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Dealing with Dutch Disease

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This note looks at so-called Dutch disease, a phenomenon reflecting changes in the structure of production in the wake of a favorable shock (such as a large natural resource discovery, a rise in the international price of an exportable commodity, or the presence of sustained aid or capital inflows). Where the natural resources discovered are oil or minerals, a contraction or stagnation of manufacturing and agriculture could accompany the positive effects of the shock, according to the theory. The note considers channels through which such natural resource wealth can affect the economy. It also focuses on the development implications of Dutch disease, particularly the potential negative effects related to productivity dynamics and volatility; and concludes with a summary of possible policy responses, including the mix of fiscal, exchange rate, and structural reform policies.

The recent boom in primary commodity prices has once more stimulated interest in the issue of "Dutch disease." This term refers to changes in the structure of production that are predicted to occur in the wake of a favorable shock, such as discovery of a large natural resource or a rise in the international price of an exportable commodity that is perceived to be permanent. Such structural changes are expected to include, in particular, a contraction or stagnation of other tradable sectors of the economy; and to be accompanied by an appreciation of the country's real exchange rate (Gelb and Associates 1988). Where the booming sector is oil or minerals, the declining tradable sectors would include manufacturing and agriculture, according to the theory. In principle, such changes in the structure of production should be welfare improving, reflecting changes in demand associated with an improvement in national income. They may, however, be a matter of concern for policy makers if the declining sectors are thought to have some special characteristics that would stimulate growth and welfare in the long term—such as increasing returns to scale, learning by doing, or positive technological externalities. Concerns about Dutch disease may also arise in the context of large, sustained private capital or foreign aid inflows (Auty 2001).

This note lays out a basic model of Dutch disease, following Corden and Neary (1982), and considers channels through which natural resource wealth can affect the economy; it focuses on the development implications of Dutch disease, particularly the potential negative effects related to productivity dynamics and volatility; and it concludes with a summary of possible policy responses, including the mix of fiscal, exchange rate, and structural reform policies.

A Model of Dutch Disease

When studying Dutch disease, researchers typically model the economy as consisting of three sectors: the natural resource sector, the nonresource tradables sector (usually understood as agriculture and manufacturing), and the

nontradables sector (including nontradable services and construction), as presented in Corden and Neary (1982). The prices for both the natural resource and nonresource tradables sectors are set in the world market, and those in the nontradables sector are set in the domestic economy. The real exchange rate is defined as the price of nontradables relative to the price of tradables. There generally are two types of effects leading to Dutch disease and real exchange rate appreciation:

1. The *spending effect* comes into play when increased domestic income from the booming natural resource sector leads to higher aggregate demand and spending by the public and private sectors. Increased demand for nontradables leads to higher prices and output in the nontradables sector. Wages in the economy will tend to rise, squeezing profits in the nonresource tradables sector ("manufacturing"), where prices are fixed at international levels.
2. The *resource movement effect* takes place when a boom in the natural resource sector attracts capital and labor from other parts of the economy. It tends to reduce output in the rest of the economy. In particular, reduced output in the nontradables sector causes the price of nontradables to rise relative to the price of tradables, which are set in the world market. This effect in less likely in low-income economies, where most inputs used in the natural resource "enclave" are imported from abroad.

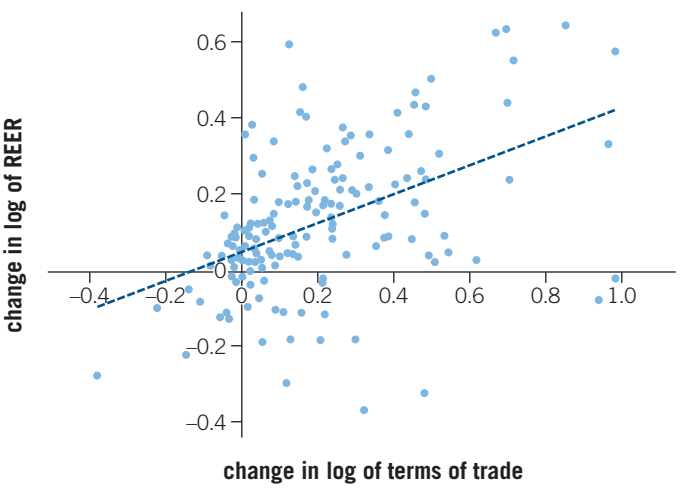
Both effects result in a fall in the output share of nonresource tradables relative to nontradables, and a real exchange rate appreciation—that is, a rise in the price of nontradables relative to that of tradables.

What about empirical evidence? There is relatively robust evidence that terms-of-trade increases cause real appreciation in natural-resource-rich countries (for example, see Spatafora and Warner [1995]). Figure 1 displays changes in real effective exchange rates compared with terms-of-trade changes, and it reveals a correlation during the recent episode of high commodity prices.

The evidence on the shrinking of the manufacturing sector in response to terms-of-trade shocks and real appreciation has been somewhat mixed (Sala-i-Martin and Subramanian 2003). Recently, though, much stronger evidence of Dutch disease is presented by Ismail (2010), who studies the impact of oil price shocks using detailed, disaggregated sectoral data for manufacturing and allowing for the possibility that the extent of Dutch disease will depend on the capital intensity of the manufacturing sector and the economy's openness to capital flows. Ismail finds that, in general, a 10.0 percent increase in an oil windfall is associated with a 3.4 percent fall in value added across manufacturing sectors. Such effects are larger in economies that are more open to capital flows and in relatively less capital-intensive manufacturing sectors, consistent with the theoretical model developed in the study.

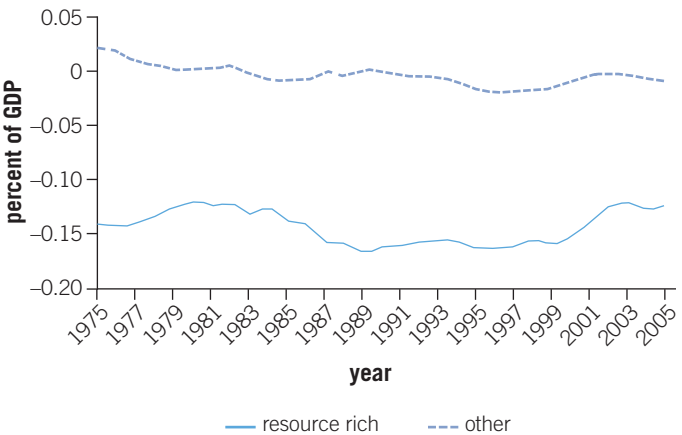
One of the measurement issues with Dutch disease is the difficulty in finding the counterfactual size of the tradables sector—that is, determining how large the tradables sector would have been in the absence of the natural resources. We use the Chenery and Syrquin (1975) norms approach to estimate a norm for the size of the tradables (manufacturing and agriculture) sector for all countries over time, after controlling for per capita income, population, and time trend. Figure 2 shows the difference between the actual size of the

Figure 1. Terms-of-Trade Shocks and Real Appreciation, 2004–08



Source: Authors' calculations, using the International Monetary Fund's Information Notice System.
Note: REER = real effective exchange rate; y = 0.3825x + 0.0481; R^2 = 0.2364.

Figure 2. Dutch Disease Measure for Resource-Rich and Other Countries, 1975–2005



Source: Authors' calculations, based on Chenery and Syrquin (1975).

tradables sector (as defined) and the Chenery-Syrquin norm, for both resource-rich and non–resource-rich countries. For the purpose of this figure, resource-rich countries are defined as those in which the resource sector produces more than 30 percent of GDP. On average, the tradables sector in such countries is lower than the norm by approximately 15 percent of GDP.

Development Implications of Dutch Disease

In general, an increase in wealth resulting from the discovery of a natural resource or a permanent rise in the terms of trade is a positive development: it leads to a new equilibrium with higher incomes and higher consumption of both nontradables and tradables (the latter supplied to a greater extent than before through imports). Moreover, rents from mineral resources collected by government can provide resources for investment in public goods and other development expenditures that would have been unaffordable in different circumstances. Analyzing the historical development of several European countries and the United States, Gelb and Associates (1988) conclude that "there is evidence that, at least in some cases, high-rent activities . . . have provided an important stimulus to growth" (see also the historical review in Lederman and Maloney [2008]).

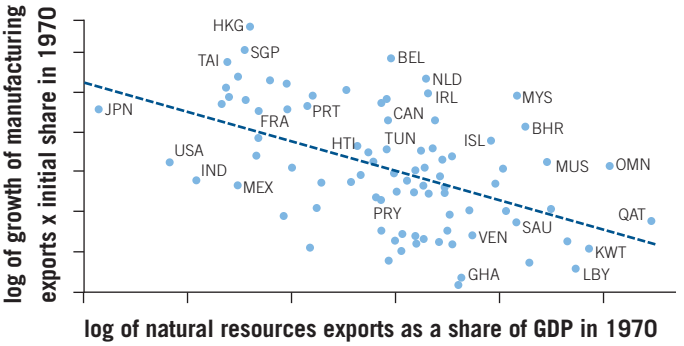
There is, however, a long tradition of economic research arguing that these obvious gains may have come at the expense of growth in the long term, based on the idea that manufacturing and other nonresource tradables possess specific long-term, growth-enhancing qualities (such as the presence of positive technological spillovers, learning by doing effects, or increasing returns to scale in production). Other considerations relate to resource depletion and employment. Given increasing returns and costly, time-consuming learning in manufacturing, the economy would struggle to rebuild sources of growth upon depletion of its natural resource. Also, if Dutch disease affects labor-intensive industries more than capital-intensive ones and increases capital intensity in general—as found by Ismail (2010)—it could increase unemployment as it did originally in the Netherlands and the United Kingdom

Research on these questions typically has not attempted to directly demonstrate the presence of spillovers or other growth-enhancing qualities in the tradables sector that tends to decline as a result of Dutch disease. The evidence is generally more indirect, and a number of threads can be distinguished.

Natural Resource Abundance and Growth

The influential studies by Sachs and Warner (1995, 2001) are representative of a stream of literature that finds that natural resource abundance has a strong negative impact on growth. In particular, they show that an increase of 10 percentage points in the ratio of natural resource exports to GDP in a cross-section of countries during 1970–90 was associated with reduced manufactured export growth (figure 3) and with as much as 0.4–0.7 percentage points lower annual per capita growth in GDP.

Figure 3. Manufacturing Growth and Resource Exports, Selected Economies



Source: Sachs and Warner 2001.
Note: y = 0.74x – 7.49; R^2 = 0.26.

On the other hand, Lederman and Maloney (2007) challenge the robustness of these findings on a number of grounds, including the econometric drawbacks associated with the use of cross-section data and the need for a measure of natural resource abundance better grounded in economic theory. Using panel data and measuring resource abundance as net exports of natural resources per worker, they find natural resource abundance to have a positive effect on growth. They also argue that productivity growth in services or the natural resource sector may not be inferior to that in manufacturing, and they question whether manufacturing really possesses such special characteristics. "If the natural resource sector is not inferior in terms of its growth potential, then this sectoral shift would be of similar import to the canonical displacement of agriculture by manufacturing. . . ."

Exchange Rate Overvaluation and Growth

In principle, the real exchange rate appreciation that is a part of Dutch disease is an equilibrium phenomenon that reflects a change in underlying fundamentals. However, to the extent that the real exchange rate overshoots and becomes overvalued—for example, if agents mistakenly overestimate the permanence of a terms-of-trade improvement—research on the relationship of overvaluation and growth is also relevant. Empirical evidence on this issue generally suggests that substantial exchange rate overvaluation has a strong negative impact on growth. Perhaps among the most carefully designed and well-known of these studies is that of Aguirre and Calderón (2005). Other studies include those of Williamson (2008); Razin and Collins (1999); and Prasad, Rajan, and Subramanian (2006).

Volatility as a Transmission Channel

Dutch disease may result in high export concentration in commodities that have exhibited statistically higher price volatility than that of manufacturing products (Jacks, O'Rourke, and Williamson 2009). Natural resource prices and revenues tend to be volatile because of the low short-term supply elasticity of natural resource output. If government spending is closely related to natural resource revenues, it also will become more volatile. Spending volatility, in turn, will drive volatility in the real exchange rate (through the spending effect described above). A large body of empirical work documents the adverse impact of economic volatility on investment and growth. Among other types of volatility, that in real exchange rates is often found to have an especially clear adverse impact on economic performance. Loayza et al. (2007) provide a recent survey. Serven (2003) documents the impact of real exchange rate volatility on investment. Van der Ploeg and Poelhekke (2009) also show that economic growth declines with the volatility of unanticipated output growth.

Overborrowing

High commodity prices in the 1970s encouraged many resource-abundant countries to use their resources as collateral to borrow abroad to finance large investment projects and high public consumption. When prices plunged in the 1980s, these countries were left with balance-of-payments crises and unsustainable external debt levels (Manzano and Rigobon 2007). A recent paper by Reinhart and Rogoff (2010) suggests that when external debt rises above 60 percent of GDP, annual growth declines on average by 2 percent; and for high levels of debt, growth is cut in half.

Reconciling the Evidence: The Importance of Governance and Policies

Recent work attempts to reconcile the somewhat disparate evidence on the relationship, if any, between natural resource abundance and growth—particularly between cross-section results that find strong evidence of a natural resource curse and time series studies that find primary commodity booms to be generally positive for growth. Collier and Goderis (2007) adopt a panel cointegration methodology that enables them to disentangle the short- and long-term effects of commodity prices on growth, looking at 130 countries during 1963–2003. They find that commodity price booms do have positive short-term impacts on growth, but that the impacts are significantly negative in the long term. However, these negative long-term effects exist only for "point source" natural resources like oil and minerals, and only in countries with bad governance.

The literature suggests that natural resource riches create or exacerbate institutional weaknesses. First, the discovery of natural resources or a natural resource boom might *induce a deterioration* in governance, for example, by stimulating greater corruption or by provoking powerful interest groups to engage in more intense political or bureaucratic battles for control and redistribution of natural resource rents, leading even to armed conflict or civil war. Tornell and Lane (1999), for example, model a "voracity effect" in which a terms-of-trade improvement leads to lower growth by provoking a struggle between powerful groups, leading to an increase in unproductive fiscal redistribution that is more than proportional. As large increases in spendable revenues divert production and the focus of bureaucrats away from the productive activities, revenues from rents could lead to a detachment of the governments from their tax bases, like in "rentier" states (Levi 1988).

The panel data study by Collier and Goderis (2007), however, does not find statistically significant evidence that natural resources directly worsen governance or institutional quality, although it does find evidence that the quality of existing institutions *conditions* the quality of economic policies that countries use to deal with natural resource abundance—that is, with how natural resources affect growth. Mehlum, Moene, and Torvik (2006) suggest that, in countries with "grabber-friendly" institutions, a natural resource boom will lead to a shift out of productive activity into unproductive rent seeking. In countries with "producer-friendly" institutions, on the other hand, a natural resource boom attracts resources to move into productive activity. In the empirical part of their study Mehlum, Moene, and Torvik find that the negative impact of natural resources on growth steadily falls as institutional quality increases. When institutional quality is sufficiently high, the natural resource effect becomes positive. Robinson, Torvik, and Verdier (2006) develop a model, in countries with weak institutional controls on the use of clientelism and patronage to influence elections, where a natural resource boom creates incentives for politicians to use revenues on expanded public sector spending and employment to improve their chances of staying in power.

Excessive public spending appears to be at the heart of economic mismanagement in the wake of natural resource booms. The following section looks at this and other policy considerations that have been found useful to control the potential negative impacts from Dutch disease.

Policy Responses

The actual impacts of natural resources on an economy will depend to a large extent on policies.

Fiscal Policy

Highlighting the role of fiscal policy in the natural resource boom episodes in the 1970s and 1980s, Gelb and Associates

(1988) conclude that "the most important recommendation to emerge from this study is that spending levels should have been adjusted to sharp rises in income levels more cautiously than they actually were." Fiscal policy is the main instrument for dealing with the negative impacts of Dutch disease for the following reasons: it is a tool that can make the increase in wealth permanent, it can constrain the spending effect (the main channel of negative impacts transmission in low-income countries), and it can smooth expenditures to reduce volatility.

There is empirical evidence that government spending is correlated with the increases in resource revenues. (For example, see Katz et al. [2004] for the case of African countries.) Saving revenue proceeds abroad and reducing aggregate spending will help if the spending effect is believed to be one of the main transmission channels. Smoothing spending over time also would help reduce volatility and its harmful impacts on the economy.

The smoothing of spending is achieved through a detachment of spending from the resource revenues, and the introduction of fiscal rules for how much of the resource revenues can be spent and how much saved in a natural resource fund (see Davis, Ossowski, and Fedilino [2003]). The use of a medium-term expenditure framework was found useful for successful implementation of fiscal policy in resource-rich countries.

Much has been written on the best institutional arrangements to govern nonrenewable natural resource revenues (see Barnett and Ossowski [2002] for a review). Although adequate revenue management does not always require setting up a special fund, an increasing number of countries have institutionalized fiscal rules to express their preferences over management of the resource revenues by creating an explicit natural resources fund, with strict rules governing payments into and out of the fund. Depending on the purpose of the fund (reducing volatility, constraining the spending effect, or investing in future growth), a stabilization fund, savings fund, or investment fund can be created. Incorporating the natural resources fund into the general budgetary system helps in making decisions on striking a balance between dealing with the impacts of Dutch disease and pursuing development objectives. A fund—however simple and transparent—cannot resolve complex fiscal policy issues by itself; it can only aid in implementing an already sound fiscal policy.

An adequate fiscal policy would be balanced between the need to implement development objectives and the need to constrain the spending effect. A fiscal rule called the "permanent income approach" provides an important benchmark for fiscal policy (van Wijnbergen 2008). Applied only to exhaustible resources, this approach recommends first calculating the expected net present value of all expected net future revenues from these resources; and then calculating the constant real amount (or annuity) that, received forever, would yield the same net present value. The permanent income approach then recommends restricting government spending from these exhaustible natural resource revenues to only this constant annuity amount, while saving the rest abroad. Later, when exhaustible natural resources have run out, the government would be able to draw on its accumulated financial assets to continue spending the same constant annuity amount.

Whereas saving most of the revenues in order to smooth consumption may be part of the development strategy in some countries, the development needs may be too great in other (especially, low-income) countries. Collier et al. (2009) argue that directing all resource revenues to current consumption is wasteful and inequitable; however, postponing the consumption into the far-distant future is wasteful and inequitable as well. They suggest an *"optimal" fiscal rule for a developing country.* This rule would make it possible to save some of the revenues (less at the beginning and more at the end of the high-resource-revenues period) and allow for more investment and consumption from the resource revenues than in the permanent income strategy. Perfect implementation of this approach would require strict fiscal discipline and clear spending rules.

Spending and Structural Policies

Spending policies also can help curb Dutch disease. Directing spending toward tradables (including imports) rather than nontradables would help slow the impacts through the spending effect. Improving the quality of spending to ensure that productivity in nontradable sectors increases alongside the structural changes also would be important. If the spending effect works also through private spending, general policies toward improving productivity of the private firms would help reduce the impacts.

Policies that encourage demand for imports—for example, trade liberalization—would help reduce demand pressure on the nontradables sector and, therefore, may be part of the structural policy response to Dutch disease.

To the extent that the country continues to experience some real exchange rate appreciation and other adverse effects of rising natural resource revenues, there may be a case for orienting spending especially to investments that would help enhance productivity in the nontradables sector of the economy—such as investments in transport and logistics infrastructure, expanded investment in education and skills training to foster faster absorption of foreign technology and innovation, and so on. Building rural roads is usually one of the most powerful poverty-reducing investments, and it could involve more local labor. However, special care needs to be taken to ensure that there is adequate capacity to pri-

oritize and implement public projects, especially in low- income countries.

The country also may undertake other reforms that do not necessarily involve large expenditures, but that enhance economywide productivity: improvements in business regulations, reductions in red tape, reduction of monopolistic barriers that discourage innovation, and other improvements in the overall business climate. Such policies will reduce the regulatory burden on the nonresource economy. Other policies, such as ones that promote foreign direct investment, could create conditions for learning by doing through spillover effects.

Monetary and Exchange Rate Policies

The choice of an appropriate anchor for monetary policy is especially important for macroeconomic management in commodity-exporting countries. For example, inflation targeting has been an extremely successful instrument, although it may result in a monetary policy that is so tight it puts appreciation pressure on the exchange rate when commodity prices increase. Recently, there has been discussion of developing more appropriate forms of price targeting in commodity-exporting countries. Whereas Consumer Price Index inflation targeting has worked in many countries, it has been less successful in stabilizing relative tradables/nontradables prices in commodity exporters. Frankel (2009) shows that targeting of a more specific price index that has a higher share of export commodity prices and/or production prices (such as the Producer Price Index or the Export Price Index) would have been more appropriate, although more difficult to administer or make transparent to the general population.

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