

COMMODITY BOOMS AND REAL EXCHANGE RATE APPRECIATION – DEVELOPING COUNTRY EXPERIENCES

Introduction

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Analysing Dutch Disease

Dutch disease effects are a subset of a wider literature on the links between natural resources and development. Other elements of this literature considering the effects of commodity price volatility and rent seeking are outside the request from the JWG, but are briefly summarised in [Attachment A](#).

What is Dutch Disease?

Various models, such as those outlined by Corden (1984), Corden and Neary (1982) and Gregory (1976), have established a framework for examining Dutch disease effects. They typically examine the interaction between three sectors: the **non-tradable** sector (for example, services), the **booming tradable sector** (natural resources in this context), and the **lagging tradable sector** (such as agriculture, tourism, manufacturing). Under this framework, a rise in the terms of trade emanating from a rise in the price of commodities can affect the economy through a **resource movement effect** and/or a **spending effect**.

The *resource movement effect* refers to the rise in the demand for labour and capital in the commodities sector leading to a shift in factors of production toward this sector and away from the lagging tradable sector and initially, the non-tradable sector.

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The *spending effect* occurs as a result of the extra income generated by the expanding natural resource sector, which increases the demand for non-tradable services, in turn raising the demand for labour in the non-tradable service sector, which attracts labour away from other tradable sectors. As a result of the increased demand for non-tradable goods, their price increases relative to the price of traded goods, appreciating the real exchange rate. If this appreciation is felt through the nominal exchange rate, this can decrease the export competitiveness of domestic trade-exposed sectors and reduce activity in those sectors.

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¹ Real exchange rate appreciation has different implications depending on each country's starting point and institutional settings. The analysis in this note relates to a developing country context, and does not readily translate to developed countries.

Real exchange rate appreciation is a predictable consequence of a long-lasting supply shock, moving factors of production to higher-value uses and increasing the country's aggregate wealth. But these effects can be of concern for a developing,

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International Experience

The magnitude of real exchange rate appreciation will therefore drive the extent of resource reallocation.

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The World Bank estimate that a one per cent increase in a country's terms of trade appreciates the real exchange rate by 0.38 per cent.

How this real exchange rate appreciation affects non-mineral sectors is more difficult to observe, because it involves isolating one effect among many, and because it involves considering how the non-booming tradable sectors *would have* performed if not for the real exchange rate rise. But consistent with the theory, international experience, whilst not uniform, suggests a negative relationship between real exchange rate appreciation and the performance of non-mineral sectors. Table 1 provides estimated examples.

² Real exchange rate appreciation can also have beneficial effects: it can increase overall wealth in the economy and international purchasing power, whilst placing downward pressure on business costs and consumer prices.

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⁴ The authors cite Spatafora and Warner (1995) in particular.

Table 1: Estimated Effects of Real Exchange Rate Appreciation

Result	Study
A 1 per cent increase in net energy exports reduces real manufacturing exports by 8 per cent (cross-country study).	Stijn, 2003
A 1 per cent increase in natural resources as a percentage of GDP leads to a 0.74 per cent reduction in manufacturing exports (cross-country study). A 1 per cent increase in oil windfall reduces the value add in manufacturing by 0.34 per cent (cross-country study). In resource rich countries, the manufacturing and agriculture sectors are lower than the norm by 15 per cent of GDP (cross-country study).	Brahmbhatt et al, 2010
In Ghana , the IMF has estimated that if all oil revenue is spent, agricultural exports will be 5.3 percentage points below their (no-oil) base case after 4 yrs, and 3.3 percentage points below the base after 18 years.	Breisinger et al, 2009

The experience of **Cameroon** may be particularly relevant to PNG. Cameroon has a relatively large population, low per capita GDP and is geologically and culturally diverse. Both economies are dominated by resource extraction and agriculture.

According to Charlier and N'cho-Oguie (2009), Cameroon experienced Dutch disease in the 1980s as a result of an oil boom and pro-cyclical spending policies. Rapid increases in domestic prices and wages, and an appreciation of the real exchange rate hampered industrial and agricultural production, and led to a surge in imports. Currency depreciation, more prudent economic policy, and structural reforms managed to reverse these impacts, but not until the mid to late 1990s. Modelling completed in the midst of Cameroon's Dutch disease (see Benjamin, Devarajan, and Weiner, 1989) identified the deleterious economic effects of the oil boom through the *spending effect* and made clear that the saving of resource revenues abroad can help ameliorate them.

The experience of **Botswana** can be used as an alternative example of how a developing country can overcome the risks of natural resource dependence. Within the literature, there are competing views as to whether or not Botswana has suffered from Dutch disease as a result of its diamond exports (see Pegg, 2010, for a useful review), but what is not disputed is that Botswana has succeeded in using its abundant natural resources to achieve sustained per capita GDP growth.

Botswana's success has been attributed to a transparent political process, a sound fiscal system, quality regulation and a sound anti-corruption framework (Iimi, 2007). More specifically to the fiscal system, Botswana established multiple funds to pursue development expenditure, manage public debt and smooth the fiscal cycle by 'keep[ing] expenditure growth below the rate of revenue growth' and adhering to strict expenditure rules (Pegg, 2010). Acemoglu, Johnson and Robinson (2003) suggest that the foundation for Botswana's success was laid before the discovery of diamonds, but Botswana used its diamond income to strengthen its institutions. More recently, its government obtained a sovereign debt rating (even though Botswana had no immediate need to borrow) as a 'commitment device': downgrades would alert citizens to policy slippage by future governments (Gelb and Grasmann, 2008).

Sao Tome is another positive example for how to anticipate hydrocarbon rents and entrench the institutions needed to manage them.⁵ Sao Tome adopted its Oil Revenue Law in 2004 which, in addition to setting out arrangements for saving and spending, requires full transparency with the responsibility placed on firms to disclose all relevant material to a public information office, or risk losing their contracts.

The Oil Revenue Law also mandates powerful oversight mechanisms which include a broad base of constituencies, which help counter weakness in government institutions. The National Assembly is required to hold yearly public sessions to discuss oil and gas policy. Ministers, investment committee members, the Auditor General and the Oversight Commission (which consists of 11 members, including three from civil society), are required to attend to answer questions.

Members of the Oversight Commission are selected by a diverse range of constituencies, including trade unions, business associations, local governments, the National Assembly (including opposition groups), and the judiciary. Only one member is directly appointed by the President. The Commission has wide powers, including investigating complaints and hearing, judging and enforcing proceedings relating to violations of the Law.

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⁵ This commentary draws extensively on Gelb and Grasmann (2008).

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ATTACHMENT A – THE RESOURCE CURSE LITERATURE

The extensive literature on resources and development proposes several dimensions of a “resource curse”. This is summarised by Gelb and Grasmann (2008) as follows.

- “**Dutch disease**” - Appreciation of the real exchange rate by resource exports may suppress and reduce the competitiveness of other exporting sectors (such as manufacturing, tourism or agriculture) with increasing returns or more potential for learning by doing than resource extraction; over the long run, this slows growth.
- **Volatility** - Terms-of-trade volatility may cause risk-averse investors to specialize prematurely in non-traded sectors; this further increases export concentration, volatility and specialization, reducing growth (Hausmann and Rigobón, 2003).
- **Rent seeking** - A high proportion of natural rent in the economy may also encourage rent-seeking, reducing transparency and deteriorating governance. In modest cases rent-seeking could simply sustain poor policies that delay the maturation of infant industries (Auty, 2001); in extreme cases, it may combine with other grievances to fan and sustain civil conflict (Collier, 2007).

Terms of Trade Volatility⁷

Compounding the Dutch Disease problem is the tendency towards extreme boom-bust cycles caused by wide hydrocarbon price swings and exacerbated by pro-cyclical access to capital markets (Gelb and Grasmann, 2008). The destructiveness of these cycles is clear from many cases.

- **Mexico** borrowed against expectations of increasing real oil prices after 1981 and suffered badly when these expectations turned out to be far off track.
- Hausmann 2001 notes that between 1920 and 1980 **Venezuela** was one of the fastest-growing Latin American economies, with growth averaging 6.4 percent. But following several euphoric years after 1974, it experienced a sharp decline, with output per head halving over the next two decades.

Resource Curse

Nigeria represents a sobering case study of the consequences of mismanaging the proceeds of resource extraction, and is held up as the classic example of the so-called *resource curse*, characterised by rent-seeking, corruption, unsustainable economic policy, Dutch disease, conflict and environmental degradation. After more than 40 years of oil production and billions of dollars in revenues, Nigeria is *worse off* in almost every measure of human development and economic performance.

There is some evidence of Dutch disease in Nigeria, with agriculture as a percentage of GDP declining from 68 per cent in 1965 to 35 per cent 1981, but this decline was

⁷ This commentary draws heavily on Gelb and Grasmann (2008).

arrested by a real exchange rate depreciation in the 1980s (Sala-i-Martin and Subramanian, 2003). That the decline merely stopped (as opposed to reversing) with a more favourable real exchange rate suggests that the negative effects on non-booming sectors are not easily repaired. Further, the decline in agriculture as both an employer and a percentage of GDP was offset by an increase in the size of the government sector, but given the latter's poor performance, was a further contributor to Nigeria's long term decline.

Volatility in the price of oil was particularly damaging in Nigeria, as the government was unable to smooth out its fiscal balance, particularly in the 1980s and 1990s; indeed public expenditure exacerbated this. This was particularly damaging when oil prices dropped and Nigeria was left with a 'debt overhang' and policy adjustment crisis that precipitated 'disastrous non-oil growth records over longer horizons' (Budina, Pang and van Wijnbergen, 2007).

The case of **Zambia**, summarised in Bigsten (2001), provides an example of the potentially severe consequences of treating mineral revenue as though it is permanent. During the 1960's Zambia received large resource rents from their thriving copper industry. They used this wealth to increase spending on social services (primarily in urban areas) and set up an import-substituting manufacturing sector.

When the copper price dropped and then production declined in the mid 1970's, per capita income and government revenue began to decline. The government borrowed to maintain previous spending levels. In an attempt to stop the decline in real wages the government tightened price controls, leading to the state owned enterprises making large losses, further exacerbating the country's debt problems.

While there was some attempt to deal with the problems in 1980's with a series of structural adjustment programmes, these encountered serious opposition and key aspects of the programs were not implemented. Major liberalisations finally began in the 1990s and the state owned copper company was finally privatised, however the government received no money for the sale, instead it was left with US\$ 1 billion in debts.

ATTACHMENT B - ANALYTICAL FRAMEWORK FOR CONSIDERING 'DUTCH DISEASE' EFFECTS

To analyse the impact of large terms of trade changes, the literature typically divides the economy into three sectors: 'resource sector - tradable', 'non-resource - tradable', and 'non-tradable'. The impact of the terms of trade change is disaggregated into the 'resource movement effect' and the 'spending effect', briefly summarised below.

The 'resource movement effect'

- Increased mineral prices lead to an increase in profitability and initially raise the returns to the factors of production used in mining.
- To take advantage of the more attractive returns, labour and capital move away from the other sectors.
- For the non-traded goods and services sectors, this is a negative supply shock: non-traded output falls and relative prices increase.
 - That is to say, there has to be a real appreciation in the exchange rate – an appreciation of the nominal exchange rate and/or a period of time during which domestic inflation exceeds the average inflation rate of trading partners.
 - : With a **flexible (market-determined) exchange rate** and a policy commitment to medium-term inflation targeting this real appreciation comes through overwhelmingly in a nominal appreciation in the domestic currency.
 - : Under a **fixed exchange rate regime**, in contrast, a real appreciation would emerge through domestic inflation.
- The higher terms of trade also induce a movement of the factors of production away from the trade-exposed sectors that are not advantaged by them.
- Thus, trade-exposed manufacturing finds it more difficult to hold onto labour and capital that chooses, instead, to move to mining and mining-related construction, and other, activities.

The 'spending effect'

- The improvement in the terms of trade arising from higher export prices generates an increase in national income — both private income and government revenues.
- As national income increases, public sector spending has the capacity to increase in response to higher government revenues. Alternatively, higher revenues can be 'recycled' to households in the form of higher transfer payments or tax cuts, including company income tax cuts that support higher real wages. In general, in response to higher household real incomes, private consumption will increase.

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- Assuming the price of traded goods and services is set in international markets, (and since the central bank's inflation target pertains to the average of all consumer prices, both for traded and non-traded goods and services) an increase in private and public spending can be expected to raise the relative price of non-tradables, resulting in a further appreciation of the real exchange rate.
 - a demand-induced increase in the relative price of non-tradables raises the demand for labour in those non-tradable sectors, leading to a further contraction in the non-mining trade-exposed sectors.
- If this appreciation is felt through the nominal exchange rate, this can decrease the export competitiveness of domestic trade-exposed sectors and reduce activity in those sectors.

Combined effects

- Depending on the size of the commodities sector and its employment share, the spending effect can be bigger than the resource movement effect.
- Overall, the following effects can be expected:
 - the mining and mining-related sectors grow strongly;
 - other trade-exposed sectors grow more slowly, or decline; and
 - depending upon the relative strengths of the negative supply and positive demand shocks, non-traded sectors either
 - : expand (but not as strongly as mining); or
 - : contract (but not to the same extent as non-mining trade-exposed sectors).