and then appreciated slightly (Kyle 2010). The government intervened regularly to keep the Kwanza nominal rate fairly stable at around 75 to the U.S. dollar.

However, given Angolan inflation rates well in excess of U.S. inflation, its RER appreciated significantly from 2000, moving rapidly after 2003 (Figure 4). This is exactly what one would expect given the dominance of oil exports and a managed exchange-rate regime.⁶ The average inflation rate in 2013 was estimated to be nearly 9 percent, compared with just under 3 percent in Angola's trade partners. No offsetting nominal currency depreciation has occurred to counterbalance the rising price level differential (World Bank 2014). The Angolan RER is currently overvalued by between 10 and 25 percent (IMF 2014a), with an average real appreciation of 12 percent per annum observed for the last decade. Given these trends, Kyle (2010) estimates that between 2001 and 2008, profit margins of trade-exposed producers declined by 72 percent on average, which is staggering given the business environment constraints already facing the non-oil economy.

Figure 4: Real Effective Exchange Rate Appreciation in Angola



Source: World Bank (2013)

Impacts by sector are summarized below.

Agriculture

The World Bank has stated that “the [real] appreciation of the Angolan Kwanza is significantly diminishing the competitiveness of the non-oil economy a stronger Kwanza has had a negative impact on Angolan manufacturers and, especially, farmers, who are also facing a decline in the cost of imported food” (World Bank 2013, vii-viii).

Agriculture today employs around two-thirds of Angolans, and suffers from extremely low productivity (World Bank 2013). Commercial agriculture and exports virtually halted during the

⁶ The National Bank of Angola managed the Kwanza to keep it trading within a band of 90 to 97.4 to the U.S. dollar, though in 2012 it adopted a policy of increased flexibility that instead aims to stabilize “reference interest rates.” (World Bank 2014, 12). The Angolan economy has also been heavily dollarized in the past, relying on the U.S. dollar for over 50 percent of credits (World Bank 2013, 17). A new Foreign Exchange Law compels oil companies in Angola to pay domestic suppliers in domestic currency through local bank accounts (World Bank 2014, 14) and the dollarization ratio is coming down.

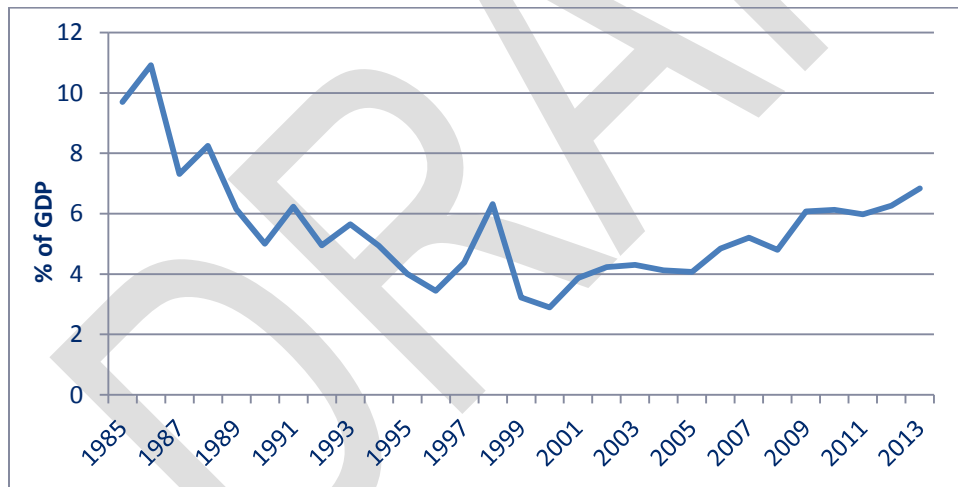
war. While some recovery of agricultural production has occurred since the 1990s when conflict peaked, with relatively robust growth rates observed more recently (for example, the sector grew 7.3 percent in 2012), this has been from a low base, and, according to the World Bank, is “below potential” (World Bank 2014, 19). Kyle (2010) claims that while agricultural production is higher today than it was during the height of the armed conflict in the 1990s, “it has not grown markedly, if at all, since the advent of peace in 2001/2002” (Kyle 2010, 3).

The sector faces many challenges, among them, clearly, the overvalued exchange rate. However, Angola is not only facing a threat to agriculture from Dutch disease, its efforts to restart agriculture in an already adverse operating environment are not yielding strong results. Given Angola’s extreme reliance on imported foods for 90 percent of total demand (Maussion 2014), its consequent vulnerability to world food price shocks, and the dependence of two-thirds of Angolans on agriculture for their livelihoods, improving agricultural performance will be critical to improving overall living standards for the majority of Angolans.

Manufacturing

The size of Angola’s manufacturing sector is small, though its share of total GDP has grown in recent years. Falling from 1985 to 2000 from 11 to 3 percent, the share has recently risen to around 7 percent of GDP in 2013 (Figure 5).

Figure 5: Angolan Manufacturing as Share of GDP



Source: World Bank Databank

The World Bank has observed in Angola that “important structural issues constrain the development of the manufacturing sector. The most salient of these is the appreciation of the real effective exchange rate” (World Bank 2013, 3). Many firms were nationalized after independence, and then privatized in the 1990s. Some foreign investment has occurred. For example, a South African packaging company opened a plant in 2011 and plans exist to build two more plants in the future, while the IFC approved loans in 2012 to a cement factory and a soap manufacturing company (African Business Magazine 2012).

Labor

Very little information, and even less hard data, is available on labor markets in Angola. However, a clear labor effect of Dutch disease is observed, with labor moving into the oil sector such that “the oil sector and ancillary industries ... employ the best educated and most experienced labor in the country. This further damages the competitiveness of the non-oil industries, which must cope with an environment of scarce and expensive investment capital and high labor costs for skilled workers” (World Bank 2013, 5). Strikes of teachers and health workers for better pay and conditions in 2014 demonstrate pent-up demand for wage increases, at least in the public sector. Certainly, the labor market presents a constraint for growth, with a predominance of low skills and lack of productivity, unsurprising given the legacy of the war. The government has put in place some measures to tackle this, including plans for the construction of 35 technical institutes with Chinese financial support. However, curricula need updating and more teachers need to be trained (African Business Magazine 2012).

Relative Prices of Tradables and Non-Tradables

There is evidence of increases in prices of non-tradables in Angola, with an “explosion of property values... in Luanda in recent years” (World Bank 2013, 5). Growth in the construction, real estate, and domestic commercial sectors (all non-tradable sectors) has consistently outpaced growth in agriculture and manufacturing (World Bank 2013).

Government Policies to Manage the Boom

How has Angola managed its natural resource boom, both in terms of managing the inflow of revenues from oil exports as well as promoting diversification in non-extractives industry sectors?

Managing Oil Revenues

In recent years the Government of Angola has initiated a number of reforms aimed at managing the oil revenues on a sustainable and more transparent basis and smoothing macroeconomic fluctuations. Two funds were launched to manage oil funds. The first, the Oil for Infrastructure Fund, was established in 2011 with a developmental agenda focused on investments in water and electricity. A second, the Sovereign Wealth Fund, was set up in 2012 to act as a stabilization fund, although it is not clear where the funding came from, or how much of the funding for the former was fed into the latter (Economist Intelligence Unit (EIU) 2014). Recent publication of an audit of the second fund is a positive step in terms of transparency (EIU 2014). However, further work is needed to define precise fiscal rules for the fund, i.e., rules that stipulate under what conditions funds can be drawn into the state budget. The IMF is working with Angola to develop a sovereign Asset and Liability Management Framework to define the size and characteristics of the fund, consistent with macroeconomic objectives (IMFa 2014).

Increasing Economic Diversification

The Government of Angola has also in recent years recognized the danger of high dependence on oil and the need to create jobs. The oil industry employs less than 1 percent of the workforce (African Development Bank 2013). Angola's weak business environment is also well recognized. The country ranked 179 out of 189 economies in 2014 in the World Bank's Ease of Doing Business Index, behind the average for sub-Saharan Africa. Other indicators, such as the World Economic Forum's Global Competitiveness Index, show broadly the same result. Some measures

have been introduced to improve the overall business environment. Other measures include a comprehensive program of public investment particularly aimed at improving transport linkages.

More controversially, Angola recently opted for increased protection of domestic markets. A number of import duties were introduced on goods that it believes can be produced locally, including many household goods, construction materials, and foodstuffs. The duty on imported eggs, for example, has been increased from 5 to 30 percent. The government also now applies “sin” taxes on items such as tobacco; beer now has a 50 percent import tax. The government also imposed a total ban on imports of cement in March 2014 to promote purchases from local cement plants that were being undercut by cheaper Chinese imports (EIU 2014).

The purpose of the import duty increases is to reduce Angola's imports and promote local industry so as to diversify the economy and create local jobs. Also, Angola hopes to position itself for membership in the Southern African Development Community Free Trade Area (EIU 2014). While the IMF has warned that these should be for a limited period and phased out “before they become inefficient” (IMF 2014b), the government sees these as necessary protection to local agriculture, agro-processing, and manufacturing. Some impact may already be visible. For example, a local bottle manufacturer, Vidrul, is planning to increase local capacity significantly, expecting to benefit from an increase in import duties on drinks and bottles from 2 to around 60 percent (EIU 2014).

Other recent government initiatives include a state program to stimulate the textile industry and the cotton industry to supply it. A new 74,000-hectare plantation, partially funded by South Korea, is planned for Kwanza Sul, once the heart of Angola's cotton industry. The Ministry of Agriculture is targeting annual output of 100,000 tons of cotton, with 40 percent expected to come from smallholdings and the remainder from commercial plantations. At the same time, investments are being made to upgrade textile factories. By the end of 2014 Angola should have three newly renovated textile factories, with two more new facilities planned for 2015. The Japan Bank for International Cooperation has provided Angola with a US\$1billion credit line to pay for the upgrades, with Japan-based Marubeni Corporation leading the rehabilitation work. In addition, spinning and weaving equipment from Japan, South Korea, and China is being imported to operate the new units, according to local media reports.

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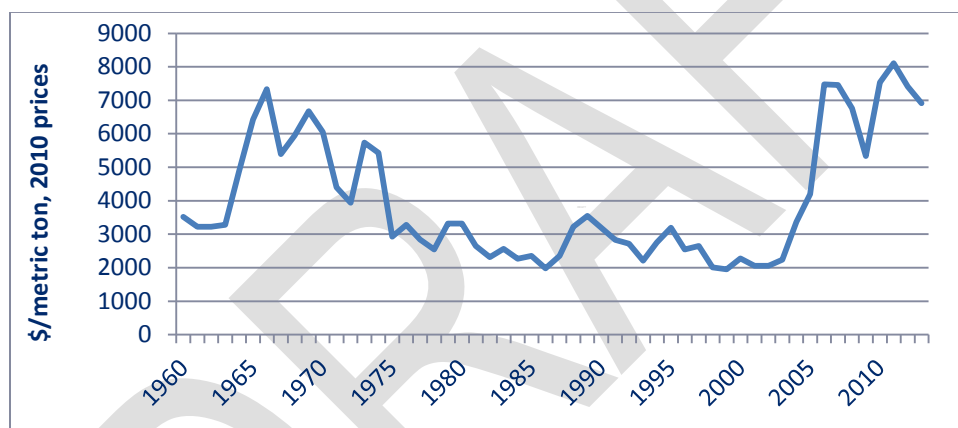
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CHILE (2007-2010)

Chile's challenge is not the recent discovery and exploitation of natural resource wealth, but rather the world commodity market volatility that accompanies it; between 2000 and 2011 real copper climbed more than fourfold (Figure 6).⁷

Figure 6: Real World Copper Prices



Note: London Metal Exchange, Grade A

Source: World Bank Commodity Prices "Pink Sheet"

Copper has been mined commercially in Chile since U.S. companies opened mines at the start of the 20th century. Over Chile's history the mining sector was first nationalized, then (partly) privatized again. Chile currently supplies about one third of the world's copper, by far the largest country supplier.⁸

Copper's share of the Chilean export basket has diminished over the last fifty years. Until the 1970s, copper played a huge role in the export basket, as high as 70 percent, but this dropped to

⁷ Real world copper prices soared four-fold in the 2000s, as seen in Figure 6.

⁸ Reuters news service reported recently that "Chile's copper boom begins to fade as production headaches mount." Increasingly difficult regulatory hurdles to launching new production sites are cited (Cambero and O'Brien 2014).

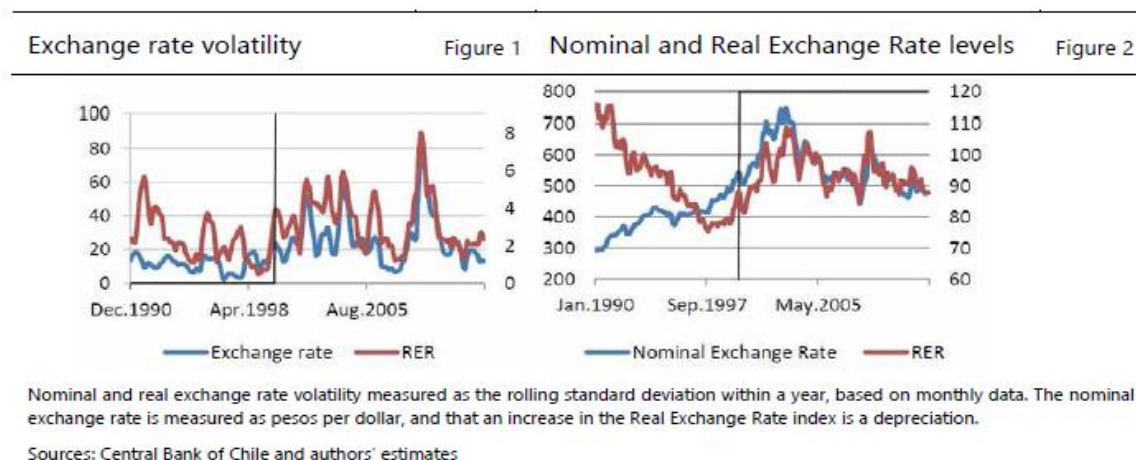
35 percent by 2002. Since then it has increased to 50-60 percent, almost entirely due to a massive increase in world copper prices (Meller and Simpasa 2011). Today, Chile produces a third of the world's copper. Exports of copper represent over 50 percent of Chile's total exports (IMF 2014) and 20 percent of the country's GDP (The Economist 2013). The country is also the world's second largest producer of gold and a major producer of lithium (KPMG 2014).

Despite this reliance on natural resource wealth, Chile has been able to avoid the potential impacts of Dutch disease and other "resource curse" effects. GDP per capita has grown strongly, but more importantly, poverty rates have fallen significantly faster than the regional average (McMahon 2010). Chile has relatively strong institutions, high levels of human capital, and a stable macroeconomic environment, all of which help to avoid the natural resource curse.

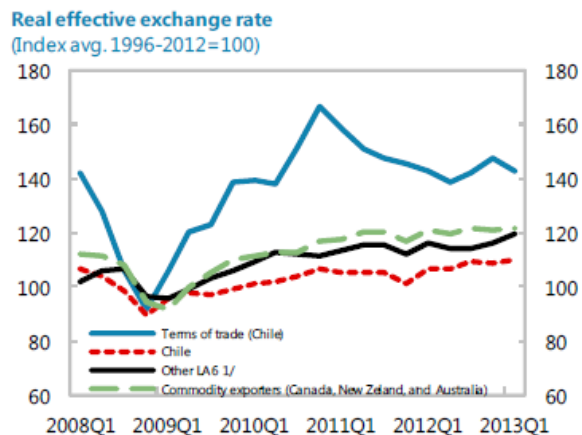
The reduced impact of copper price fluctuations on the business cycle is also due to strategic macroeconomic policies (De Gregorio and Labbe 2011). Particularly since the introduction in 2000 of fiscal rules that determine how natural resource revenues are to be saved and spent, the government has been able to successfully insulate the wider economy from fluctuations in the world price of copper, thereby smoothing volatility of copper export revenues on the Chilean economy.

During the 1990s, Chile followed different versions of a "crawling peg" approach to setting the exchange rate, whereby the nominal exchange rate was set based on some function of previous months' inflation. During this time, the RER showed a significant appreciation. This had a negative effect on some exports in manufacturing, but overall productivity gains in both agriculture and, particularly, manufacturing seem to have more than compensated, with "overall manufacturing exports coping relatively well with the appreciation of the RER" (Guerguil and Kaufman 1998). At the end of the 1990s, a fully floating nominal exchange rate system was introduced. Since then, the RER has shown no real trend for appreciation (or depreciation) (Figure 7) (Claro and Soto 2013). More recent data suggest a slight upward trend (Figure 8).

Figure 7: Nominal and Real Exchange Rates, Chilean Peso, 1990-2006



Source: Claro and Soto (2013)

Figure 8: Real Effective Exchange Rate, Chilean Peso, 1996-2012

Source: IMF (2013)

In 2013, the IMF concluded that while the RER was “on the strong side” it was “not clearly overvalued” (IMF 2013b). During this time, both agriculture and manufacturing have expanded considerably, showing impressive growth in output and productivity. Meller and Simpasa (2011) find that growth in manufactured exports have increased strongly since the start of the mid-2000s commodities price boom, the opposite of what one would expect if Dutch disease were present.

Chile and Dutch Disease

For these reasons, Chile is often cited as an example of a country that has “got it right” when it comes to managing natural resource revenues prudently and avoiding negative consequences for the competitiveness of non-extractives industry sectors of the economy.

In the period 2000-05, the government’s income from mining averaged \$2.1 billion per year. Due to booming commodity prices and steady output levels, this increased to \$11.5 billion per year between 2005 and 2011 (Economist 2013). In relative terms, taxes on the mining sector went from 1.4 percent of GDP in 2005 to 3.8 percent just two years later in 2007, then plunging to 0.8 percent in 2009, according to various IMF Article IV staff reports. This huge increase, driven largely by rising demand from China that in turn increased world prices, shows the extreme dependence of the Chilean economy and the Chilean government’s revenue on world copper prices and the volatility to which they are subject.

Labor

Mining in Chile absorbs just 1.5 percent of employment, down from 2.6 percent in the 1980s. Some indirect employment is also created, but this is limited (De Gregorio and Labbe 2011). Chile’s agricultural sector also provides employment for less than 5 percent of the total workforce, suggesting that the economy has already undergone substantial structural economic transformation.

In analyzing the impact of the mid-2000s boom in copper prices on wage differentials (between skilled and unskilled), the IMF found that labor in tradables was on average more highly skilled than labor in other parts of the economy. Wages of skilled workers increased faster than those of unskilled workers from the start of the terms-of-trade shock (IMF 2010). The combination of a

higher concentration of skilled labor in the booming sector and increasing wage levels in this sector meant that the terms of trade shock worsened the wage gap.

Labor rights have also been a key part of government labor policy, and there has been a high emphasis on training and increased productivity (KPMG 2014). Chile is considered one of the most successful developing countries in terms of effectively implementing an investment program in human resources (Perone 2014). According to the *Economist* (2013) some mining sector wages in the Chilean mining industry are higher than in the United States.⁹ Chilean workers are also organized and quick to strike. A shortage of skilled labor in Chile's mining sector has led to increases in wage levels as unions have threatened strike action (KPMG 2014).

Agriculture and Manufacturing

Agriculture, including export agriculture, has been an important part of Chile's economic modernization. Manufacturing, on the other hand, of non-extractives industry-related products has been a small share of the overall economy.

Under Dutch disease we would expect to see a negative impact of an appreciated RER on the competitiveness of these other tradable sectors of the economy. However, this impact has been "mild," according to Chilean Central Banker Sebastián Claro. He attributes this in part to the fact that the prices of Chile's main exports *aside from* copper – horticulture, seafood, beverages, etc. – also benefited from global commodity price booms during the same period and the 2000s (Claro 2013). The rise in world prices of Chile's agricultural exports thus provided a counterweight to the surging extractives exports prices.

Moreover, the impact of Dutch disease in Chile and consequent threats to competitiveness were also countered by significant improvements in manufacturing and agriculture sector productivity (Claro 2013). This is especially true in agriculture, where average labor productivity has increased three times faster than in the aggregate. The trend of industry was similar to the aggregate, while the mining industry experienced a significant fall in average labor productivity. In Chile, even services sectors (commerce, financial services, construction, telecommunications) have seen their average labor productivity rise significantly faster than the aggregate, as foreign direct investment has stimulated productivity (and even export growth) in these fields.

Government Policies to Manage Natural Resource Volatility

As seen, RER appreciation was present in Chile in the 1990s, but did not seem to have had particularly negative effects on traditional tradables sectors of the economy. Both manufacturing and agriculture achieved strong improvements in productivity that enabled them to remain competitive. More recently since 2000, no evidence of Dutch disease has been observed. Chile seems to have been successful in avoiding a significant appreciation of the RER, despite booming copper prices. During this time, non-copper exports also boomed.

⁹ The example given is of mining truck drivers, who are said to earn \$U.S. 10,000 more in Chile, compared with the equivalent in the United States.

Fiscal Policy Leading to Stable Macroeconomic Environment

Fiscal rules and institutions established by Chile have enabled the country to maintain macroeconomic stability despite volatile copper prices. As a result, the impact of fluctuating copper prices has reduced over time. Prior to the 2000s, “the Chilean economy generally went into recession when the copper price collapsed” (De Gregorio and Labbe 2011, 4). Since then Chile has maintained economic growth during times of low copper prices.

One of the impacts of the fiscal rules is that surpluses do not immediately enter the national economy, but are instead saved for leaner times. This dampens the “spending effect” associated with Dutch disease, and thus moderates the significance of upward pressure on prices of non-tradables, and hence RER appreciation.

Since 2001, Chile has structured its fiscal policy around the “structural balance rule” (Marcel 2013; Perone 2014). The goal is to isolate revenues – and the economy – from cyclical factors. In effect, it is a way of ensuring discipline so that government is ‘forced’ to save when times are good (e.g., prices or output are higher than trend) in order to be able to spend (i.e., stimulate the economy) when times are hard.

Structural revenue is determined by two independent panels of experts and reflects what revenue would have been if the economy had operated at potential rather than actual output, and what copper revenue would have been at a medium-term, reference, world copper price as opposed to actual price. Under these rules, the government can run a deficit larger than the target if output is below its medium-term equilibrium, if there is a recession, or if the price of copper is below its medium-term equilibrium (Perone 2014). The use of independent panels of experts aims to ensure transparency and lack of political interference.

The vehicle for saving surpluses is a fiscal stabilization fund, formerly known as the Copper Stabilization Fund and replaced by the Economic and Social Stabilization Fund established in 2007,¹⁰ which invests in international financial instruments, thereby avoiding pressure on the Chilean peso. The fund

...has accumulation and withdrawal rules based in part on a reference copper price determined annually by the authorities. In practice, the copper reference price is based roughly on a 10-year moving average. When the price of copper exceeds the reference price by between \$0.04 and \$0.06 a pound,¹¹ 50 percent of the state copper company’s revenue is deposited in the fund. If the price of copper is above this range, 100 percent of the revenues are deposited in the fund. Withdrawals from the fund, which are governed by rules that are symmetric to the deposit rules, have generally been used to subsidize domestic gasoline prices (Perone 2014, 163-164).

¹⁰ See <http://www.hacienda.cl/english/sovereign-wealth-funds.html>.

¹¹ By way of comparison, the world copper price in September 2014 was \$6,872 per metric ton, or \$3.12 per pound. The fiscal rule is, therefore, equivalent to 1.3-1.9% variation.

Due to high prices for copper, Chile accumulated 19.5 percent of GDP in its stabilization fund by 2008 and was running a fiscal surplus of over 8 percent. It is unlikely that the government would have been able to resist calls to spend some of the surplus without the fiscal rule. Instead the rule provided for funds that underpinned one of the largest fiscal stimuli in the world (relative to the size of the economy) during the global recession of the late 2000s (De Gregorio and Labbe 2010).

Promoting Economic Diversification

Chile has long been committed to diversification of its economy. Championed by Fundación Chile, a public-private partnership established in 1976, operating today with support from the Chilean government and the multinational mining giant BHP Billiton, and Corfo, a state development agency (Economist 2010), new sectors, technologies, and exports have been introduced. For example, new high-value, counter-seasonal fruits and vegetables have been promoted through a commitment to agricultural research (Economist 2010). As another example, Chile's government convinced General Electric to set up a software development center. Today, Fundación Chile proactively introduces technology innovations and develops companies in target industries including agribusiness, marine resources, forestry, environment and chemical metrology, human capital, and information and communication technologies. Among its successes is a new method for packaging beef that enables ranchers to export it more easily, and the introduction of raspberries, blueberries, oysters, and salmon for overseas markets (World Bank 2014).

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4. Policy Options to Consider

The four experiences presented in this note have shown how different countries – with different starting points, political economies, economic bases, institutional capacities, attitudes about exporting versus substituting for imports, approaches to exchange rate management, labor sector policies, agricultural policies, industrial policies, trade policies, and fiscal priorities – have experienced natural resource booms in different ways.

They also highlight the fact that governments have policy options to consider when confronted with natural resource booms and the windfall gains they produce:¹²

- Whether to save some or all of the windfall gain in a foreign exchange account managed by the central bank;
- Whether to keep those savings as foreign reserves or convert some or all into local currency, and if so, at what rate;
- Whether to spend part of the gain, and if so, how much, when, and on which priorities;¹³ ideally, spending should be focused on investments that will increase productivity in the longer run (such as those undertaken by Indonesia in its rice sector¹⁴) rather than on spending that will more likely fuel immediate domestic consumption and thereby put further upward pressure on domestic prices (such as the public sector wage increases granted in Nigeria);
- If opting to spend, how to ensure “smart investments” that do not intervene in markets but rather provide the horizontal “level playing field” needed by producers and firms to access skilled labor, technology and inputs, and markets;
- How and via which institutions to engage in “countercyclical” saving and spending, that is, saving during boom times and spending during lean times; this may involve funds (referred to as “commodity funds” or “sovereign wealth funds” or other names) that are governed by fiscal rules defining when it is appropriate to spend surpluses (such as the rule utilized by Chile) and assuring that expenditures are made transparently on-budget;

¹² This note ignores the issue of fiscal treatment of the extractives sector, which determines the magnitude and possibly the regularity of the windfall gain transfers. See Calder (2014) for a guidebook to those options.

¹³ Brahmabhatt et al. (2010) present the “permanent income approach” that calculates the expected net present value (NPV) of all expected net future revenues and then the real annual annuity, received forever, that would yield the same NPV. The rule would say to spend only the value of the annuity, saving the rest abroad for the future.

¹⁴ Nigeria's increased public expenditures on physical infrastructure and primary education were investments made in this vein as well, though BCG (1999) claim they were ineffective.

- Whether to distribute some portion of the windfall directly to citizens on an equal per capita basis via what is called a “lump sum distribution;”^{15, 16}
- Whether spending on tradables is to be encouraged so as to minimize the upward demand pressure on non-tradables, via trade liberalization or relaxed capital controls on outflows.

The choice of exchange rate regime, i.e., whether to maintain a fixed, floating, or managed floating exchange rate regime, also shapes the impact of increased natural resource revenues on the local economy. This is usually a given, not a policy decision variable. Managing the exchange rate, however, is a policy decision, e.g., whether to anchor the exchange rate to inflation (and if so, which price index) or to one or a basket of export prices. Ebrahim-zadeh (2003) suggests that countries may wish to consider foreign exchange market interventions to manage pressures to appreciate the nominal currency value, selling domestic currency to try to moderate upward pressure on the domestic currency.

To moderate the effects of Dutch disease, i.e., impacts of exchange rate appreciation, Biggs (2012) recommends some combination of a savings fund, accumulation of international reserves by the central bank, and reducing net capital inflows or encouraging capital outflows. He also mentions the possibility of “selective protection” of threatened sectors, though acknowledges the many risks associated with such an option. He also points to the need to accelerate productive domestic investments, promote increased consumption by citizens, and manage volatility aspects of the natural resource-derived revenues.

Perone (2014, 163-166) summarizes policy options in terms of “two complementary approaches.” The first is to adopt an institutional mechanism and accompanying transparent fiscal rules that allow the government to smooth consumption of natural resource-derived revenues over time (i.e., a sovereign wealth fund, as used successfully in Chile). The second is to invest, consistent with the country’s development strategy, in public goods that will help to improve the competitiveness of non-booming tradables sectors, e.g., human and physical infrastructure and improved business environment.

A government’s decisions regarding the above cited options will determine, to some extent, its vulnerability to Dutch disease and the impact thereof on different constituencies within the national economy. These are not easy decisions and involve trade-offs over time (how much to spend on current generations vs. how much to save for future generations) and between different stakeholders (importers vs. exporters, rural vs. urban consumers, consumers vs. producers, etc).

¹⁵ As an example, the U.S. State of Alaska established the Alaska Permanent Fund in 1976 as its oil pipeline was nearing completion. At least 25 percent of revenues from oil sales must be placed in this fund. The principal may only be used for income-producing investments, it may not be spent. The earnings from those investments are distributed via dividend checks to qualified Alaska residents. For more information, see <http://www.apfc.org/home/Content/aboutFund/aboutPermFund.cfm>.

¹⁶ Alternatively, the World Bank in Mozambique (2014) discusses the possibility of broader revenue-sharing with local governments, suggesting ways to build local capacity to absorb such funds and spend them productively.

With the benefit of 20-20 hindsight, the natural resource boom management experiences of Indonesia and Chile appear to have been more successful than those of Angola and Nigeria. Some of this success was due to the pure chance of a boom affecting all commodity prices, not just the discrete start-up of a discrete number of export streams (Indonesia's rice producers were as much "protected" by the sharp rise in global rice prices as they were assisted by the government's interventions, whereas Mozambique's boom is unique to Mozambique's launch into energy and mineral markets rather than a global commodity boom). Some of this was due to greater institutional capacity of government institutions in both Indonesia and Chile. And some of this was due to differing histories and political economies that led to more broad-based and longer term focused priorities of government policymakers.

Compared with Indonesia and Chile, Mozambique is still a much poorer country, with much weaker government capacity and an economy that is still much earlier in its structural economic transformation. It is unlikely to be successful in "picking winners." Mozambique will benefit most from transparent expression of government's goals and priorities to let foreign and domestic actors know how it intends to move forward, establishment of transparent rules of fiscal and monetary policy to mitigate the severity and volatility of Dutch Disease, and to enable saving. Mozambique should also, consistent with its recently adopted National Development Strategy (ENDE), reinforce existing measures to enable potentially affected sectors to increase their competitiveness such as overall improvements to infrastructure, the business environment, agricultural productivity, and make investments in relevant skills and education of the current and future workforce.

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5. Conclusion: Establishing a Natural Resource Boom Dashboard

The potential impacts of a natural resource boom in Mozambique on labor markets and the agriculture, tourism, and manufacturing sectors have been explored by SPEED in other studies. An interesting finding from that work is that the possibility of currency *appreciation* and the threats to competitiveness that this would impose have been relatively overlooked by the private sector in Mozambique to date, despite this having potentially very significant effects on profitability and even viability of some companies and sectors.

While Mozambique's economic policymakers are undoubtedly already familiar with the risks associated with natural resource booms, the private sector and the public need more information. In order to support the transparency mentioned at the end of the previous section, tracking possible impacts of the natural resource boom on the Mozambican economy and using them to inform the private sector and public is recommended.

To this end, a "policy dashboard" could be created, similar to the dashboard of an automobile whose gauges tell the driver whether the car is overheated or in need of refueling. This policy dashboard would follow trends in the variables listed here. Decision rules could be attached to these variables (such as "when inflation rises above X percent, we will do Y"). Some of these, of course, are already reported on a regular basis by the *Banco de Moçambique* or the National Statistics Institute, but the tracking of others may require new data collection efforts.

- Nominal exchange rates, with all major trading partners;
- Foreign exchange reserves;
- Government debt, both domestic and foreign;
- Rates of wholesale and consumer price inflation, in Mozambique and significant trade partner economies whose currencies matter to Mozambique's trade balance, e.g., the U.S. dollar, the euro, and the rand, with which to estimate real and real effective exchange rates.
- Prices of a limited number of non-tradable benchmark goods and services, such as the price of housing rentals in Maputo and several other key urban areas around the country, the price of 4-star hotel rooms in Maputo and several other key urban areas around the country, costs of transportation between major cities, construction services, etc;
- Shares of Gross Domestic Product contributed by agriculture, mining, minerals- and metals-related manufacturing, non-extractives manufacturing, other industry, and services.
- Shares of exports contributed by agriculture, mining, minerals- and metals-related manufacturing, non-extractives manufacturing, other industry, and services.

- Shares of agriculture, mining, minerals- and metals-related manufacturing, non-extractives manufacturing, other industry, and services in total employment.
- Total export volumes for key tradables outside of the extractives industry, e.g., tobacco, sugar, cotton lint, wood, bananas, shrimp, cashews (raw and processed), langoustines, clothing articles, etc.
- Total imports of staple foods, such as maize, rice, or vegetable oil; processed foods; construction materials (cement, processed metal goods); and other discretionary imports.
- Trends in government spending, in the aggregate and also broken out by target sectors, such as infrastructure, human capital development (education, training, health), as well as discretionary variables such as public sector wages.
- Public and private sector wages, by skill level and occupation for a selected number of reference occupations (e.g., entry and mid-level wages for teachers, doctors, other civil servants (public sector) as well as skilled construction workers, machine operators, accountants, human resource managers (private sector)).

Regular dissemination by the central bank or Ministry of Finance of a publication dedicated to the explicit tracking of Dutch disease-related indicators would provide important signals to citizens and the economy that the government is aware of, and working to mitigate against, the potential negative effects and would raise awareness via the media of these possible trends.