

SPECIAL POLICY BRIEF 18

Protecting Developing Economies From Price Shocks

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I. INTRODUCTION

Resource wealth is both a blessing of greater potential, but also a potential cause of ruin. The natural resource curse is an economic issue that is both a challenge to economic intuition and yet familiar in another way. Consider the old insult “poor little rich kid” or the old warning “be careful what you wish for.” There are also literary metaphors of cursed treasures and the tragic tales of lottery winners. This suggests that our folklore includes the awareness that riches may lead to problems that would not otherwise be confronted.

Not only is the notion of a natural resource curse a challenge to economic thinking, it is also a challenge to those trying to design feasible and effective policies

II. BACKGROUND

There are several reasons why otherwise bountiful endowments of natural resources might become a hindrance rather than an uncompromised benefit.¹ Most of these arguments conform to the following line of reasoning. The curse occurs when a country’s abundance in natural resources causes a distortion in its economy which results in resources being used less efficiently than they otherwise would be. The consequence of this distortion is to lower actual or potential growth prospects by hampering the growth of the manufacturing sector (and especially the export of manufactured goods). This distortion can appear as various things such as corruption,

¹) See Tsalik (2003) for more discussion.

complacency, over borrowing or high wages. Hence there is a variety of explanations for the cause of the curse.

One early hypothesis can be found in Rousseau's Social Contract, Book III, Chapter 8. *We find then, in every climate, natural causes according to which the form of government which it requires can be assigned, and we can even say what sort of inhabitants it should have.... Lands where the surplus of product over labor is only middling are suitable for free peoples; those in which the soil is abundant and fertile and gives a great product for a little labor call for monarchical government, in order that the surplus of superfluities among the subjects may be consumed by the luxury of the prince: for it is better for this excess to be absorbed by the government than dissipated among the individuals.*

The modern expression of this line of reasoning attempts to explain why natural resources wealth can lead to behavioral problems.

- The presence of immense wealth leads not to the development of entrepreneurial skills but rather the pursuit of easy money from less productive, if not unproductive or merely rent-seeking, activities that seek to appropriate instead of producing value.
- The wealth effect resource riches leads people think that it is advantageous to spend more and save less. This reduces the overall amount of resources available for investing in a diversified economy and thereby hampers manufactured exports and growth.
- The government too can be overcome by imprudence from the wealth effect. The government's fiscal imprudence leads to deficit spending, and while this is not unique to resource rich countries, it does exacerbate the problem. Further adding to the problems is the perception by foreign investors that the country is more creditworthy and deserving of more borrowing.
- A related problem is that the government's tax revenues from the production and export of the natural resource allow it to fail to develop a proper tax base that can efficiently extend beyond the natural resource sector.

The first modern economic theory of a resource curse arose from efforts to explain the economic troubles experienced by the Netherlands after the discovery of oil reserves lead to an oil boom but also a decline in manufacturing and overall economic growth. Identified as the "Dutch Disease," the theory holds that the rapid increase in oil exports lead to a surplus in international trade which in turn lead an increase in the value of the Dutch guilder in foreign exchange markets. The higher value of the guilder made exports from the Netherlands less competitive and thereby depressed manufactured exports and the growth rate.

These is another, although similar, version of the Dutch Disease theory. The oil boom drives up wages throughout the economy, and this raises the costs of producing tradable manufactured goods as well as non-tradable goods and services. As a result, exports are less competitive, local non-tradable goods are more expensive and growth is reduced.

Yet another variation on the Dutch Disease theory starts with the premise that the manufacturing sector is characterized by increasing returns to scale technology while

that for the oil sector is not. Thus the substitution of labor and other resources into the oil sector reduced overall long-term productivity and growth potential by starving the manufacturing sector of inputs.

Another economic theory focuses on volatility of the prices of primary commodities, such as minerals, metals and agricultural products. As a result, the more a country's income depends upon the production and export one or a few natural resource based commodities, the greater will be the volatility of its income. A high degree of fluctuation in the real income of country acts as a deterrence to investment and growth. In addition, the standard of living is reduced by the fact that the costliness of an economic downturn is greater than the benefit of an economic boom. Together these explain how volatility hampers prosperity. Government tax revenues are also linked to the price of key resources, and so the budget will tend to expand and contract pro-cyclically with resource prices so as to fuel booms and exaggerate downturns.

III. POLICY REMEDIES

In his novel “East of Eden”, John Steinbeck described the variability of the natural resource wealth generated by farming. He described how the rain would come in cycles in which several wet years would be followed by several dry years. During the wet years the land was rich and fertile, and in turn the people grew rich and prosperous. During the dry years the land was bare and desolate, and in turn the people became poor and often moved away. He concluded, “And it never failed that during the dry years the people forgot about the rich years, and during the wet years they lost all memory of the dry years. It was always that way.”

But it does not have to be that way. Appropriately designed and implemented public policies can stabilize the income from resource wealth so as to avoid Dutch Disease type problems and promote prosperous as opposed to unproductive behavior.

A. Stabilizing the effects of the wealth

Some of the ways in which natural resource wealth becomes a problem is through its impact on individual and government consumption spending behavior and its macroeconomic impact on exchange rates and international trade competitiveness.

One way to prevent or substantially diminish the effects of a sudden increase in wealth is by establishing financial institutions that will prudently manage the newfound wealth and its disposition over time. Two examples of such social trust funds are known as Stabilization Funds and Savings Funds. In both of these cases the purpose is to mitigate any harmful impact of changes in wealth, and especially new found wealth, on fiscal policy and international competitiveness.

- Stabilization Fund

The basic economic lesson for Stabilization Funds is as old and familiar as the Bible. The story of Joseph can be read in the Torah, the Christian Old Testament and the Koran where Yusef is given his own sura. The scriptures describe how Joseph advised the leaders of Egypt to conserve output during period of bumper harvests – called the “fat” years – and then to dispense the inventory during future “lean” years. This inventory management stabilized Egypt’s income over time and contributed to its peace and prosperity.

Stabilization Funds are designed to accumulate funds when resource prices exceed a target level and to dispense funds when the price falls below the target level. In doing so it takes income away from current spending when the price level generates windfall gains, and it makes income available again when times are depressed by low resource prices.

In order to be effective, Stabilization Funds require two types of budgetary protections. The first, which is important during boom periods, prevents surpluses in the Stabilization Fund from being used as collateral to increase borrowing and thereby increase overall spending. The result would be that government spending was not

dampened during a boom period and that instead the interest cost on the new debt would put a burden on future income when commodity prices might not be so high. The second, which is important when prices are depressed, protects the fiduciary integrity of the fund so that it is not raided for short-term reasons. The Stabilization Fund is designed to pump money into the government budget when commodity prices fall below their target levels, but sometimes there is great pressure for additional resources. In order to protect the fund's savings for future stabilization purposes, it needs to be managed by leadership that is professional, protected from immediate political pressures and ultimately representative of the people served by the fund. One manner of doing this is to have a commission or board appointed by the legislative body to terms of intermediate length that expire at staggered years in the future.

An example of a successful fund is that of Chile's Copper Fund. Established in 1985, its savings are held in an account at the Central Bank and its management comes from an independent board (which includes members from the state owned copper corporation CODELCO). It has been credited with helping the Chilean government avoid fiscal deficits up until 1999. A poor example is that of the Macroeconomic Stabilization Investment Fund (FIEM) of Venezuela where the lack of strict budget rules has allowed the government to borrow against accumulated assets in order to increase spending as well as to delay scheduled payments into the fund. The result is that the FIEM has only \$700 million in reserve² (even though oil prices have been very high), and that its effectiveness has been diminished.

A successful Stabilization Fund will stabilize government budgets, and it can also protect against the effects known as the Dutch Disease by preventing the appreciation of the currency. This is accomplished by investing the fund's savings in foreign currency denominated securities. Moreover, a successful Stabilization Fund will serve as a signal that the nation's resource wealth can be constructively channeled into a stabilizing force in the economy.

There is, however, a key limit to this policy strategy. It is premised on the assumption that the "fat" years will come first. Unless the fund can borrow against future income, then it cannot begin to exercise a stabilizing influence on government budgets until resource prices have first exceeded the target level, and therefore the fund has the additional political burden of having to first act as a drag on the economy before it can act as a stimulus.

- Savings Fund

A Savings Fund is designed to act as a rainy day fund or to help transfer wealth to future generations. This is especially desirable for non-renewable natural resources that might otherwise be exhausted by current generations. A Savings Fund is designed to accumulate assets during times when the resource price exceeded the target level, and hence provide some dampening or stabilizing function, but the assets would then form a trust and the income on the trust could be paid out over time. One example of such a Savings Fund is the Alaska Permanent Fund. It was created in 1977, by the end of 2003

²) Venezuelan Ministry of Finance, April 2004.

it had accumulated over \$28 billion in assets, and today the income from its assets generate payments that are made to all Alaskan citizens.³

B. Commodity Bonds

In addition to the wealth effects caused by newfound natural resource riches, another potential problem source comes from exposure to the shock effects from large and sudden changes in the prices of those resources. One immediate result of a sharp drop in resource prices is to reduce the ability of a developing country to make prompt payments on its foreign debts. For example, in the fall of 1998, after the price of oil fell from \$21 to \$13 a barrel over the previous nine months (a 38% drop), the Russian government declared a moratorium on foreign debt payments. This debt default trigger a financial crisis of global proportion.

Even when the results are less severe, there are important economic problems caused by significant price changes. It will disrupt any long-term plans that were made on the assumption that resource prices would remain high. It will also lead governments, businesses and individuals to curtail spending that depends on current levels of income. In turn, this will in turn lead to fluctuations in other spending, investing and living standards.

Reducing exposure to these changes in resource prices can reduce their impact on the economy. One method to reduce exposure to this price volatility is to transfer the price risk to others – especially foreign investors – through the use of commodity-indexed bonds or commodity-linked bonds.⁴

- Commodity-indexed bonds

A bond is a security, and a conventional bond is structured so its issuer (the borrower) pays to the owner a payment once or twice a year (known as a coupon payment) and the full principal is paid upon maturity. For example, a 30-year, U.S. Treasury bond with a 5% coupon rate will yield semi-annual coupon payments based upon 5% of the bond's principal and then pay the full principal at the end of 30 years. The price of conventional bonds is determined by the value of the all the future coupon and principal payments; since future payments are worth less than current payments and payments in the far future are worth less than those in the near future, the bond's value is determined by properly discounting the future payments so as to arrive at their present value.

Commodity bonds are structured differently than conventional bonds because their coupon or principal payments are determined by the price of a referenced commodity. For instance, the principal might be 1,000 barrels of oil so that at \$25 a barrel it amounts to a \$25,000 bond. If the price of oil were to fall to \$20, then the borrower who issued the bond would only have to repay \$20,000. Of course if the price were to rise to \$30, then the borrower would be obligated repay \$30,000 at maturity. This version of a commodity bond can be thought of as a conventional bond with a forward

³) Alaska Permanent Fund Corporation, financial statements for December 2003.

⁴) See Wright, Brian D. and David M. Newbery (1989) for more detailed analysis.

derivative contract attached to it; a derivative contract known as a “forward contract”⁵ specifies the price and amount of a commodity or asset that will be bought or sold in the future. In this case, the borrower issues the commodity bond which is structured like a conventional bond with a short⁶ forward position so that the borrower gains when the oil price drops and loses when the price of oil rises.

Another instance might be for the commodity bond to link the coupons and the principal to the price of oil. Assume that the current oil price is \$25, and consider a bond that offers annual coupon payments based on the price of 200 barrels and a principal to be paid at maturity of 4,000 barrels. If oil prices remain at \$25, then the bond’s principal will be \$100,000 and the annual coupon payments will be \$5,000 or 5% of the principal – in other words will pay off like a conventional 5% bond if prices do not change, and it will generate gains to the borrower if the price falls and gains to the investor if the price of oil rises.

By issuing this type of commodity bond, the developing country borrower can shift some of the risk of a fall in oil prices to their bond investors. In the event the price falls, then the developing country borrower will be obliged to make lower payments. In the event the price rises, the same government will presumably be in a better position to make larger payments because of its claim on the income stream from the nation’s oil exports that would be larger due to the rise in oil prices.

- Commodity-linked bonds

Another version of a commodity bond is to link the coupon or principal payments to the price of the underlying commodity through an options-like structure.⁷ An option is a derivative that generates a payment only if the price of the referenced asset rises above (or alternatively, only if it falls below) a specified target price known as the “strike” or “exercise” price. For example, a call option on IBM stock will pay-off if the market price of the stock exceeds the call option’s strike price. In this case, the bond’s coupon or principal payments might be structured to fall if the oil price fell below the target but would not rise if prices rose above the target. In exchange for what amounts to a one-way bet on the movement in prices, the option holder must pay a “premium” to the seller or “writer” of the option. In this case of a commodity-linked bond, the bond’s price and coupon yield would reflect the fact that the borrower would be holding an option that allowed it to make lower payments in the event that oil prices fell below the strike price. In order to compensate the investor for holding the other side of a one-way bet, the bond’s price would have to be lower or the coupon rate higher in order to cover what would amount to a premium payment to the investor as options writer.

Commodity-linked bonds are usually of two basic types. Bonds with a “short” put option provision – as described above – give the issuer (the borrower) the right to pay the lower of a specified cash payment or one determined by the commodity price if the price falls below the strike price. This type of commodity linked-bond shifts the downside risk of resource prices to the foreign bond investor. Bonds with a “long” call

⁵) See Dodd (2002a and 2004) for primers describing derivatives and derivatives contracts.

⁶) A short position is akin to owing something while a long position amounts to owning something, thus the former benefits from a price decrease and the latter benefits from a price increase.

⁷) See Dodd (2002a and 2004) for primers describing the various derivatives instruments.

option provision give the bond investor the right to the higher of a specified cash payment or one determined by the price of the commodity if the price exceeds the strike price. In this instance the bond investor would share in the upside gain from higher resource prices, and the developing country borrower would benefit by borrowing at a lower interest rate.

While all these types of commodity bonds can serve to help developing countries to transfer some of their exposure to commodity price risk, it can be expensive.

Commodity bonds, whether they amount to an attached forward contract or option contract, are more complex than conventional bonds. In financial markets, complexity is more costly than simplicity. Moreover, in the commodity-linked type of bond with a short option position, the options premiums are an additional expense – borrowers pay this additional expense in the form of higher coupon yields. In all cases, however, the developing country borrowers will pay higher yields on bonds that are more complex. Yields will be higher still on those that give the borrower to option to pay lower coupon or principal payments if the commodity price drops and that must be sold to the subset of foreign investors that are also willing to buy long-term commodity price risk.

C. Government policy to hedge budget

One of the direct ways that price volatility can act as a curse on developing countries is through its impact on their government budgets. When the natural resource price rises, it raises the world value of its output as well as the value earned from exporting it, and in turn this increases the government's tax base so that government revenues tend to increase accordingly. Greater revenues can be use to lower budget deficits, increase spending or potentially some of both. When the price falls the opposite happens and larger budget deficits are the most likely outcome.

In order to protect themselves from these fluctuations in the price of their natural resources, developing country governments can use derivatives instruments to hedge against adverse price movements. If government budgets are not protected from these price fluctuation, then the price changes are likely to be transmitted throughout the economy through pro-cyclical fiscal policy where the budget injects an economic stimulus in good times (when it is not especially needed) and injects a contractionary force during bad times (when it is definitely not needed).

The following Table 1 provides examples of 10 countries whose government revenues (far right column) is highly correlated with changes in the price of the country's major export commodity (second column). The correlation coefficients are for annual data between 1989 and 2002, and export values are converted to U.S. dollars. An additional example is Mexico where oil accounts for 10% of its exports but 40% of government revenues.⁸

⁸) Larson, et al. 1998.

Table 1

Correlations with Major Export Commodity Price

Country	Commodity	GDP	Exports	Revenue
Burundi	Coffee	-0.55	0.44	1.00
Colombia	Oil	0.05	0.30	0.62
Ethiopia	Coffee	0.44	0.33	0.36
Ghana	Cocoa	0.75	0.22	0.72
Kazakhstan	Oil	0.65	0.90	0.44
Nicaragua	Coffee	0.48	0.40	0.48
Nigeria	Oil	0.30	0.66	0.11
Uganda	Coffee	0.65	0.52	0.64
Uruguay	Beef	0.20	0.00	0.45
Venezuela	Oil	0.01	0.71	0.50

-- GDP and Revenue in real 1995 local currency values

-- Exports in nominal U.S. dollar values

-- International Financial Statistics, 1989-2002

Given the importance of price fluctuations for the government's revenues, as well as for the economy as a whole, it is risky if not reckless to do nothing to protect against this price exposure. Instead, governments can and should manage their risk exposure. Stabilization Funds and commodity bonds, described above, are two risk management strategies. Yet another policy approach, and one which addresses the problem more directly and does so with potentially less expense, is to use derivatives to hedge the commodity price exposure.

There are a variety of derivative instruments available on futures exchanges (mostly futures and options type contracts) or in the over-the-counter (OTC) market (where there are forwards, options and swaps).⁹ While the exchange traded contracts are mostly short-term, they can be effectively rolled-over in order to provide an effective hedge over a long period of time. This approach has its skeptics who are worried about the risks associated with the roll-over process. While roll-over risks – such as basis risk and market illiquidity – are real, they are small and manageable in comparison to the risk of not hedging. Moreover, many multinational oil corporations, global agricultural corporations and other businesses regularly use this technique as an inexpensive and effective hedge against price risk.

An important variation on this approach comes from the Australian Wheat Board.¹⁰ It promises participating farmers a minimum price for their crops, thus essentially giving away put options to participating farmers, and then hedges its exposure to this agricultural program by selling wheat futures on futures exchanges. As recently as the late 1990s it was the largest participant in the wheat futures market on the Chicago Board of Trade.

Hedging works to reduce risk in the following manner. Consider the simple case of a country in which the production and export of oil amounts to the total national output and export volume. A 20% rise or fall in the price will raise or lower its output and

⁹) See Dodd (2002b) for a primer describing the various markets in which derivatives are traded.

¹⁰) The Australian Wheat Board was privatized in the late 1990s.

exports by 20%. A country can hedge against this shock by taking a “short” position in the major commodity, or oil. For instance, it can sell oil in the forward market. A short forward position requires that a certain amount of the commodity be sold for a specific price at a specific time in the future. If oil is sold forward on January 1st for delivery on December 31st at \$25 a barrel, then a five dollar decline in oil prices will generate a \$5 profit for every barrel of oil covered by the forward contract. Similarly, it will lose \$5 if the price rises \$5. If the country produces 10 million barrels a year and the government sells short 10 million barrels at \$25 in one year, then the government has nailed down the price the nation’s oil output. No matter if the price falls or rises the sum of the value of the actual oil and the forward contracts will be the same, namely \$250 million at year’s end.

Hedging will generate gains when prices fall (loses when prices rise) and thereby reduce the variability of budget revenues due to price volatility. This will help prevent pro-cyclical fiscal policy, and allow the government to serve a more counter-cyclical role in stabilizing economic performance and promoting sustained growth. Moreover, everyone will know in January that the value of output and exports will be \$250 million by year’s end, and the government knows that it will have sufficient resources to pay it foreign debt or other obligations.

The advantages of this approach are that it is inexpensive, that it is a reversible policy and that it does not depend on the “fat” years coming first. It allows the government to borrow through conventional debt instruments instead of paying a premium to tap into smaller pools of investors willing to invest in commodity bonds. Unlike Stabilization Funds it neither tempts corrupt officials nor acts as a target for those seeking easy funding for new or expanded programs. The disadvantage is that it tends to give up the gains of price increases, however the solution to this problem is to hedge over a limited two or three year horizon or to hedge only 75% or 80% of the price exposure so that the economy “feels” some of the effects of the price changes.

D. Governance reform

Other frequently cited causes of the natural resource curse are corruption of government officials and the tendency toward spending profligacy by national governments. One way to reduce the incidence of both gross fiscal mismanagement and corruption (meaning the outright embezzlement of funds and the misdirection of funds for political purposes) is to require a high degree of transparency in government budgets and budgeting processes and to distribute budget authority across the executive and legislative branches of government.

- “Publish what you pay”

In order to put pressure on governments to make their budgets and budgeting processes more transparent, the Open Society Institute has embarked on an advocacy campaign to get corporations to report on their costs for royalties, rights and all other payments to development country governments for the extraction of oil, other minerals as well as metals. This “publish what you pay” campaign is designed to both make corporate reports more transparent – thus possibly exposing bribes – and make developing country budgets more transparent by showing their revenue from foreign investors.

The best analysis and account of this policy recommendation is found in Palley (2003 and 2004). He points out that the “publish what you pay” rule would provide a “double-entry check on government revenues, since companies’ reported payments should match governments reported natural resource revenues.”

IV. CONCLUSION

While it is perplexing to think that wealth can become a curse, it is even more vexing to see so little done about it. All of the above policy remedies are both feasible and affordable, and none of them would pose a major policy challenge. They would each benefit from further research and investigative reporting in order to discover more of the advantages and flaws as well as what could be learned from earlier experiments. The biggest political challenge is the widespread lack of understanding of the costs of doing nothing, and the lack of knowledge amongst policy makers about the merits of appropriate policy remedies.

RESOURCES

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Suggested questions of inquiry for journalists:

1. How much does your government revenues vary with the prices of your major export commodities?

2. How are you, what steps are you taking, to reduce the impact of the price fluctuations on your budget?
3. Are you doing anything to help businesses and individuals protect themselves from the price shocks?
4. Why are not more steps being taken to reduce the exposure to these risks?
5. How much is the government receiving as direct payments from primary resource production?
6. Is this in the form of royalties, rents or profits. Is the amount contracted in fixed amounts of the local or foreign currency, or it is contracted in amounts of the resource produced or exported?

Links for more information

- Financial Policy Forum
www.financialpolicy.org
- UNCTAD – U.N Conference on Trade and Development
www.unctad.org
- Open Society Institute
www.osi.org
- New York Mercantile Exchange (oil, mineral and metal futures and options)
www.nymex.com
- New York Board of Trade (futures and options)
www.nybot.com
- World Bank, Treasury Department – Risk Management
<http://treasury.worldbank.org/index.html>
- U.S. Department of Agriculture – Risk Management Agency
www.mra.usda.gov