



Natural Resources and Development Strategy after the Crisis

Milan Brahmbhatt and Otaviano Canuto

Recent events have rekindled interest in the role of primary commodities in development. Was the boom in commodity prices from around 2003 through 2008 just a cyclical event, or does it suggest that prices have entered on a period of secular strength, driven by factors such as demand in big, fast-growing developing countries like China? It is notable that, while commodity prices fell sharply from their peak in 2008 with the onset of the global recession, they generally remained much higher than previous recession lows, often as high as in 2005–07, a period of robust world growth. Furthermore, prices have also rebounded smartly over the course of 2009 (figures 1 and 2).

If a period of sustained commodity strength is imminent, what are the implications for development policies? Development economists have long debated the problems associated with the traditionally high specialization in production and export of primary commodities of most developing countries. Many argue that dependence on primary commodities has proved to be a poisoned chalice or curse for development, which, given this view, necessarily entails structural change and rapid industrialization. Others, however, suggest that sustained high commodity prices could reduce the relevance of an industrialization-focused

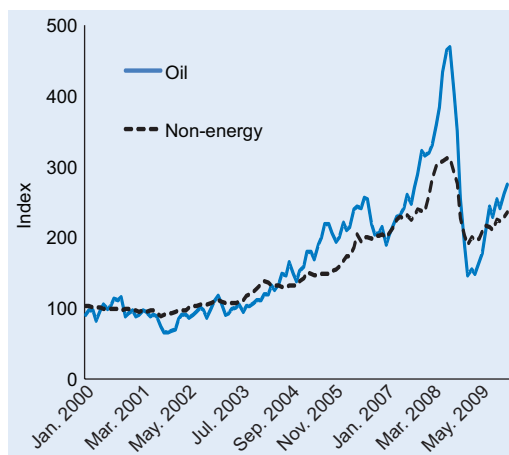
development strategy for commodity-dependent, low-income countries (LICs).¹ In this note we briefly review four questions: How dependent are developing countries on primary commodity exports? What is the outlook for primary commodity prices? Is there a natural resource “curse” (or blessing)? What policies can help poor countries best manage commodity resources for long-run development?

How dependent are developing countries on primary commodity exports?

If we view developing countries as a single aggregate then only about 40 percent of their merchandise exports were primary commodities by value in 2005–07, down from around 50 percent in the early 1990s. This aggregate measure can be misleading, however, because it is dominated by a few big economies like China that are almost entirely exporters of manufactures.

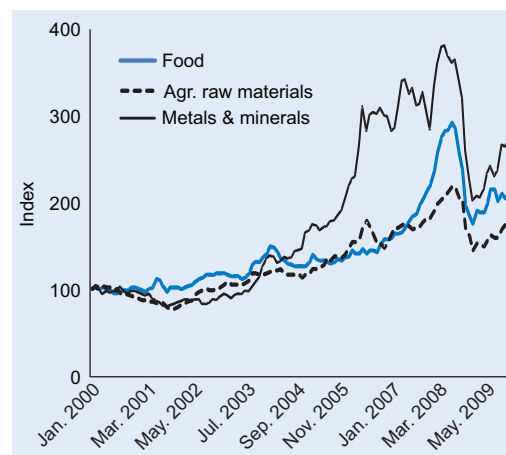
A different picture emerges if we take a *simple average* across developing countries (that is, giving each country an equal weight). Commodities still comprised a little over 60 percent of the merchandise exports of the average developing country in the middle part of this decade, although this was down from over 90 percent in the late 1960s. Looking at

Figure 1. Commodity Price Indexes, January 2000 to November 2009 (US\$ 2000 = 100)



Source: World Bank data and staff estimates

Figure 2. Commodity Price Indexes, January 2000 to November 2009 (US\$ 2000 = 100)



Source: World Bank data and staff estimates

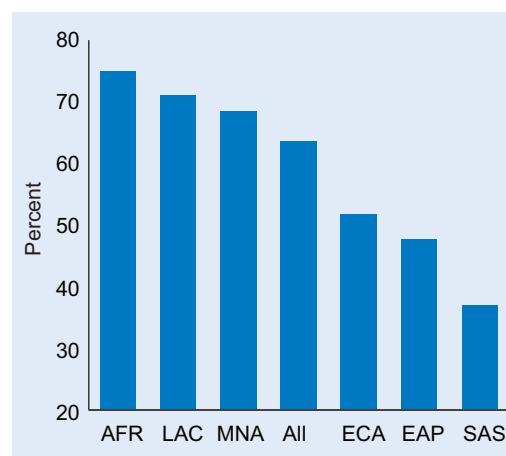
the *median*, half of developing countries still have commodity export dependence of over 70 percent. Among LICs, commodity export dependence averages around 75 percent. Viewed by regions, Africa, Latin America and the Caribbean, and the Middle East and North Africa are the most commodity dependent, while South Asia, East Asia, and Europe and Central Asia are the least (figure 3). So, although declining, commodity or natural resource dependence remains a fact of life for a majority of developing countries.

What is the outlook for primary commodity prices?

In the 1950s the famous Prebisch-Singer thesis argued that real primary commodity prices (for example, relative to manufactures prices) displayed a long-run *declining* trend. Faced with a resulting steady decline in their terms of trade, developing countries should foster industrialization, following, according to the thinking of the time, an import substitution strategy. During the commodity price spike of the 1970s, on the other hand, many analysts argued that permanent natural resource scarcity would result in steadily *rising* real commodity prices.

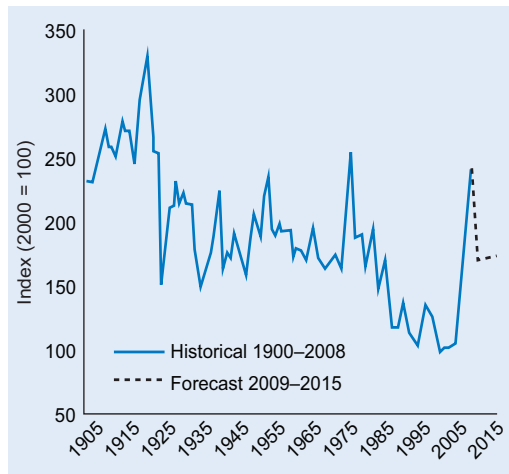
Based on econometric study of long time series, the present consensus appears to be that real commodity prices do not display any permanent trend or drift over time. Figure 4 shows the Grilli and Yang time series of real non-energy commodity prices (updated by other researchers) for the period 1900–2008. (Grilli and Yang, 1988; Pfaffensteller et al., 2007). The series is a weighted index of the nominal prices of 24 non-energy commodities, divided by an index of the unit values of manufactured

Figure 3. Developing Countries: Commodity Exports Share (%) in 2003–07



Source: World Development Indicators, World Bank.
*As % of merchandise exports. Simple averages for country groups.

Figure 4. Real Non Energy Commodity Prices, 1900–2015*



Sources: Grilli and Yang (1988); Pfaffenzeller et al. (2007).
World Bank estimates 2004–08, forecasts 2009–15.
* Indexes, 2000 = 100. Deflated by unit value of manufactured exports.

goods exported from developed to developing countries. Visual inspection of figure 4 suggests a definite downward trend, and this appears to be confirmed by regression of the log of the Grilli-Yang series on a deterministic time trend (modeling the error process as a first-order AR1 process) over the whole period 1900–2008, which yields an estimate that real commodity prices fall on average by 0.5 percent per year, apparently confirming the Prebisch-Singer hypothesis.

However, it is now well understood that attempts to assess long-run trends on the basis of visual inspection and simple time series models can be misleading, especially if the series in question are so-called unit root processes. In this case processes without any deterministic trend can yield apparently significant but actually spurious regression results. Cuddington et al. (2007) carefully survey econometric studies of the Grilli-Yang series through 1998. Their overall conclusion is that, although there is clear evidence of a structural break in 1921, it is not possible to reject the unit root hypothesis for real commodity prices. There is also no evidence of drift, either

positive or negative. We find essentially the same results for the Grilli-Yang series over the period 1900–2008.

So, based on statistical properties alone, we have little reason to expect real commodity prices to trend either up or down in the long run. It is a feature of unit root processes, however, that series with this property are highly correlated over time. So it is quite possible for commodity prices to move significantly lower or higher for substantial periods even in the absence of a long-run trend or drift, such as, for example, the long period of unusually low prices from the mid-1980s through the 1990s. Again, based on statistical properties alone, one would not be surprised to see a sustained period of high prices following the low prices of the 1980s and 1990s.

Are there plausible fundamental economic factors to support such an outlook? The price of commodities relative to the price of manufactures can be usefully analyzed in terms of demand and supply: the demand for primary commodities *relative to* the demand for manufactures, and the supply of commodities relative to the supply of manufactures.

On the supply side, if long-term productivity growth in agriculture and minerals is less than in manufacturing then, other things equal, one would expect agricultural and mineral prices to rise relative to those of manufactures. But there is little evidence to suggest that productivity growth in commodities sectors is significantly different from that in manufactures, so this is unlikely to influence relative prices either way (World Bank, 2009). It is true, however, that investment in new capacity in energy and minerals was cut substantially when prices were low in the 1980s and 1990s and is recovering only slowly due to skill shortages, technical difficulties in developing new reserves (for example, deep offshore), and political

uncertainty in regions with new reserves. Bio-fuel subsidies have also helped switch grain acreage away from food to fuel use, providing a major reason for the steep grain price hikes from 2005 through the early part of 2008. Over the longer term, though, one would expect a more copious supply response, as skill shortages and technical difficulties are overcome, and new reserves and acreage are brought into production.

Relative demand for commodities could also rise in the medium term to the extent world growth after the financial crisis is more dependent on developing countries and demand in these countries is more commodity intensive than elsewhere. In the longer term, however, production processes in developing countries will continue to become more efficient in terms of raw material consumption, approaching closer to developed-country levels, while relative final demand for commodities like food will continue to decline due to low income elasticity relative to things like services. There is also evidence that real commodity prices are affected by monetary conditions (Frankel, 2008). Since commodities are traded in flexible price markets, their prices tend to overshoot in response to monetary changes relative to general manufactures and services prices, which adjust more sluggishly. Commodity prices will tend to be high when real interest rates are low and monetary conditions lax, as at present, since inventory carrying costs are low and there is more incentive to leave depletable natural resources in the ground. In the longer term, however, general price levels and real interest rates can be expected to rise, removing the overshooting in real commodity prices.

So there are both supply and demand factors that could support the present relatively high level of real commodity prices in the medium term, although these factors will tend to dissipate in the longer term. Current World Bank forecasts are consistent with this

scenario, projecting only a gradual easing in real commodity prices from existing levels by 2015. Forecast real prices in this period are in fact squarely in the range that prevailed from the 1920s through the early 1980s (figure 4). If correct, this means that commodity exporters are likely to face a more benign medium-term price environment than in the 1980s and 1990s.

Is there a natural resource “curse” (or blessing)?

The short answer is “no” or rather “it depends.” A survey of the large and rapidly growing empirical research in this area suggests that, in the words of a recent World Bank report, natural resources are “neither curse nor destiny” (Lederman and Maloney, 2007). Studies of the relationship between natural resource abundance and growth have, however, often tended to generate disparate and sometimes contradictory results. The influential study by Sachs and Warner (1995) is representative of results which find that natural resource abundance has a strong *negative* impact on growth. Lederman and Maloney (2007), on the other hand, challenge the Sachs and Warner findings on measurement and econometric grounds and find natural resource abundance to have a *positive* effect on growth.

A recent effort to reconcile such apparently disparate research findings (Collier and Goderis, 2007) observes that, first, negative long-run growth effects are mostly related to oil and minerals —concentrated “point source” resources that can easily become the object of rent-seeking and redistributive struggles (including armed conflict). On the other hand, there is little evidence of negative growth effects related to high prices for agricultural commodities, which are generally more open to competitive entry. Second, high oil and mineral prices mostly have a negative impact on long-run growth in exporting countries *with bad governance*.

They have a significant *positive* impact on growth in exporters with good governance. This finding suggests that continued high commodity prices in the next few years could provide valuable resources to accelerate economic and social development in commodity exporting countries with good policies and governance.

There are several considerations to keep in mind when evaluating the ways in which natural resource abundance *can* lead to worse economic performance, especially under conditions of poor governance.

First, because of political economy reasons, countries with weak governance are more likely to adopt poor economic policies to manage commodity booms, contributing to significant misallocation and mismanagement of resources. For example politicians may expand public spending and employment excessively and too rapidly, with the aim of increasing their patronage networks and improving their chances of staying in power, while resources shift out of productive activity into unproductive rent-seeking activity (Mehlum et al., 2006; Robinson et al., 2006.) Poor fiscal policy indeed appears to be at the heart of economic mismanagement in the wake of natural resource booms. Studying natural resource boom episodes in the 1970s and 1980s Gelb (1988) concluded 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.”²

Second, natural resource booms create complicated problems in macroeconomic management that are challenging even in economies with good governance and capable institutions, and much more so in economies without these advantages. One of these problems is the so-called Dutch Disease effect: increased domestic income from the booming natural resource sector generates higher spending on domestic

goods (as well as imports), leading to higher prices and output in the non-tradables sector. Wages in the economy also tend to rise, squeezing profits in sectors of the economy that are internationally tradable but which are not based on natural resources, such as manufacturing, where prices are largely fixed at international levels. With increased inflation in non-tradables prices there is an appreciation of the real exchange rate and an output contraction in non-resource tradables sectors like manufacturing. These adjustments are of concern if one believes that sectors like manufacturing have some special characteristics that stimulate long-run growth, for example increasing returns to scale, learning by doing, or abundant technological spillovers. Evidence that manufacturing possesses these special characteristics is mixed, but there is fairly robust evidence for the more general proposition of a negative relation between real exchange rate overvaluation and growth (Rodrik, 2007; Aguirre and Calderon, 2005.)

There are also problems because volatility of primary commodity prices and revenues can drive volatility in government spending and real exchange rates, with the resulting uncertainty damaging investment and growth. Another related way in which commodity price volatility may affect growth is by fostering over-borrowing. High commodity prices in the 1970s encouraged many resource-abundant countries to borrow heavily from 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. Again, it is critical to note that the actual extent of Dutch Disease effects, volatility, and over-borrowing will depend to a large extent on policies—for example, on the extent to which cautious fiscal policies are able to moderate aggregate demand pressures,

smooth volatility in government revenues, and curb external over-borrowing.

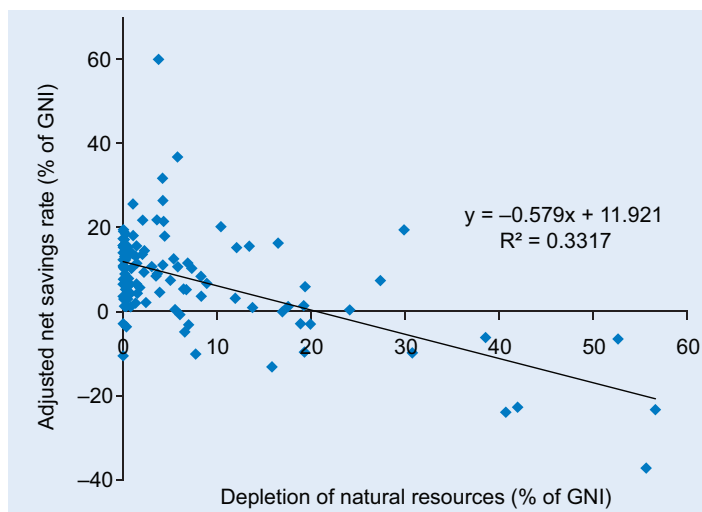
Lastly, in addition to problems of short-run economic management, natural resource-abundant countries also face important longer-run questions about the optimal pace at which to deplete their resources and about how much of the proceeds to consume today and how much to save for the welfare of future generations. An important metric here is whether the country's economic strategy is *sustainable*, meaning one that transfers sufficient capital to future generations to allow them to achieve at least the same level of welfare as current generations.³ From this perspective natural resources can be viewed as part of a country's overall capital stock, alongside its physical capital stock (such as existing machinery and buildings) and intangible capital (including human capital, social capital, and other factors such as the quality of its institutions). To increase its overall capital stock, a country's investment in its physical, human, and other capital must be larger than the depreciation of its physical and other capital, including the depletion of its natural resources. This measure of countries' *adjusted net savings rates*

is shown on the vertical axis of figure 5. The horizontal axis shows countries' annual depletion of their natural resources (principally oil and minerals, together with a measure of forest depletion). Figure 5 suggests that countries with high rates of natural resource depletion are often on unsustainable development paths: they are not saving enough to cover the depletion of their natural resources, resulting in negative adjusted net savings rates.

What policies can help poor countries best manage commodity resources for development?

First, given the evidence that problems with governance are at the root of economic problems associated with natural resource abundance, efforts to enhance transparency and strengthen checks and balances concerning all aspects of natural resource extraction and use are clearly vital for ensuring accountability. These aspects include the terms of contracts with companies engaged in resource extraction or operation, ongoing monitoring of operations, and the collection and use of government taxes and other revenues from natural resources. Broad global efforts like the Extractive Industries Transparency Initiative can play a part, as, at the domestic level, can anti-corruption reforms, measures to improve transparency and scrutiny by civil society and media, procurement reforms, strengthening of formal audit, parliamentary scrutiny, and so on. Equitable sharing of benefits across regions, ethnic groups, and so forth can help reduce the danger of civil strife over resources.

Figure 5. Natural Resource Depletion and Net Savings Rates, 2007



Source: World Development Indicators, World Bank.

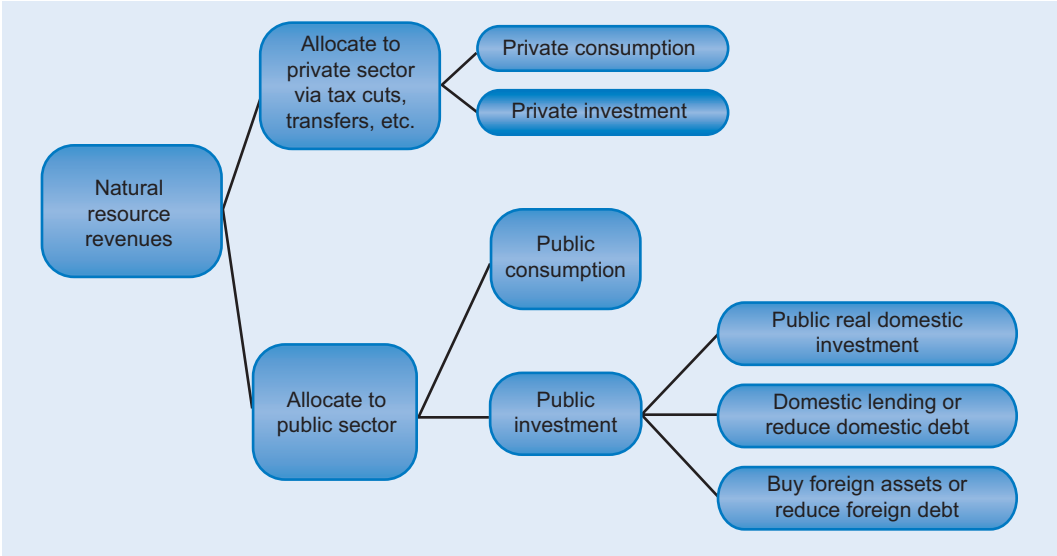
An institutional innovation that has attracted much recent attention is the use a separate (extra-budgetary) Natural Resource Fund (NRF) to facilitate good management of revenues. However, experience suggests that the establishment of such funds is no substitute for sound overall fiscal and economic management, although in certain circumstances it may buttress the right policy mix. While Natural Resource Funds are sometimes created to protect resource revenue from political pressure and potential waste and corruption, and this argument has its merits, an NRF of itself will not prevent such waste and abuse unless it is part of a broader effort to strengthen governance and integrate the fund with an overall fiscal policy framework.

Second, attention also needs to be paid to the actual substance of economic policy decisions about the allocation of natural resource revenues between consumption and savings of various kinds. These decisions will help determine how well the country is able to handle the macro management problems associated with natural resource abundance, such as the Dutch Disease and commodity price volatility, as well as the impact of natu-

ral resources on the country’s longer-run growth and poverty reduction efforts. Figure 6 provides a schematic of basic choices open to the government, for example whether to return revenues to private citizens (via tax cuts or transfers, which will then be reflected in increased private consumption and investment), or to retain resource revenues in public hands, which then need to be allocated between public consumption and various kinds of public investment (or net asset accumulation).

At a very general level these decisions need to be guided by a comparison of the government’s social discount rate (which measures the value it puts on consumption today versus consumption at later dates) with the rates of return available on various kinds of investment, for example the return on foreign assets, the return from reducing foreign debt (not generally the same thing in developing countries), and returns to domestic public investments. A commonly used benchmark for fiscal policy in a natural resource-rich economy is the *permanent income rule*. Under this rule the country should save all resource revenues over and above a certain permanently sustainable increase in

Figure 6: Government choices in allocating resource revenues



the level of consumption, which is equal to the annuity value of the country's natural resource wealth.⁴ In practice the rule often leads to a recommendation to establish a Natural Resource or Sovereign Wealth Fund that invests in foreign assets, the returns from which can support spending on the government's non-natural-resource fiscal budget.

It is worth noting that the permanent income approach addresses several of the key issues associated with natural resource fiscal management. It is by definition a sustainable policy in that converts a temporary, exhaustible stock of natural resources into a stock of financial assets that generates a permanent income stream. Since the policy calls for saving a substantial proportion of natural resource revenues, it reduces the pressure of rising domestic demand that leads to real exchange rate appreciation and Dutch Disease effects. By smoothing expenditures, the policy also moderates the problems caused by volatility in natural prices and revenues.

There is nevertheless something anomalous about viewing the permanent income rule as a long-run development strategy, with poor capital-scarce countries financing investments in rich countries through sovereign wealth funds. Several analysts have recently argued that the permanent income rule is optimal only under special circumstances that do not apply to most developing countries; essentially these conditions are the ability to freely borrow and lend at the world rate of interest, which would result in foreign and domestic rates of return becoming aligned (Collier and Venables, 2008; Van der Ploeg and Venables, 2009). Most developing countries, however, are characterized by restricted access to world capital markets, capital scarcity, and potentially high rates of return on domestic investment, especially if the government is able to efficiently supply

scarce public infrastructure and to improve the investment climate so as to raise returns on private investment. Under these circumstances a more optimal strategy would be to devote a larger portion of resource revenues to high-return public domestic investments, leading to higher growth and, ultimately, a higher value of consumption than under the permanent income strategy.

Evidently, much of the success of a strategy oriented more toward domestic investment will depend on how efficiently public investment funds can be allocated and managed to achieve high returns in practice. So, thirdly, reforms to strengthen public investment management, cost benefit analysis, monitoring and evaluation, and budget processes and institutions provide another crucial element of a successful natural resource-based development strategy. To the extent that it will take time to develop a pipeline of good projects and to strengthen public investment management capacity, it may be prudent for the country to initially continue to invest most of its revenues in foreign assets, but to then increase the proportion invested domestically, in line with domestic absorptive capacity. The country will also likely continue to flexibly shift resources into or out of its natural resources fund, depending on the need to address price volatility and Dutch Disease type pressures. However, investment climate reforms, support for innovation, and high-return domestic infrastructure investments can also help alleviate Dutch Disease pressures by increasing the supply capacity of the economy.

We conclude that booming commodity revenues raise difficult challenges that, if not adequately addressed, *can* harm long-run development. However, with good policies, governance, and management, such revenues can also be a valuable resource that

helps accelerate overall economic and social development.

Notes

1. See, for example, *Oxford Analytica International*, 2009, “Commodities Force Re-think on Growth,” August 18.

2. A stronger version of the political economy channel argues that natural resource booms can even lead to a *worsening* of governance, for example a “voracity effect” as political actors race to seize and spend natural resource revenues before others do, provoking more intense political, bureaucratic, and even violent conflicts for control of natural resource revenues (Tornell and Lane, 1999). The evidence for this hypothesis is mixed.

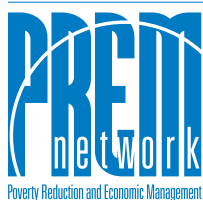
3. Heal (1996) discusses alternative interpretations of sustainability.

4. The permanent income approach to fiscal policy in natural resource–abundant economies is studied in more detail in Van Wijnbergen (2008), Davis et al. (2003), and Barnett and Ossowski (2002).

References

- Aguirre, Alvaro, and Cesar Calderon. 2005. “Real Exchange Rate Misalignments and Economic Performance.” April. Central Bank of Chile Economic Research Division.
- Barnett, Steven, and Rolando Ossowski. 2002. “Operational Aspects of Fiscal Policy in Oil-Producing Countries.” IMF Working Paper WP/02/177. IMF, Washington, DC.
- Collier, Paul, and Benedikt Goderis. 2007. “Commodity Prices, Growth and the Natural Resources Curse: Reconciling a Conundrum.” August. Working Paper 276. Centre for the Study of African Economies.
- Collier, Paul, and Anthony Venables. 2008. “Managing Resource Revenues: Lessons for Low Income Countries.” Paper for the Africa Economic Research Consortium 2008 Annual Conference.
- Cuddington, John T., Rodney Ludema, and Shamila A. Jayasuriya. 2007. “Prebisch-Singer Redux.” In Daniel Lederman and William F. Maloney, eds., *Natural Resources: Neither Curse Nor Destiny*. Stanford University Press and the World Bank.
- Davis, J.M., R. Ossowski, and A. Fedilino, eds. 2003. *Fiscal Policy Formulation and Implementation in Oil Producing Countries*. Washington, DC: IMF.
- Frankel, Jeffrey. 2008. “The Effect of Monetary Policy on Real Commodity Prices.” In John Campbell, ed., *Asset Prices and Monetary Policy*. University of Chicago Press.
- Gelb, Alan and Associates. 1988. *Oil Windfalls: Blessing or Curse?* World Bank and Oxford University Press.
- Grilli, Enzo R., and M.C. Yang. 1988. “Primary Commodity Prices, Manufactured Goods Prices, and the Terms of Trade of Developing Countries: What the Long Run Shows.” *World Bank Economic Review* 2(1): 1–47.
- Heal, Geoffrey. 1996. “Interpreting Sustainability.” Paine Webber Working Paper Series in Money, Economics and Finance PW-95-24. May. Columbia Business School, New York, NY.
- Lederman, Daniel, and William F. Maloney, eds. 2007. *Natural Resources: Neither Curse nor Destiny*. World Bank and Stanford University Press.
- Mehlum, Halvor, Karl Moene, and Ragnar Torvik. 2006. “Institutions and the Resource Curse.” *Economic Journal* 116(508): 1–20.
- Pfaffenzeller, Stephan, Paul Newbold, and Anthony Rayner. 2007. “A Short Note on Updating the Grilli and Yang Commodity Price Index.” *World Bank Economic Review* 21(1): 151–163.

- Robinson, James A., Ragnar Torvik, and Thierry Verdier. "Political Foundations of the Resource Curse." *Journal of Development Economics* 79(2): 447–68.
- Rodrik, Dani. 2007. "The Real Exchange Rate and Economic Growth: Theory and Evidence." August. John F. Kennedy School of Government, Harvard University, Cambridge, MA.
- Sachs**, Jeffrey D., and Andrew M. **Warner**. 1995. "Natural Resource Abundance and Economic Growth." NBER Working Paper 5398. National Bureau of Economic Research, Cambridge, MA.
- Tornell, Aaron, and Philip R. Lane. 1999. "The Voracity Effect." *American Economic Review* 89(1): 22–46.
- Van Der Ploeg, Frederick, and Anthony Venables. 2009. "Harnessing Windfall Revenues: Optimal Policies for Resource-Rich Developing Economies." Working Paper No. 2571. CESifo Group, Munich, Germany.
- Van Wijnberger, Sweder. 2008. "The Permanent Income Approach in Practice." Unpublished paper. March. PREM Network, World Bank, Washington, DC.
- World Bank. 2009. *Global Economic Prospects and the Developing Countries*. Washington, DC: World Bank.



This note series is intended to summarize good practices and key policy findings on PREM-related topics. The views expressed in the notes are those of the authors and do not necessarily reflect those of the World Bank. PREMnotes are widely distributed to Bank staff and are also available on the PREM Web site (<http://www.worldbank.org/prem>). If you are interested in writing a PREMnote, email your idea to Madjiguene Seck at mseck@worldbank.org. For additional copies of this PREMnote please contact the PREM Advisory Service at x87736. PREMnotes are edited and laid out by Grammarians, Inc.

Prepared for World Bank staff