2

Natural Resources and Economic Performance

One can think of natural resources as a windfall, like a gift that should make you wealthier. An 18-year-old who gets a trust fund should be wealthier at age 40 than her twin who did not get the trust fund, unless the trust fund has some nefarious effects. But as revealed by a glance at table 2.1, countries whose wealth is heavily derived from the exploitation of natural resources generally are not rich—indeed they tend to be poorer and less democratic than countries whose wealth is based on the accumulation of human and physical capital. These relationships broadly hold for the entire sample for which data are available (figures 2.1 and 2.2).

What is driving this seemingly paradoxical relationship between the exploitation of natural resources and development? Understanding the precise channels through which resource dependency might affect outcomes is necessary for designing policies to address the issue. Is it an issue of abundance, the availability of resource-derived rents, or the centrality of resources in the economy? What is the direction of causality in this crude correlation? Are countries poor and undemocratic because they are dependent on the exploitation of natural resources—or are countries rich because they have developed the institutions and practices that have enabled them to move from extraction to the production of high-value-added services and manufactures? Is the dependence of poor countries on resources a manifestation of underlying institutional weaknesses that have prevented them from moving into more remunerative activities? In short, is the "resource curse" a cause or an effect?

This chapter surveys some of the channels through which the exploitation of natural resources may inhibit economic performance, examining in turn the possible roles of declining terms of trade, price volatility, resource pulls, and Dutch disease. It finds that there is cause for concern about all chan-

Table 2.1 Top and bottom countries by share of natural capital in country's total wealth, 2005

Country	Share of natural capital in total wealth (percent)	GDP per capita (2000 US dollars)	Polity IV score
Top 10 percent			
Republic of the Congo	244	1,113	–4
Uzbekistan	144	684	–9
Burundi	123	128	6
Guyana	114	989	6
Angola	96	888	–2
Papua New Guinea	95	626	4
Liberia	95	187	5
Chad	93	308	–2
Central African Republic	87	227	–1
Bhutan	85	964	–6
Brunei Darussalam	79	18,312	n.a.
Azerbaijan	76	1,183	–7
Gabon	72	4,029	–4
Democratic Republic of the Congo	70	92	4
Saudi Arabia	66	9,440	–10

(continues on next page)

nels, at least with respect to the production of certain commodities and in certain settings. Even setting aside sustainability and optimal rate of extraction concerns, the exploitation of natural resources clearly poses particular problems for economic policy management. But the chapter concludes that whatever the nature of the resource curse, a complete understanding requires moving beyond economics, narrowly defined, and taking up the issues of political institutions (addressed in chapter 3).

Declining Terms of Trade

Although it may come as a shock to people who came of age during the long current bull market in commodities, for much of the last century, the real value of commodities was believed to be subject to long-term decline. In the 1950s, Argentinean economist Raúl Prebisch (1950) argued that commodities were subject to a long-term secular decline in their terms of trade relative to manufactures (see also Singer 1950). A variety of theoretical conditions could generate this empirical regularity. One would be a low income elasticity of demand for primary commodities, as a result of intrinsically low elasticities (for example, Engel curves for staple foods) or an indirect result of techno-

Table 2.1 Top and bottom countries by share of natural capital in country's total wealth, 2005 *(continued)*

Country	Share of natural capital in total wealth (percent)	GDP per capita (2000 US dollars)	Polity IV score
Bottom 10 percent			
Macao, China	0	22,024	n.a.
Singapore	0	28,389	–2
Hong Kong, China	0	30,395	n.a.
St. Lucia	0	4,827	n.a.
Japan	0.4	39,295	10
Luxembourg	0.7	51,980	n.a.
Belgium	0.9	24,034	10
United Kingdom	0.9	28,261	10
Germany	1.0	23,564	10
South Korea	1.1	13,802	8
Seychelles	1.1	7,209	n.a.
Switzerland	1.3	35,860	10
Iceland	1.4	36,129	n.a.
Portugal	1.4	11,587	10
France	1.5	22,734	9

n.a. = Polity IV Project does not report these countries in its data

Note: Polity scores range from 10 (most democratic) to –10 (least democratic), based inter alia on the relative competitiveness of executive recruitment, constraints on the chief executive, and competitiveness of political participation.

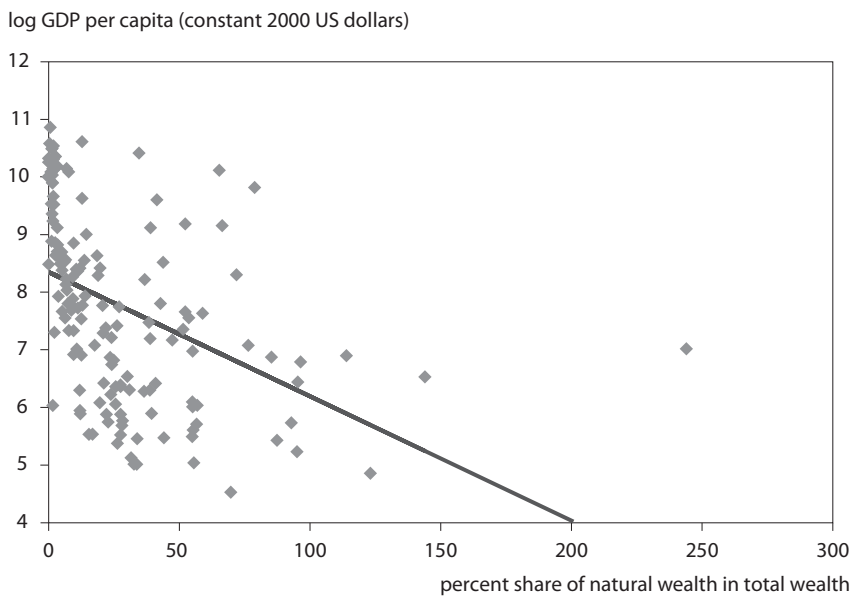
Source: World Bank; Polity IV Project, www.systemicpeace.org/polity/polity4.htm (accessed on February 20, 2014).

logical change either generating alternatives (for example, artificial rubber) or conserving on the quantity of natural resources needed in industrial production. Another is lack of product differentiation, contributing to highly competitive markets and the dissipation of rents.[1] Such a secular deterioration in their terms of trade in the absence of significant productivity advances would create an ongoing balance of payments challenge for developing countries reliant on commodity exports, effectively forcing them to run uphill by exporting ever larger quantities of raw materials to finance industrial imports.[2]

1. In the case of nonrenewable resources, there is the Malthusian argument of exhaustion, which would imply that prices should rise in the long run. This view finds its greatest prominence with respect to "peak oil," but it has spawned a host of "peak" imitators, including water, potassium, and phosphate (Hendrix 2011).

2. If productivity increases are sufficiently large, countries could be better off even with declining terms of trade. Indeed, it is even possible that productivity improvements could be the cause

Figure 2.1 Relationship between per capita GDP and share of natural wealth in total wealth



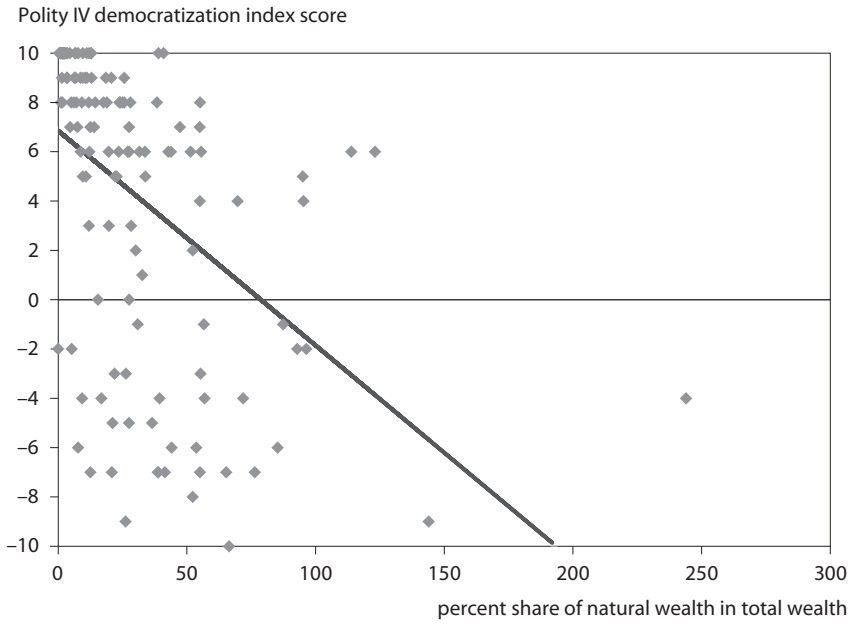
Sources: World Bank, *Changing Wealth of Nations*, http://data.worldbank.org/data-catalog/wealth-of-nations (accessed on February 19, 2014); GDP per capita (constant 2000 US dollars): World Bank, *World Development Indicators*.

Whether what came to be known as the "Prebisch-Singer hypothesis" is correct is an empirical matter; unsurprisingly, there is a lack of consensus, turning in large part on highly technical statistical issues.[3] Perhaps the most exhaustive study, based on 400 years of price data, finds support for the Prebisch-Singer hypothesis for only a handful of the 25 commodities examined (aluminum, bananas, rice, sugar, and tea), meaning that their prices fell for all or some significant later fraction of the sample period (Harvey et al. 2012). For beef, coal, cocoa, coffee, copper, cotton, gold, hide, jute, lamb, lead, nickel, oil, pig iron, silver, tin, wheat, wool, and zinc, David Harvey et al. find

of declining prices (Tilton 2013). Chapter 7 examines the advisability of adopting policies to encourage diversification.

3. Studies finding confirmatory evidence for the Prebisch-Singer hypothesis include Spraos (1980), Sapsford (1985), Thirlwall and Bergevin (1985), Grilli and Yang (1988), and Powell (1991). Apart from nontrivial data issues (see Svedberg and Tilton 2006, 2011; Cuddington 2010; and Harvey et al. 2010), two statistical issues are at play: uncertainty regarding the true time series process generating the series and the possible presence of infrequent structural breaks in trend. Depending on how these two issues are handled, the same data set can generate apparently contradictory results regarding a secular deterioration in the relative price of commodities. See Cuddington, Ludema, and Jayasuriya (2007); Cuddington and Nülle (2013); and Harvey et al. (2013).

Figure 2.2 Relationship between democratization and share of natural wealth in total wealth



Sources: World Bank, *Changing Wealth of Nations*, http://data.worldbank.org/data-catalog/wealth-of-nations (accessed on February 19, 2014); Polity IV Project, www.systemicpeace.org/polity/polity4.htm (accessed on February 20, 2014).

no evidence of a price trend. Only in the single case of tobacco do they discover a positive price trend.[4]

Given the conceptual challenges of establishing a global price, the quality of the data, falling computational costs, and increasingly easy access to ever more sophisticated forms of time series analysis, it is not surprising that there is no consensus on these results. In particular, there is some evidence of "super-cycles" in the data and possible evidence of a positive upswing in the last decade or so (Cuddington and Jerrett 2008, Erten and Ocampo 2012, Harvey et al. 2013, and Yamada and Yoon 2013). Harvey et al. (2013) discover commodity price cycles of roughly 24 (cocoa) to 39 (copper) years. A period of 20 to 40 years is probably long enough to be relevant in terms of establishing a "new normal" and affecting economic and political behavior.

Developing countries typically do not export baskets of commodities: As Harvey et al. (2012) observe, three or fewer commodities account for virtually

4. The results reported in Harvey et al. (2010), which finds that nearly half the commodities had secularly declining prices, are erroneous because of an error in the way in which the various historical price series were converted to a common currency.

all exports for 40 least developed countries. And, regardless of the validity of the Prebisch-Singer hypothesis for commodities as a class, the hypothesis may well describe the experience of particular developing countries. In 2011, the five commodities that Harvey et al. identify as having experienced a secular deterioration in their terms of trade accounted for 45 percent of the exports of Guyana, 21 percent of the exports of Malawi, and 20 percent of the exports of Belize (table 2.2).[5] Fortuitously, Malawi also has the world's highest concentration of exports in tobacco (40 percent).[6]

The countries listed in table 2.2 are predominantly small and poor. As a rule, the exports of small countries tend to be concentrated in relatively few products, so the degree of specialization itself is not surprising. Presumably their low level of per capita income is linked to the fact that they specialize in commodities with secularly declining prices. As a group, they also have unusually conflictual political histories.

Commodity Price Volatility

If a few small developing countries defined the extent of the issue, it would amount to a significant, though relatively localized, problem. A related, though distinct, concern is that commodity prices may be highly volatile and the instability of export revenues may discourage saving and investment, complicating macroeconomic policy management, encouraging a boom-bust mentality, contributing to welfare-reducing instability in income and consumption, and ultimately slowing growth in income and consumption (UN 1952, Nurkse 1958). Developing countries do experience greater macroeconomic volatility than developed countries, and this volatility has a negative impact on economic performance. How much of this macroeconomic volatility can be attributed to commodity price volatility is an empirical issue.

The stylized facts, based on an examination of data on commodity prices going back as far as 1700, are that commodity prices are indeed more volatile than manufactures prices, there is little evidence of increased commodity price volatility over time, and periods during which global market integration is high are associated with less volatility than periods of wars or protectionism (Jacks, O'Rourke, and Williamson 2012). David Jacks, Kevin O'Rourke, and Jeffrey Williamson interpret their first finding—that commodity prices have

5. For the purposes of this calculation, exports of bauxite rather than aluminum were used. Researchers include aluminum in the commodity basket because good price data exist going back to the late 1800s, when an electrolytic reduction process was discovered that essentially turned aluminum from a precious into a mass-produced industrial metal. The process is very energy intensive, however, and today the local production of aluminum is very much a function of local energy prices rather than the location of bauxite ores. This characteristic explains the recent concentration of aluminum smelting in the Gulf countries. For our purposes, the location of the mining of the primary input, not the smelting, is more relevant.

6. Other countries with substantial concentrations in tobacco include Aruba (32 percent) and Zimbabwe (20 percent).

Table 2.2 Countries most specialized in exports with secularly declining prices, 2011

Rank	Country	Total goods exports in commodity basket (percent)[a]
1	Guyana	45.4
2	Malawi	21.1
3	Belize	19.5
4	Sri Lanka	14.8
5	St. Vincent and the Grenadines	14.1
6	Mauritius	13.7
7	Jamaica	12.9
8	Rwanda	12.7
9	Guatemala	12.2
10	Ecuador	10.5

Note: Countries have been ranked out of 148 countries by 2011 export data.

a. Basket of commodities with secularly declining prices includes bananas (including plantains, fresh or dried), tea, rice, sugar and confectionary, bauxite, and concentrates of aluminum.

Source: UN Comtrade Database.

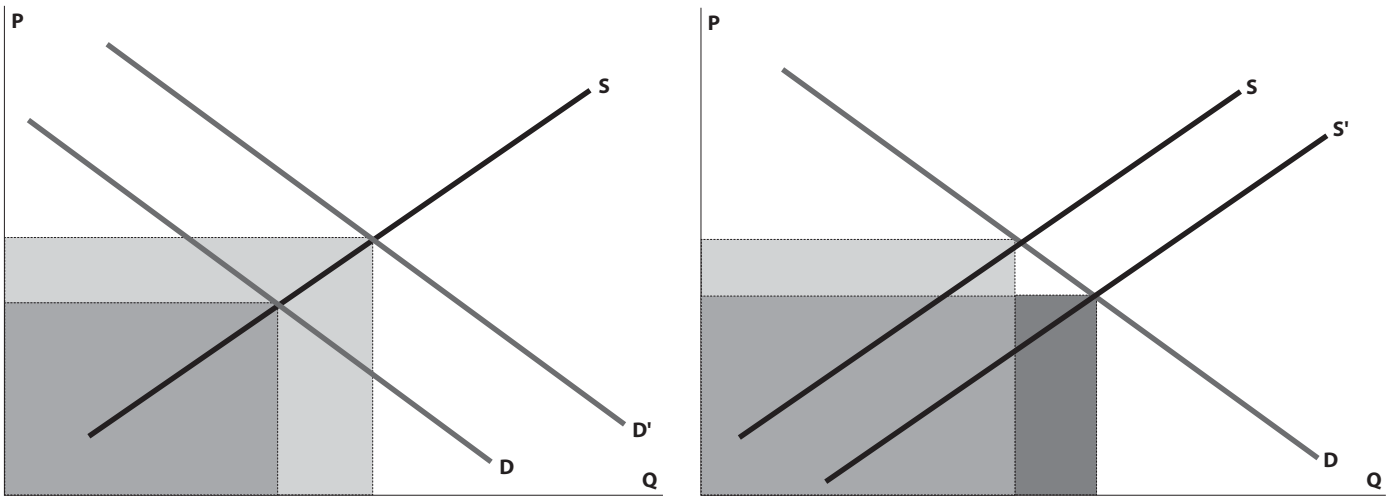
always been more volatile than prices of manufactures, extending deep into the 18th century, before the Industrial Revolution—as contrary to the hypothesis that asymmetries in product differentiation or the degree of oligopoly contribute to the "rent dissipation" explanation for the secular decline in the terms of trade.

But in terms of economic performance, not all volatility is alike. Ultimately, one is concerned about the volatility of income and consumption, not prices per se. From this perspective, the implications differ, at least in a closed-economy model (figure 2.3). In the case of demand shocks, the impact on quantity magnifies the price impact on revenues. In the case of supply-side shocks, the price and quantity effects move in opposite directions, stabilizing revenue. Agricultural products may be more susceptible to weather-related supply shocks, whereas nonfood commodities may be more prone to business cycle–related demand shocks. Empirically, commodity price volatility appears to be predominantly a result of the less worrisome supply-side shocks.[7]

This argument has to be relaxed in an open-economy setting. In this situation, it is not enough for the shocks to emanate from the supply side: They must be common across producers. This may not be an issue if, for example,

7. See Murray (1978), Behrman (1984), and Lutz (1994). It is also the case that export instability may result from either domestic or foreign shocks, although the latter appear to predominate (Wong 1986).

Figure 2.3 Revenue effects of demand and supply shocks



P = price; Q = quantity; D = demand; S = supply

Source: Authors' illustration.

common weather conditions affect agricultural producers, such as contiguous cocoa producers in Côte d'Ivoire, Ghana, and Togo. The opening of a new copper mine in Mongolia may be bad news for producers in Chile or Zambia, however.

The arguments of the United Nations' research group and Ragnar Nurkse (1958) regarding commodity price volatility launched a body of empirical literature that generated a mélange of apparently contradictory conclusions regarding the impact of price volatility on saving, investment, and growth among commodity exporters.

For a number of reasons, fiscal policy in commodity-exporting countries appears to have a procyclical bias (Heinrich 2011).[8] There is a tendency for governments to increase low-quality public investments, which cost money in the short term and do not generate adequate offsetting revenue flows in the long term, contributing to long-run fiscal woes. There is also a tendency to expand the size of the public sector, in terms of both the number of public employees and their wages, as well as to increase subsidies to food and other products. Once made, such commitments are difficult to reverse when export prices weaken.

External capital flows also tend to be procyclical. This response can be endogenous to the expansionary fiscal policy noted above. Also, if resource revenues contribute to a real appreciation in the exchange rate, the real resource costs of debt service can appear (temporarily) low, encouraging borrowing. There is therefore a tendency for fiscal policy to be procyclical. That said, in some countries there is evidence of learning and improved management. Chile, for example, makes better use of its copper revenues than it did a generation ago, and some Gulf energy producers made better use of their revenues during the recent boom than they did in the 1970s, allocating resources to improving human capital through education expenditures (see chapter 7).

What about private saving? The expected impact of either price or revenue volatility is not unambiguous. From a permanent income hypothesis perspective, if the saving response were asymmetric, with high saving in boom times not fully offset by dissaving in busts—as a result of uncertainty about the duration of the bust, for example—one might expect volatility to actually increase aggregate saving. Indeed, some studies make precisely this claim (Knudsen and Parnes 1975, Nugent and Yotopoulos 1976). But instability also creates "capital risk" (uncertainty regarding the value of and return on capital investment), which discourages saving. Christián Morán (1983) obtained results consistent with this interpretation.

The literature has generated conflicting results as to whether private investment is negatively or positively correlated with export instability. Peter Kenen and Constantine Voivodas (1972) find a negative correlation; Jeffrey Nugent and Pan Yotopoulos (1976) and David Dawe (1996) find a positive

8. See Caceres and Medina (2012) for an analysis of oil price volatility for the fiscal policies of oil exporters.

correlation. Both Alasdair MacBean (1966) and Kenen and Voivodas (1972) find that export instability is positively correlated with investment growth, which they associate with higher rates of investment.

Philip Brock (1991) develops a stochastic optimal control model based on the maximizing behavior of a risk-averse representative agent. It provides a useful framework for sorting through the evidence. He shows that the MacBean and Kenen and Voivodas results are consistent with a growth path in which instability reduces long-run accumulation by raising the risk premium. This interpretation appears to be borne out in results obtained by Sule Özler and James Harrigan (1988), who find that export uncertainty is negatively correlated with capital stock growth rates.

Ultimately, what matters is income and consumption growth. Although studies reach a variety of conclusions, the preponderance of evidence would appear to support the notion that export uncertainty is negatively correlated with income growth (van der Ploeg and Poelhekke 2008).[9] Matthias Lutz (1994) observes that although export instability may be negatively associated with growth, its influence on performance is weakest for the lowest-income countries and primary products exporters, noting that "there must be other important factors contributing to growth in these countries"; export instability is not the preponderant influence. Indeed, the direction of causality is ambiguous. Are these countries poor because the prices of their exports are unstable, or do they specialize in commodities because their weak business-enabling environments frustrate the emergence of more complex forms of production? To reiterate a point made earlier with respect to possible secular deterioration in the terms of trade, the conclusion that the volatility of commodity prices as a class may not be growing may be little recompense to a policymaker in a poor country whose exports are highly unstable.

Resource Pulls and Crowding Out

It is unsurprising that whatever their ultimate empirical validity, these arguments regarding the long-term trends in and volatility of commodity prices were used to justify the adoption of import-substituting industrialization policies in many developing countries, as well as the establishment of commodity cartels bent on stabilizing—and raising—commodity prices. The Organization of Petroleum Exporting Countries (OPEC) is the best known and most successful of these initiatives, but many others were tried—and largely failed—in commodities as diverse as coffee, copper, and tin, to name but three.

To be sure, some of the most successful economies of the last half-

9. See also the exchanges between Glezakos (1973, 1984) and Savvides (1984); Lam (1980), Tan (1983), and Glezakos (1983); and Özler and Harrigan (1988) and Lutz (1994). Dawe (1996) finds that instability is positively correlated with investment but negatively correlated with growth, which he asserts could be caused by uncertainty about future prices reducing the rate of return on investment and/or investment booms undertaken in the context of closed capital markets.

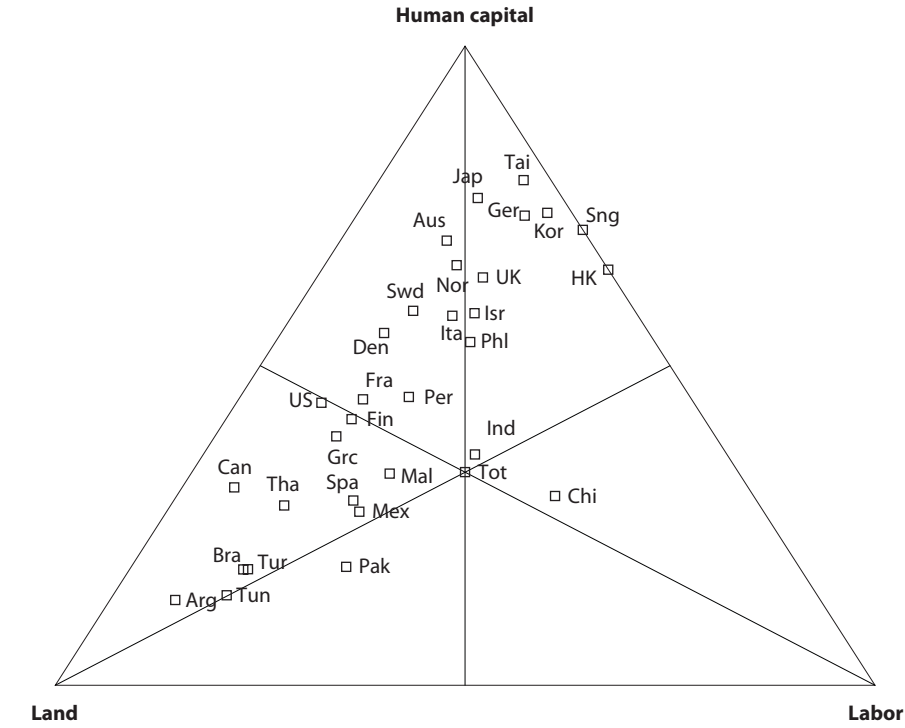
century—Japan, South Korea, and Taiwan, for example—have not been abundantly endowed in natural resources, but the cross-country statistical evidence on the relationship between abundance and growth is ambiguous (see Leamer et al. 1999, Rodríguez and Sachs 1999, Lederman and Maloney 2007). Figures 2.4 and 2.5 project labor, physical capital, human capital, and arable land endowments onto a two-dimensional diagram. (For reasons of data availability and tractability, arable land is used as a proxy in this illustration for natural resources more broadly. It is not the only resource; its use in this application is purely illustrative.) The average world endowment is represented by the intersection in the center of the triangle of the three rays emanating from its vertices. As one gets closer to the corner, the relative abundance of that factor increases. So, for example, in figure 2.4, Japan is very land scarce (i.e., it is far from the land vertex) and has a higher capital-labor ratio than South Korea, which, in turn, has a higher ratio than Taiwan.

It does appear that land- or resource-scarce countries developed manufacturing activities at an earlier stage in their development, specialized more intensively in those activities, or grew faster than land- or natural resource–abundant countries, however (Leamer 1987; see also Kuralbayeva and Stefanski 2013). In this distinctive "land- or resource-scarce" trajectory of development, natural resource–based activities do not crowd out the development of manufacturing to the extent that might occur in more resource-abundant economies. And distinct from some other development trajectories possible with greater resource abundance, real wages rise monotonically with the accumulation of capital: The interests of capitalists and workers are more closely aligned than in some other potential settings. Industrial promotion policies may be less politically contentious than in countries with greater resource abundance, thanks to the relative weakness of a rural landowner class.[10] Industrial policy may be "leaning with the wind" and relatively popular, if not Pareto-improving. Rates of return on education may be particularly high, encouraging the accumulation of human capital, facilitating the transition to industrial activities of greater complexity.[11] As a result, these economies experience relatively smooth industrial upgrading and rising welfare (Grossman and Helpman 1991). In contrast, development in more resource-abundant economies may be intrinsically more conflictual, regardless of the specifics of the political system. Of course, internal conflict may also contribute to the development of certain types of political institutions, as discussed in greater detail in the next chapter.

10. Kiminori Matsuyama (1992) distinguishes between open and closed economies. In an open economy, where prices are determined parametrically in the world market, high output and productivity in the agricultural sector may squeeze out the manufacturing sector, in some circumstances reducing welfare.

11. Thorvaldur Gylfason (2001) finds that the share of natural capital in national wealth is negatively associated with public expenditure on education relative to national income, expected years of schooling for girls, and gross secondary school enrollment rates.

Figure 2.4 Endowment triangle for labor, human capital, and land (1968 data)



Arg = Argentina, Aus = Austria, Bra = Brazil, Can = Canada, Chi = China, Den = Denmark, Fin = Finland, Fra = France, Ger = Germany, Grc = Greece, HK = Hong Kong, Ind = India, Isr = Israel, Ita = Italy, Jap = Japan, Kor = Korea, Mal = Malaysia, Mex = Mexico, Nor = Norway, Pak = Pakistan, Per = Peru, Phl = Philippines, Sng = Singapore, Spa = Spain, Swd = Sweden, Tai = Taiwan, Tha = Thailand, Tun = Tunisia, Tur = Turkey, UK = United Kingdom, US = United States, Tot = Total

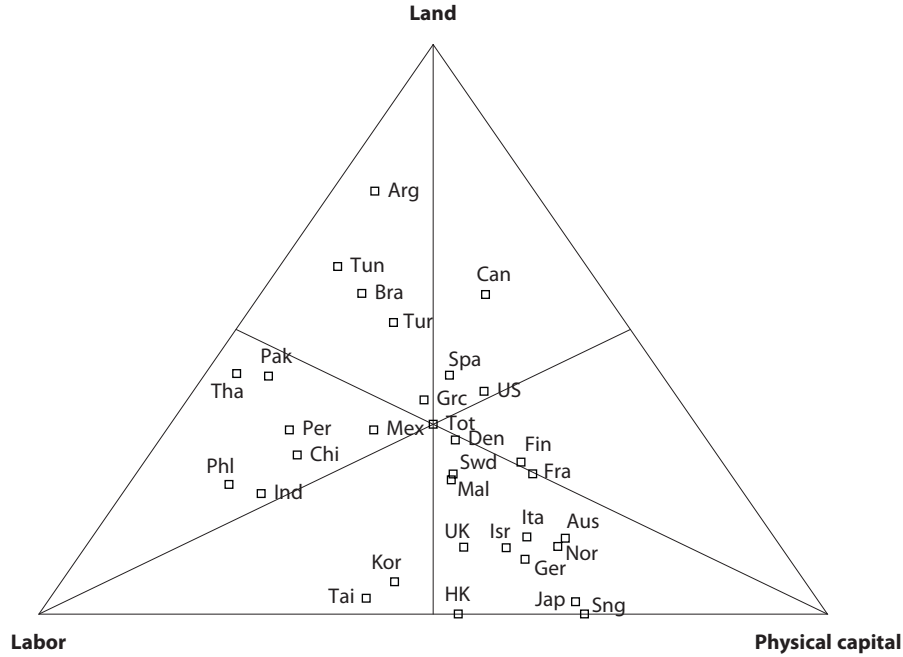
Source: Noland (1997).

Dutch Disease

A variant on the resource pull argument for the paradoxical result that the existence of valuable commodities may detract from economic performance is the "Dutch disease" phenomenon.[12] Named for the discovery of natural gas in the North Sea off the coast of the Netherlands in the 1950s, Dutch disease refers to the tendency of the real exchange rate to appreciate following the discovery of a valuable commodity or during commodity price booms, rendering traditional industries internationally uncompetitive. Especially if there are path

12. See Magud and Sosa (2010) for a survey of the literature. Gregory (1976), Corden and Neary (1982), and Neary and van Wijnbergen (1986) are early expositions. Jeffrey Sachs (2007) disputes the notion that Dutch disease is necessarily a problem to be avoided.

Figure 2.5 Endowment triangle for labor, physical capital, and land (1968 data)



Arg = Argentina, Aus = Austria, Bra = Brazil, Can = Canada, Chi = China, Den = Denmark, Fin = Finland, Fra = France, Ger = Germany, Grc = Greece, HK = Hong Kong, Ind = India, Isr = Israel, Ita = Italy, Jap = Japan, Kor = Korea, Mal = Malaysia, Mex = Mexico, Nor = Norway, Pak = Pakistan, Per = Peru, Phl = Philippines, Sng = Singapore, Spa = Spain, Swd = Sweden, Tai = Taiwan, Tha = Thailand, Tun = Tunisia, Tur = Turkey, UK = United Kingdom, US = United States, Tot = Total

Source: Noland (1997).

dependencies, irreversibilities, or hysteresis effects (meaning that conditions will not return to their original state), such temporary booms can deindustrialize the economy, perhaps permanently. Policies to dampen the exchange rate effects would therefore be justified.[13]

In a meta-analysis of 60 papers, Nicolás Magud and Sebastián Sosa (2010) find evidence that Dutch disease shocks are indeed associated with real exchange rate appreciation and a shift in the composition of output away from tradables, but not with a reduction in growth. If the effects are reversible and do not affect growth, why worry?

If there are asymmetries in adjustment or hysteresis effects, Dutch disease could be a problem in the long run. Analyzing panel data, Rabah Arezki and Kareem Ismail (2013) find that there are indeed asymmetries in adjustment:

13. Pietro Peretto (2012) develops a model that generates similar effects in a closed-economy context.

Governments' current spending (as distinct from capital investment) increases during booms but is downwardly sticky during busts, as is the real exchange rate, which could generate hysteresis. Reda Cherif (2013) links such effects to the composition of output, illustrating this possibility in a two-country model with a differentiated-products–producing manufacturing sector subject to scale economies or learning by doing. A commodity boom (or indeed any transfer that generated a real exchange rate appreciation) could permanently retard the development of manufacturing in the poorer/lower-productivity/less developed country by shifting resources out of the tradables sector subject to the externality. Empirical analysis of cross-country data supports the notion that the interaction of resource dependence and an initial technology gap widens that gap over time, suggesting that the phenomenon is more problematic for less developed countries.

Possibly as, or more, important in terms of long-run economic performance is the fact that the procyclicality of booms facilitates engagement in ineffective industrial promotion policies to promote nonfavored activities, including downstream resource-based industry. Historically, such policies have included the expansion of high-cost domestic manufacturing via overly protective infant industry policies and the promotion of domestic food self-sufficiency, even in some Middle Eastern countries endowed with highly challenging climates from the standpoint of food production (Hendrix 2011). Programs to grow wheat in Qatar and Saudi Arabia are examples.

Richard Auty (1993) identifies four critical challenges in economies prone to Dutch disease:

- insufficiency of saving during booms,
- establishment of unsustainable patterns of saving and investment during booms,
- neglect of lagging manufacturing and/or agricultural sectors during booms, and
- tardy adjustment to the postboom downturn.[14]

The last point may present particular challenges in all but the lowest-income countries. Although at very low levels of development, it may be possible for agriculture to reabsorb some labor unemployed in the downswing, even in still relatively poor countries, such as Ghana, people are unlikely to move back to the farm. The result may be a surge in urban unemployment and underemployment.

The Dutch disease phenomenon has encouraged a variety of policies to dampen exchange rate swings and smooth procyclicality, as discussed in

14. He concludes by observing, "A striking feature of the policy response of governments in mineral economies is the persistent tendency towards over-optimism concerning future minerals prices" (page 21).

chapter 7. Yet although Dutch disease complicates exchange rate management and fiscal policy and may encourage misguided sectoral promotion interventions, it is unlikely to represent the whole explanation for the underperformance of commodity exporters; recent research suggests that it is probably not the primary channel through which natural resource abundance could negatively affect economic performance (Sala-i-Martin and Subramanian 2003, van der Ploeg 2006).

Assessing the Resource Curse

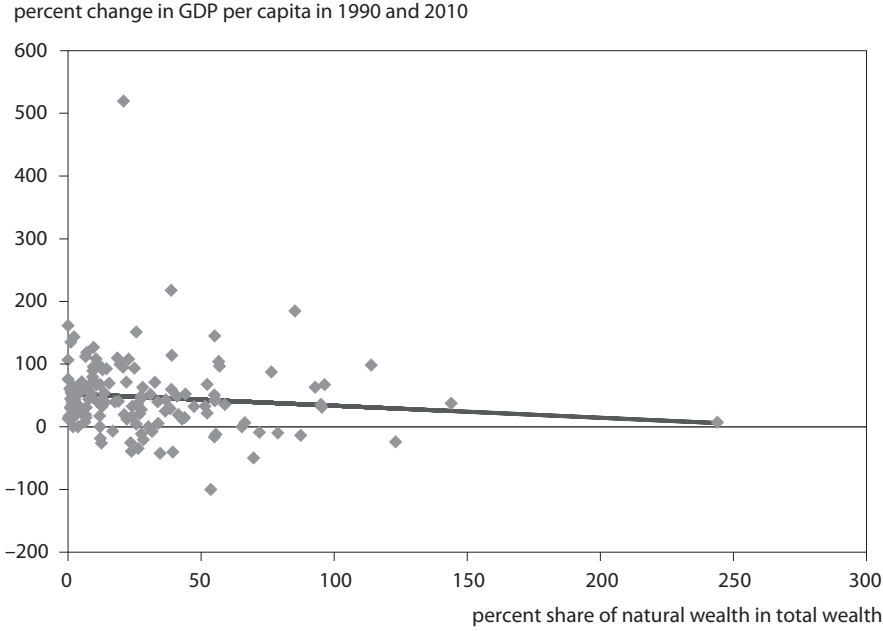
Reliance on the production of primary products may negatively affect economic performance through a variety of channels, including deterioration in the terms of trade, revenue instability, crowding out other activities with greater long-run potential, and Dutch disease. But the evidence on none of these factors is overwhelming. Taken together, are these factors a significant drag on growth or development?

Scatterplots display economic growth against the share of natural wealth in total national wealth (figure 2.6) and the ore and metal share of total exports (figure 2.7). (Natural capital is defined as the present discounted value of subsoil minerals, timber, cropland, and pasture land. The use of this broad definition in this illustration is driven by data availability.) Although there appears to be a modest negative relationship between growth and either of these measures of resource dependence, it is not dramatic. The question is whether this modest relationship is strengthened or disappears when other factors that might affect growth are taken into account.

Jeffrey Sachs and Andrew Warner (1997) examine the performance of a cross-section of countries for the period 1970–90. They find little if any correlation between resource intensity (measured as the share of primary product commodity exports in GDP) and either physical or human capital accumulation. They find a U-shaped relationship between resource intensity and the Sachs-Warner measure of openness. They argue that low resource intensity and extremely high resource intensity countries are open, but countries with high levels of resource intensity are tempted to pursue interventionist policies to promote the manufacturing sector, per Auty.

But resource intensity is negatively correlated with a variety of indicators of institutional quality. Sachs and Warner conclude that once the standard growth-theoretic explanators are taken into account, resource intensity has a large direct negative impact on growth and that the indirect effects through these other channels are relatively minor in comparison. In contrast, Halvor Mehlum, Karl Moene, and Ragnar Torvik (2006), anticipating the argument in chapter 3, maintain that institutions are the story: When they focus on lootable resources, they find a stronger direct negative impact of resources on growth and, notably, a strong negative interaction between resource abundance and the quality of institutions. They conclude that it is resource endowments in the presence of weak institutions that give rise to the result,

Figure 2.6 Relationship between per capita GDP growth (constant 2000 US dollars), 1990–2010, and share of natural wealth in total wealth



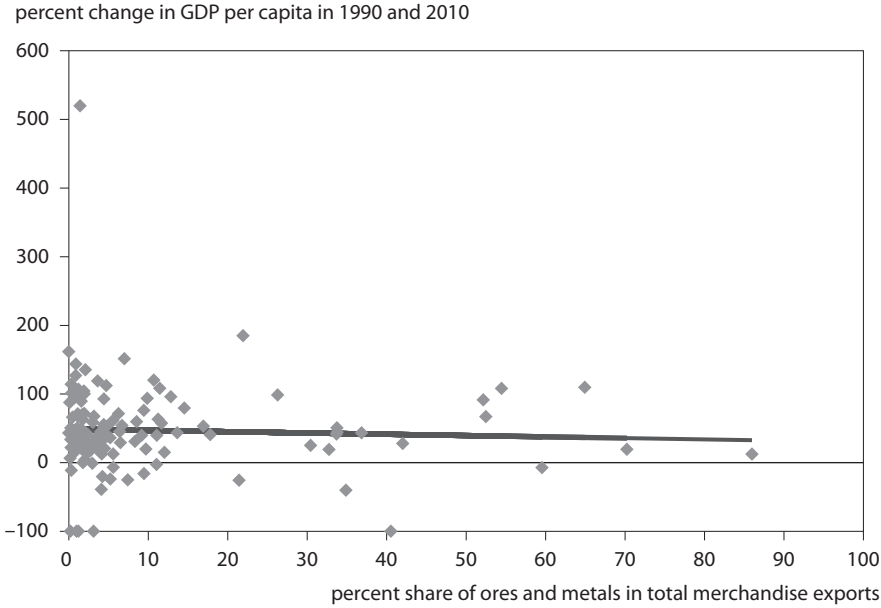
Sources: World Bank, *Changing Wealth of Nations*, http://data.worldbank.org/data-catalog/wealth-of-nations (accessed on February 19, 2014); GDP per capita (constant 2000 US dollars): World Bank, *World Development Indicators*.

in contrast to the sort of Dutch disease interpretation proffered by Sachs and Warner.[15]

Francisco Rodríguez and Jeffrey Sachs (1999) provide a theoretical justification for this observed negative correlation between resources and growth. They argue that if a resource-based economy cannot invest its windfalls in international capital markets (for whatever reason—political restrictions, home bias, low rates of return abroad), it will experience temporary domestic investment and consumption booms. As originally noted by Brock (1991), convergence back to the steady-state growth path following such booms will be from above and generate the result that the country will simultaneously have a relatively high level of contemporary income and relatively slow growth.

15. Ann Boschini, Jan Pettersson, and Jesper Roine (2012) extend the analysis of Mehlum, Moene, and Torvik (2006) by examining the robustness of the results for different types of resources, measures of institutional quality, and time periods. They find that the resource curse, as well as its reversal with sufficiently strong institutions, is driven by the ores and metals component of primary product exports.

Figure 2.7 Relationship between per capita GDP growth (constant 2000 US dollars), 1990–2010, and share of ores and metals in total merchandise exports, 2010



Sources: Ores and metal exports: World Bank, *World Development Indicators*, http://data.worldbank.org/indicator/TX.VAL.MMTL.ZS.UN (accessed on February 19, 2014); GDP per capita (constant 2000 US dollars): World Bank, *World Development Indicators*.

This finding suggests that transitory acceleration or deceleration of growth may not be identical to a long-run rise or fall in welfare. John Boyce and Herbert Emery (2011) make this point explicitly, examining the conditions for a possible resource curse, setting aside market or institutional failures, in the context of well-functioning markets. They analyze data on US states for the period 1970–2001. Their results (similar to those shown in figure 2.7) confirm the negative correlation between economic growth and the mining share of employment. In the familiar cross-country growth model set-up, they confirm that US states exhibit convergence conditional on initial income levels. Their results also indicate that the rate of technological change in the manufacturing sector has exceeded that in the resource sector. But their results, like those of Rodríguez and Sachs, indicate that although resource-abundant states exhibit slower growth, they also have higher incomes—by a significant degree. On this basis, they conclude that if there is a resource curse, its origins lie in market, institutional, or policy failures, not intrinsic interactions between the resource and nonresource parts of the economy.[16]

16. Michael Alexeev and Robert Conrad (2009, 2011) reach similar conclusions based on their

In what is probably the closest thing to a definitive paper in the cross-country growth literature, Xavier Sala-i-Martin, Gernot Doppelhofer, and Ronald Miller (2004) find that the share of GDP originating in mining is strongly and robustly positively correlated with growth. With respect to the purely economic channels of effect, Daniel Lederman and William Maloney (2007), editors of a World Bank volume on natural resources and economic performance, conclude "put bluntly, *there is no resource curse*" [emphasis in the original, page 3]. Similarly, Otaviano Canuto and Matheus Cavallari (2012) find that the stock of natural capital, either in total or broken down by subsoil and other components, contributes positively to growth; the share of natural capital has no impact. They interpret this finding as indicating that natural capital is just another form of capital, providing no support for any sort of natural resource curse.

Conclusion

Economies in which natural resource production plays a central role face a variety of challenges that can impair economic performance. These challenges appear to be particularly acute for the poorest countries. A variety of policy tools is available to address these challenges, but none is perfect (as discussed in chapter 7). Achieving the desired effects depends critically on the quality of implementation, which in turn hinges on the quality of governance.

In this regard, as important as the cross-country statistical evidence is, the general tendencies appear to be marked by exceptions and counter-examples: Apart from high-income countries like Australia, Canada, and Norway, diamond producer Botswana, one of the most resource-centric economies on the planet, has also been one of its best performing; it maintains a quite open and liberal political regime as well (see Harvey and Lewis 1990; Acemoglu, Johnson, and Robinson 2001; Iimi 2006; and Noland and Spector 2006). Nigeria stands as a cautionary counterexample (see Bevan, Collier, and Gunning 1999; Sala-i-Martin and Subramanian 2003; and Human Rights Watch 2005). Analyses by Sala-i-Martin, Doppelhofer, and Miller (2004) and Lederman and Maloney (2007) examine the impact of resources on growth only through a direct economic channel. As intimated by Mehlum, Moene, and Torvik (2006), the primary channel through which resource endowments affect economic performance may be through the impact on institutions and political development. As Henning Bohn and Robert Deacon (2000) observe, insecurity of property rights may have a disparate impact on the rate of exploitation of natural resources—encouraging rapid cutting of forests, for example, but discouraging production in sectors such as oil, which require large sunk investments, which are vulnerable to exploitation. It is to these deeper institutional and political issues that we now turn.

work on transition economies, using the break-up of the Soviet Union as a kind of natural experiment.