

The Resource Curse and Fiscal Policy†

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Abstract

Recent discoveries of natural gas reserves, and continued exploration in the Eastern Mediterranean, have attracted the attention of investors to the region. Interestingly, many studies have highlighted that in general resource-rich countries grow more slowly than their resource-poor neighbours, rather than growing faster as would be expected. This literature has been labelled the “resource curse”, since it suggests that natural resources have been a curse more than a blessing for many countries, creating social tensions, governance problems, and economic distortions, that have hampered rather than facilitated growth. In this study, we analyse how natural-resource revenues should be managed, first by looking at the prescriptions of the theoretical literature, and then at what has been done in practice in a selected range of countries, including both failure stories, and success stories. These case studies help to highlight the pitfalls that should be avoided and the practices that have proved successful, and should be of particular interest for countries like Israel and Cyprus, which have unveiled or may be in all likelihood about to unveil new stocks.

Keywords: Resource Curse, Fiscal Policy, Economic Growth

JEL: Q30, E62, E40

1. Introduction

Recent discoveries of natural gas reserves, and continued exploration in the Eastern Mediterranean, have attracted the attention of foreign investors in the region, as well as of government and several interest groups eagerly waiting to utilize such resources and to extract rents: Israel has discovered

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large stocks of natural gas in the Leviathan field off its Northern coast, while explorations are ongoing in Cyprus, in neighbouring areas that are thought to also possess considerable natural gas reserves. Interestingly, many studies have highlighted that, in general, resource-rich countries grow more slowly than their resource-poor neighbours, rather than growing faster as would be expected. This literature has been labelled the “resource curse”, since it suggests that natural resources have been a curse more than a blessing for many countries, creating social tensions, governance problems, and economic distortions that have hampered, rather than facilitated, growth. Hence, this topic is highly relevant for countries that are thought to possess as yet unexploited natural resources like Cyprus, Israel, etc. It is crucial that from the outset these countries follow the right policies to maximize the benefits that can accrue to this, as well as to future generations, and avoid some of the mistakes that other resource-rich countries have repeated in the past.

There have been several studies trying to identify the reasons behind the “resource curse” in endowment-rich economies. The main reasons pointed out in the literature can be grouped into six categories: (i) the “Dutch disease”; (ii) deterioration of governance; (iii) over-investment in physical capital; (iv) under-investment in human capital; (v) under-developed financial markets; and (vi) increased macroeconomic volatility.

The first symptoms of a resource curse were identified in the Netherlands, after the discovery of natural gas deposits off its North Sea coast, in the late 1950s. The “Dutch disease”, as it became known, refers to the contraction of the rest of the tradable sector following an increase in profits in the resource-abundant sector (e.g., oil, natural gas, coal, or minerals). This contraction was initially said to occur through two main channels, but recently an additional channel has been highlighted. The main channel that is traditionally thought to adversely affect the economy is the real exchange rate appreciation that typically follows the discovery of natural resources, through a combination of nominal appreciation and domestic price inflation: the influx of foreign exchange reserves prompts an increase in the demand for domestic currency, causing a nominal appreciation (in fixed exchange rate regimes the real appreciation will be prompted by an increase in the money supply and inflation); this is accompanied by an increase in the demand for goods and services, which exerts upward pressure on the domestic non-tradable prices and, therefore, on domestic inflation. This real exchange rate appreciation lowers exports in the non-resource-abundant sectors and increases imports. This negative impact can be exacerbated by foreign borrowing, since countries experiencing oil windfalls have more access to capital markets and are tempted to “live beyond their means” (Usui, 1997). The other traditional channel is the

diversion of factors of production from the non-resource-abundant tradable sector into the resource-abundant sector, caused by the fact that the resource-abundant industry, experiencing windfall revenues, is able to pay higher wages and higher interest rates than other tradable producing activities (World Bank, 2006). Finally, the third channel, which has been recently unveiled (see Gylfason, 2004) is exchange rate variability. This variability is a by-product of the variability in natural-resource prices. Unstable exchange rates create uncertainty that reduces trade and foreign investment. Although the “Dutch disease” has been mostly associated with the shrinkage of the manufacturing sector, its impact on non-resource-abundant agricultural activities or even services can be similar (see Mickelson, 1997). When the resource-abundant sector is booming, it attracts capital and labour away from other sectors. At the same time, real exchange rate appreciation means that local products and services (such as tourism) can become uncompetitive in world markets.

More recently, the resource curse has also been attributed to weak institutions. Natural resource windfalls allow the government to appropriate large rents that can be re-distributed, and give rise to rent-seeking behaviour on the part of various economic groups. Rent-seeking activities divert resources from productive uses and represent a dead-weight loss for the society. Pressure on the part of different interest groups, combined with weak institutions, leads to a misallocation of revenues (Auty, 2000, Eifert et al., 2002, Carneiro, 2007, World Bank, 2006, Boschini and Pettersson, 2007). Lane and Tornell (1996) show that the submission of national governments to rent-seeking behaviour by various interest groups gives rise to what they call the “voracity effect”, whereby the growth benefits of revenue windfalls are wasted.

In resource-rich countries it has also often been observed that revenue windfalls tend to be channelled to low-return, overly ambitious projects, which crowd out private investment, and have to be downsized or abandoned when revenues fall (see Deaton and Miller, 1995; Sala-i-Martin and Subramanian, 2003; Sachs and Warner, 1999 and 2001). The uncertainty in revenues creates a boom and bust cycle in government investment, associated with very high investment adjustment costs, that is, costs of training new workers when investment levels are unexpectedly high and laying off workers when investment levels are unexpectedly cut (Devlin and Titman, 2004).

High levels of capital accumulation without human capital development lead to diminishing returns to capital. Education can thus increase economic growth by increasing the productivity of labour (Barro, 1997). It can also improve social conditions by fostering democracy and better governance, by improving health, and by enhancing equality (Aghion et

al., 1999). Gylfason (2001) finds that alternative measures of education (e.g., school enrolment), reflecting education inputs, outcomes, and participation, are all inversely related to natural resource abundance. A possible explanation is that natural capital crowds out human capital, by raising the opportunity cost of investing in education. Natural-resource-based activities, such as mining, generally require relatively low skill levels. The relative abundance of work in such sectors means that the return in higher education is relatively low (given that the probability of unemployment in skilled jobs is relatively high and the wage differential relatively low). At the same time, a large pool of unskilled workers does not encourage investment in activities that require skilled labour, but for which there is learning by doing and technological advance that can boost economic growth. To avoid this vicious circle, the government may be required to invest in education to change the relative abundance of skills.

In some countries resource abundance is also associated with undeveloped financial markets, which hamper the efficient allocation of resources across potential investments; the mobilization of higher levels of savings; and the development of financial instruments to deal with resource price volatility (Gylfason and Zoega, 2001). The poor functioning of financial markets in resource-rich countries is probably associated with the dominant role of government in total investment and the weakness of the private sector (Nili and Rastad, 2007).

Finally, the resource curse can also be attributed to poor macroeconomic management: booms and busts in expenditure and, in some cases, inappropriate monetary policy frameworks. Procyclical fiscal policies translate the ups and downs in natural resource prices into macroeconomic instability (see Frankel, 2011). Furthermore, overspending during the boom, due to access to cheap credit in international capital markets, amplifies the economic cycle. Without contravening monetary policy, resulting inflation aggravates the problem of local currency overvaluation. Everything else constant, high inflation means that domestic goods become relatively more expensive than foreign goods, and results in an appreciation of the real exchange rate. In addition, the accumulation of high levels of debt leads to high interest rate spreads during periods of lower natural resource prices (see Barnett and Ossowski, 2003; Devlin and Lewin, 2005). In fact, Manzano and Rigobon (2008) attribute the resource curse of oil rich countries to the “debt overhang” which occurred in the 1970s when these countries used commodities as collateral to take on excessive debt when oil prices were high. A collapse in oil prices in the 1980s left these countries with no ability to service their debts. This is indeed very relevant for current policies in many countries in view of the high oil and commodity prices, which may be reversed in the near future.

The poor management of windfall revenues may indeed be one of the most important causes of the resource curse, to which most of the other causes of the curse can be tracked down (e.g., real exchange rate appreciation can be exacerbated by government borrowing and real exchange rate volatility can be exacerbated by pro-cyclical fiscal policies). In this study, we analyse how natural resource revenues should be managed, first by looking at the prescriptions of the theoretical literature, and then at what has been done in practice in a selected range of countries, including both failure stories, and success stories. These case studies help to highlight the pitfalls that should be avoided and the practices that have proved successful.

The remainder of the study is structured as follows. Section 2 reviews the literature that analyses best practice in fiscal policy and institutional frameworks for resource rich economies. Section 3 analyses case studies with the objective of highlighting pitfalls that should be avoided and solutions that have proved beneficial. Conclusions are in Section 4.

2. Optimal use of revenues: The theory

If consumption smoothing improves welfare as postulated in the permanent income theory of consumption of Friedman and Modigliani (see Hall, 1978, and references therein), current spending should be based on an estimate of permanent rather than current income. Most natural resources (such as oil) are exhaustible resources and may become obsolete, and natural resource prices are volatile. Measures of permanent income in resource rich countries have to take these characteristics into account. Spending must therefore be based on the present value of expected revenues, taking into account price uncertainty, and uncertainty about the time of resource depletion or redundancy (see Barnett and Ossowski, 2003). This means that revenues should be saved and invested in good times, so that returns on investment constitute a permanent stream of income and even dis-saving can take place in bad times to sustain consumption and alternative investment.

Another motivation for saving revenue windfalls is due to the importance of taking into account the welfare of future generations, as property rights on existing stocks of assets do not necessarily pertain only to the current generation. Since resources are exhaustible long-term optimality requires

that some of the current revenues be saved for future generations, which will inherit declining amounts of the resource endowment.¹

In this context, binding fiscal rules can be used to limit the use of windfall revenues, and guarantee an optimal level of savings. Barnett and Ossowski (2003) suggest the determination of a sustainable non-natural resource deficit (as in Ecuador), and treating natural resource revenues as financing. Other types of rules can be considered, such as rules that limit the structural budget deficit (as in Chile), but the key point is to insulate government expenditure from fluctuations in oil prices. Decoupling fiscal policy from revenue fluctuations should also work to minimize the “Dutch disease”, through the containment of fiscal spending and the sterilization of some proportion of the revenue windfall. This will contain the increase in domestic absorption, and to a certain extent the nominal exchange rate appreciation, and inflation. Besides the accumulation of savings, an alternative way to sterilize windfall and take the pressure from the real exchange rate is to use supernormal profits to repay public debt (Mazano and Rigobon, 2007). This can strengthen the fiscal position and give the government room for manoeuvre during revenue downfalls.

In addition to fiscal rules, National Revenue Funds (NRF) have also been prescribed in the literature (see Davis, Ossowski, and Barnett, 2001, and references therein) as good vehicles for both expenditure smoothing (stabilization funds or rainy-day funds), and inter-generational transfer (savings funds or future generation funds), when transparent and well designed. The key challenge in this regard is the definition of optimal accumulation rules. Such rules often rely on some measures of permanent income which can be easily subject to error and political manipulation.² Frankel (2011) advocates the importance of setting up a system which avoids persistently optimistic forecasts on the part of the government with, for instance, the appointment of independent experts in charge of estimating long-term trends for natural resource prices and GDP.

Institutional provisions, however, will not insulate forecasts from the effects of unanticipated information about natural resource depletion, and by changes in the volatility of natural resource prices. Given this type of uncertainty, Devlin and Titman (2004) make a case for combining stabilization funds with the use of hedging financial instruments. Derivative instruments like futures and options, forwards and swaps,

¹ Some economic models such as overlapping-generations models are based on long-term welfare optimization and help to take decisions embodying welfare impacts on future generations.

² This problem also applies to the implementation of fiscal policy rules that set targets for structural budget deficits.

allow a country to sell their production forward, locking in a known price for a given period, and/or buy insurance against significant price declines.

Despite the benefits of market-based instruments to manage oil/mineral price risk, the use of these instruments is not widespread. An important reason for this is that the amounts to be hedged are very large, while potential counterparties (businesses, households) tend to be small, scattered, and uninformed. Specialized hedge funds take only a very small part of the necessary exposure.

Fiscal rules, national revenue funds, and hedging instruments solve the problems of price volatility and exhaustibility, but do not guarantee that oil revenues are used to foster growth and development. That has to do with how revenues made available each period are spent. Takizawa, Gardner, and Ueda (2004) show that government spending can affect not only the welfare of the current generation, because of the consumption value of government spending, but also that of future generations, because of the impact of government spending on productivity and the incentives it creates for private capital accumulation, and adoption of new technologies. This interpretation of government spending is consistent with the broadly shared view that government spending on social (e.g., health and education) and physical infrastructure can raise productivity and private investment. This argument suggests that it may be optimal for oil-rich, less-industrialized, countries to spend more of the resource endowment upfront, if the marginal benefit of government spending is higher than the return on financial assets. Government investment and incentives directed towards the resource-rich sector, however, can exacerbate "Dutch disease" effects. On the other hand, directing government spending and subsidies towards infrastructure, capital deepening, and adoption of new technologies in non-natural-resource traded sectors can help maintain a diversified export base.

Capital expenditures, however, will face diminishing returns at some point when the economy faces other constraints such as insufficient labour force, or insufficient labour skills. Therefore, capital expenditure should also be combined with investment in human capital and the preservation of natural resources stock (e.g. soil fertility, water availability, air quality). Expenditure in human capital can improve growth not only by increasing the efficiency of labour, but also by promoting democracy (Barro, 1997) and good governance, under the assumption that democracy and good governance increase and improve participation in economic activities, and by improving health and equality (Aghion et al., 1999). In addition, a more skilled and educated work force is more mobile across sectors and can provide a better base for the diversification of the economy into the industrial and service sectors.

Auty (2007) proposes the establishment of an independent public investment evaluation unit that would compare projected rates of return of offshore assets with those of proposed public investments in human capital, economic infrastructure, or productive activities. It is important to have in mind, though, that in the long run, the sustainability of growth will hinge on the ability of the economy to diversify its economic base away from natural resources.

One fundamental question remains, however, of whether governments can be trusted to use revenue windfalls in the most effective way. This debate, however, is not specific to resource revenue windfalls, but relates to the overall discussion about the role of the state in the economy. In any case, there is no guarantee that alternative appropriation schemes of revenue windfalls (e.g., international agencies or supra-national bodies) would result in a better use of funds, although there might be room on these grounds to ensure more international equity.³ On the other hand, it is also not clear whether private appropriation would be welfare improving for three reasons: i) private agents may be myopic and fail to recognize the temporary nature of the windfall; ii) they may also put a low weight on the welfare of future generations; iii) and may fail to put a sufficient weight on the social benefits of certain large investments such as investment in infrastructure, or in education (van der Ploeg, 2006, also discusses this issue). In addition, windfall profits are generated by public assets, thus direct appropriation by private agents could raise a series of problems.

In summary, economic theory does not have one single recipe to deal with natural resource revenues, which can be applied under all circumstances. But one way to envisage possible solutions for specific cases is to look at different countries' experience, having the theory in mind. We proceed to do so in the next section. We will start by analysing stories of failures, from which we will be able to extract the "don'ts" from resource management policy. Because in this literature failure stories are unfortunately more abundant than success stories, we will consider the failure cases occurred in the following country groups: Africa, Latin America, and Gulf States.

Success stories will give examples of how the theory can be put into practice. It is important to analyse these cases in detail to understand whether the strategies followed in these countries can constitute best practices to be replicated in other countries or regions, or whether they

³ The president of Senegal, Mr. Abdoulaye Wade, has suggested the creation of a pan-African oil fund as a means to ensure a more equitable distribution of oil revenues in Africa, with positive externalities for the region (Reuters, 2006).

would pose risks if transplanted to other economic, institutional, and social environments. Here we will review the cases of Botswana, Chile, Malaysia, and Indonesia, among less-industrialized countries, and Norway and Alaska, among industrial countries.

3. Country experiences

3.1. Some failure stories

Nigeria, Saudi Arabia, and mineral/oil rich countries in Latin America like Mexico are often cited as failure stories. In the case of Nigeria, the average growth rate in the aftermath of the two oil shocks of the 1970s (between 1981 and 1989) was about 0.6 percent a year (see Table 1), and the country now ranks among the 15 poorest countries in the world, despite being a major oil exporter since 1965. Between 2000 and 2006 the percentage of the Nigerian population with less than US\$1 per day was estimated to be close to 65 percent, which is about two times the poverty rate experienced in 1970 (about 36 percent), and reflects an increase in the number of poor from about 19 million people in 1970 to about 90 million people⁴.

Saudi Arabia has also performed poorly, with an average annual per capita growth rate of about 1.8 percent per year, between 1981 and 2007 (Table 1). In Mexico, after the oil booms of the 1970s, growth collapsed from about 7 percent to about 1.5 percent (Table 1).

Although experiences vary, there are common patterns in these stories of failure. In most cases the share of windfall revenues allocated to domestic absorption was too high, and consequently there was no effective strategy for sterilizing the effect of oil price shocks on the real exchange rate. Windfall revenues were appropriated by the government and used in overly ambitious investment projects with low rates of return, and to expand the public sector. Government policies led in most cases to the collapse of the agricultural sector, without a counterbalancing development of industry. There was a lack of investment in training and education to improve labour productivity, and entrepreneurship. Government investment crowded out private investment. Poor

⁴ Table 2 reports the percentage of the population with less than \$1 per day, for our selection of countries, but due to problems with data availability the data refer to the average of the available data in the selected period. The Nigerian poverty rate in the 1970s is reported in Sala-i-Martin and Subramanian (2003).

macroeconomic management led in most cases to over-indebtedness, inflation, and real exchange rate appreciation.

TABLE 1
GDP Growth (Average Growth Rates, Percent)

	<i>1970-1980</i>	<i>1981-1989</i>	<i>1990-2007</i>	<i>1981-2007</i>
Botswana	15.4	11.4	5.8	7.7
Chile	3.0	4.0	5.5	5.0
Indonesia	7.9	6.1	4.9	5.3
Malaysia	7.7	5.7	6.4	6.2
Mexico	6.7	1.5	3.2	2.6
Nigeria	6.7	0.6	4.4	3.1
Saudi Arabia	13.5	-1.4	3.4	1.8
Norway	4.4	2.6	3.1	3.0

Source: World Development Indicators 2008, World Bank

TABLE 2
Poverty and Inequality Indicators

	Population below \$1 (PPP) per day, percentage		Gini Index
	<i>1990-1995</i>	<i>2000-2006</i>	<i>1997-2006</i>
Botswana	31.2	-	-
Chile	3.5	2.0	56.3
Indonesia	54.4	25.4	32.3
Malaysia	2.1	2.0	49.2
Mexico	3.9	3.3	49.1
Nigeria	49.2	64.4	43.7

Source: United Nations, Millennium Goals Indicators and World Development Indicators (average of the data available in each period).

Nigeria

In Nigeria, the use of oil revenues was dominated by rent seeking and patronage, although, between the two major oil shocks of the 1970s, the capital stock grew on average by about 14 percent a year, mostly due to public investment, which as a share of GDP increased by 7 percentage points during the same period (Sala-i-Martin and Subramanian, 2003). This

investment, however, was followed by a sharp decline in capacity utilization, from 77 percent in 1975 to below 40 percent from the mid 1980s, due to the poor productivity of an unskilled labour force. Increased public investment and the expansion of the size of the government created jobs in urban areas, which caused a migration of labour from rural to urban areas. This led to a sharp decline in agricultural production and a rise in food prices (Bevan et al., 1998). The failure of industrialization, and the collapse of agriculture, led to an undiversified economy heavily dependent on oil revenues, and subject to oil price volatility. In 2004, Nigeria constituted an oil fund and used part of the windfall profits to reduce its external debt between 2004 and 2006, but there is still limited data to assess the impact of this strategy on growth (see Bellù and Marandino, 2008).

Saudi Arabia

Similarly, in the 1970s, in Saudi Arabia, as in other oil-rich gulf states, the government also allocated too high a fraction of the oil windfall to the increase in domestic absorption, causing the real exchange rate to appreciate sharply, eroding the competitiveness of the non-oil traded sector, and preventing the economy from diversifying away from oil to build a basis for sustained development. Public sector expansion was the main mechanism for job creation. In the mid-1990s, public sector wages absorbed 19% of GDP in Saudi Arabia.

The private sector showed signs of atrophy and labour productivity was low (Auty, 2000). Public investments, mostly on infrastructure, showed low rates of return and were overambitious compared to the capacity of absorption of the economy. In the aftermath of the oil shocks, the decline in oil rents forced the government to cut public expenditure drastically, intensifying the economic downturn. Despite the downsizing, the government drew down its foreign exchange reserves significantly, and accumulated high levels of external debt (Auty, 2000).

Mexico

In Mexico the government also used oil revenues to embark on overly ambitious projects with low rates of return, failing to anticipate the temporary nature of the windfall gains. The share of public investment in GDP rose by about 20 percent in 1979, after the second oil shock of the 1970s (Usui, 1997). This investment boom was accompanied by a sharp rise in imports of capital and intermediate goods that resulted in the accumulation of a large trade deficit. Most significantly, Mexican public investment projects were mostly directed towards the state oil company PEMEX, to increase productive capacity in the oil sector.

There were essentially no measures to strengthen the non-oil tradable sector, to avoid the effects of Dutch disease. Mexico did implement currency devaluation to curtail the real appreciation of the exchange rate during the oil boom, but the effects of the devaluation on the real exchange rate were short lived. The Mexican authorities devalued the peso in 1976, from 12.5 pesos per US dollar to 19 pesos and, in 1977, to 22.6 pesos, but just a few years later, the Mexican peso real exchange rate showed a sharp appreciation. This ineffectiveness of the Mexican devaluations can be attributed to inconsistent government policies that created high inflation, coupled with a large external imbalance. The Mexican government used its increased borrowing capacity, during the boom period, to finance additional spending abroad, rapidly increasing its external debt, especially short-term (Everhart and Duval-Hernandez, 2001).

This supports the view that the authorities failed to recognize the temporary nature of the windfall gains. The external imbalance in Mexico was made worse by a large scale capital flight: from 1974 to 1976, the error and omissions in the balance of payments expanded from a negative US\$ 479 million to a negative US\$3 billion (Usui, 1997). This capital flight reflects the lack of confidence in government policies, and the lack of opportunities for private sector investment in the country. The Mexican government over borrowing resulted in the debt crisis of 1982, when a sharp rise in international interest rates prompted by disinflationary monetary policies in the US and across Europe and the decline in oil prices forced Mexico to default on its debts. The crisis forced drastic cutbacks in government expenditure and a new currency devaluation, which further increased the debt burden and prompted further capital flight, on fears of continuing government defaults and devaluations. In summary, the crisis forced the Mexican economy to contract sharply after the oil boom, due to a poor investment strategy and imprudent fiscal policy.

3.2. Selected success stories

Only a few oil/mineral-rich countries managed to sustain long-term investment to GDP ratios comparable to that of successful industrial countries lacking such resources. These are countries that also managed to sustain relatively high per capita GDP growth rates following resource booms. The most cited of these success stories are Botswana, Indonesia, Malaysia, and Chile. The three Asian countries achieved this success by diversifying their economies and by industrializing; Botswana, rich in diamonds, by prudent revenue management policies. Chile, rich in copper, achieved sustainability with the use of fiscal constraints and by fostering private investment through market liberalization.

In addition to the success stories of less-industrialized countries, there is the experience of industrial countries in the management of natural resource revenues, from which lessons can also be derived. There have been essentially two types of solutions to the management of natural resource revenues in industrial countries: national revenue funds, managed by the government, as in the case of Norway; and national revenue funds that distribute dividends to the population, as in the case of Alaska.

This sub-section will review the experiences cited above with the aim of drawing conclusions about best practices in dealing with windfall revenues. It will provide a critical review of different approaches and discuss their applicability in different socio-economic and political environments.

Botswana

In Botswana, diamond production begun in 1972 on a small scale, expanded in 1982, and peaked in 1991; 1972-1991 was the boom period (Mogotosi, 1992). During those years, GDP growth was high and less variable than in other resource rich countries. Important policy moves contributed to this success story, including the creation of a stabilization fund, long-term investment horizons, and the diversification of the economy.

In 1972, when the first diamond mine was being constructed, Botswana created a Revenue Stabilization Fund and a Public Debt Service Fund (Auty, 2001).⁵ Government current and capital expenditure plans are approved by parliament for the medium-term, based on long-term projections of future resource revenues. These plans follow an informal rule that mineral revenues should only be used for undertaking investments. Any revenue in excess of planned investment is saved (Sarraf and Jiwanji, 2001).

Financial reserves increased rapidly in Botswana, and by 1998 the accumulated financial reserves of the country amounted to US\$5.9 billion, approximately US\$3000 per capita, or 125% of the country's GDP (IMF, 1999). Two-fifths of these rents were sterilized in offshore investments, and the interest earned has constituted a steady and significant annual contribution to government revenue, having reached about 12% of GDP by the mid-1990s (Auty, 1991). The remaining three-fifths of the rents were

⁵ The Debswana Diamond Company Ltd has the monopoly of diamond extraction in Botswana and it is currently owned 50% by De Beers and 50% by Botswana's government (Iimi, 2006).

used to increase public investment in infrastructure, education, and health provision; although some overambitious investment programs in 1987-1991 had to be scaled back later. State enterprises did expand in Botswana in the 1980s boom period, but by far less than in other resource rich countries, with most of the country's state-owned enterprises remaining profitable (IMF, 1999).

In terms of exchange rate policy, Botswana's currency has been pegged to the South African rand. This peg has worked as a good anchor for inflation, and has led to a relatively stable exchange rate and even real depreciation from the end of the 1990s with the nominal depreciation of the South African rand. The containment of real appreciation in Botswana allowed for some economic diversification through import substitution development in manufacturing, and allowed the country to run a relatively open trade policy.

While the scope for economic diversification in Botswana through the expansion of agriculture is limited by poor resources (including limited rainfall and poor soil, see Iimi, 2006), the country achieved some diversification through import substitution policies aimed at fostering manufacturing, with its share rising from 8% in 1974 to 15% in 2007. This created some base for sustaining growth in periods of resource revenue shortfalls.

Despite the relatively good performance of the country so far, the country faces some serious problems, such as: 1) almost 90% of exports are still generated by the mineral sector; 2) while "the mining industry accounts for 40% of GDP, 90% of exports and 50% of government revenues, it employs only 9,200 people, or around 3% of the total labour force" (UNCTAD, 2007; pp. 87, 134, 135); 3) Debswana - a joint venture between the Government and De Beers - generated also some social problems, including the forced resettlement in 2002 of the Bushmen, a local population of hunters, out of their ancestral territories in the Kalahari reserve, where new mining fields had to be opened; 4) Botswana's public investment decision system has not prevented unproductive public sector investment, especially in the sectors of defence, community and social services, and agriculture, which have experienced diminishing returns to expansion (Lange and Wright, 2004); 5) the country still ranked 124th in the 2007 Human Development Index (UNDP 2007); and 6) the HIV prevalence (around 30%) is very likely to hamper growth perspectives and contribute to additional poverty and food insecurity (Thurlow, 2007).

Indonesia

Indonesia is considered in the literature an example of an oil exporting country that has on balance managed to avoid the resource curse. Between

1981 and 2007 the country sustained an average growth rate of GDP of about 5%, significantly above the average growth rate of GDP of industrial countries over the same period, and with poverty and income inequality considerably lower than in other less-industrialized countries, according to World Bank indicators (Carneiro, 2007). Indonesia has also managed to keep a relatively diversified traded sector.

The relative success of the Indonesian economy has been attributed to its use of oil revenues and its macroeconomic management. There was a concern to distribute revenues intertemporally (as permanent income considerations would dictate), translated into the accumulation of de-facto government surpluses. Expenditure was focused on giving support to the non-oil exporting sector, especially agriculture, an activity in which the largest share of the population was engaged. There were also efforts towards spending on education. Real exchange rate appreciation was limited by nominal devaluation coupled with the control over the growth of domestic absorption. Reliance on foreign borrowing was also limited.

The government budget in Indonesia follows a “balanced budget” rule. This rule could have prompted sharp increases in government expenditure during oil boom periods. The government, however, managed to run de-facto budget surpluses by registering fictitious spending in its accounts, while depositing the money in government deposit accounts in the banking system. Although the budget is close to balance according to budget data, the net position of the government with the banking sector increased significantly during the oil boom (Usui, 1996)⁶. The accumulation of deposits in the banking sector helped sustain development programs during revenue downfalls, more successfully than in other countries.

Regarding the composition of government expenditure in Indonesia, the share of capital spending was maintained at a high level relative to the share of current expenditure. In addition, capital expenditure was biased towards agriculture and industry, with the aim of strengthening production. Development programs in agriculture gave priority to rice production, with an emphasis on research and development (BIMAS), investment in irrigation, and subsidization of fertilizers. Subsidies for fertilizers in combination with a price support mechanism administered by the national logistic agency BULOG, encouraged the production of new

⁶ The “balance budget rule in Indonesia requires that total expenditures be covered by total revenues, including foreign borrowing (considered “development revenue”). This means that the net position change with respect to the banking system (change in borrowing minus change in deposits) should be zero (see Usui, 1996).

high-yielding varieties heavily dependent on fertilizers⁷. Following these programs, Indonesia became self-sufficient in rice production in the mid-1980s, and the real value added per agricultural worker rose by over 65 percent (see Usui, 1997; Ross, 2003). Support for agriculture was revealed to be a highly effective pro-poor strategy, given that the majority of Indonesia's poor depend on agriculture for subsistence (Ross, 2003).

Education also received attention in Indonesia with the construction of primary schools. This program contributed to boosting enrolment from 77% in 1970 to 100% in 1978 (Eifert et al., 2002). The use of windfall revenues to sustain long term projects focusing on improving rural infrastructure, and providing health and education in low-income areas also helped to reduce poverty and income inequality in Indonesia.

In terms of macroeconomic management, Indonesia followed a fixed exchange rate regime but resorted to devaluations to respond to concerns over the real appreciation of the rupiah, following oil windfalls. In 1978, for instance, the rupiah was devalued from 415 rupiahs per US dollar to 625 rupiahs per US dollar (a 50.6% devaluation). It is important to note that this devaluation was not motivated by disequilibria in the balance of payments, but was simply aimed at maintaining the profitability of the non-oil trading sector. Indonesia had a relatively high level of foreign exchange reserves in 1978 (about US\$ 2.2 billion) and a trade surplus of about US\$ 7.4 million in the second quarter of 1978 (Usui, 1997). Due to the partial sterilization of oil revenues, through budget surpluses, and to the containment of foreign borrowing, inflation was kept under control, with the result that the containment of real exchange rate appreciation could last until the end of the oil price boom in 1982. This containment supported private investment in the non-oil tradable sector during the oil price boom.

The containment of foreign borrowing was very important in determining the success of real exchange rate stabilization policies, in the sense that it helped contain the growth of aggregate demand and inflation. To avoid foreign borrowing by state owned oil companies, which had particularly easy access to foreign credit, the government introduced new regulations requiring these enterprises to obtain approval from the authorities before contracting medium and long-term debt to finance projects. These restrictions were later strengthened in response to defaults by the Pertamina state-owned oil company on its short term foreign debt (which was not subject to regulation). After the Pertamina crisis, new regulation

⁷ Price support mechanisms are important in agricultural markets. If production is dumped in the markets immediately after harvest, prices can become very low. Logistics capacity to manage inventories is important to stabilize prices in these markets (see de la Torre et. al., 2006).

prohibited short-term borrowing by the public sector, and required external loans to be approved by the Bank of Indonesia and the Ministry of Finance. As a result of this containment in exposure to foreign borrowing, Indonesia enjoyed low interest rates on external debt, long maturities, and long grace periods between 1978 and 1982 (Usui, 1997).

It is important to note that the management of domestic absorption and inflation and the re-direction of funds from the oil to non-oil sectors were possible in Indonesia for institutional reasons. One of these reasons was the prominent role of economic advisors (“technocrats”) in the design of economic strategies.⁸ The second institutional reason was the existence of strong non-oil tradable sector interest groups, in agriculture and labour intensive industry, which would monitor how oil was spent and were concerned with developments in the real exchange rate (Eifert et al., 2002).

Malaysia

Malaysia is a mineral rich country with rich reserves of tin, oil and natural gas, that has achieved sustained economic growth through diversification of the productive base, even with deterioration in its terms of trade.

Mineral revenues in Malaysia are fully controlled by the state, with the monopoly of the state-owned oil company. This has led to an expansion of the role of government in the economy, with the share of government in GDP reaching about 42%, double of that of neighbouring countries like South Korea and Thailand. On the positive side, funds from the exploitation of mineral reserves are invested according to long-term development plans.

Malaysia has used natural resource rents to raise the share of investment in GDP, but human capital formation has lagged behind that of resource poor East Asian countries. The country did develop through competitive industrialization but with a lag, greater income inequality, and slower skill accumulation than resource-poor countries in East Asia (Auty, 1993). Political constraints in Malaysia determined that mineral rents be first transferred to the agricultural sector, to please the peasant Malay majority, and delayed industrialization. Nevertheless, investments in agriculture helped Malaysia to diversify to various commodities such as rubber, palm oil, timber. This helped sustain growth rates in agriculture of 4-6% per annum in the 1960s and 1970s (Auty, 2000). As a result, and despite the delayed industrialization, the country has performed significantly better than most other resource-rich countries.

⁸ In the period of the oil windfalls of the mid 1970s to early 1980s, the government was advised by a group of economists that became known as the “Berkeley Mafia”.

Chile

Chile is one of the world's leading copper and iodine producers. Chile's economy grew at an average annual rate of 5% from 1981 to 2007. This growth has been sustained by growth in a well-diversified and competitive exporting sector, in parallel with the experience of the East Asian Tigers.

The Chilean copper industry was dominated by US firms until the 1950s, and the government imposed high taxes on the foreign firms in order to appropriate part of the copper revenues. In 1955, Chile agreed to lower taxes and to grant other benefits for US companies in exchange for investments in new industrial plants, to increase the Chilean productive capacity and world market share (the New Treatment Law). The perception that US promises failed to materialize led to the nationalization of the copper industry in the early 1970s and the creation of the state-owned company CODELCO (Maxwell, 2004).

During the 1970s, in the context of economic recession and high inflation, the Chilean government sought the technocrat guidance of a group of economists, trained in Chicago under the supervision of Milton Friedman and Arnold Harberger, who became known as the "Chicago boys". In this period, several anti-inflationary measures and exchange rate devaluation were undertaken to stabilize the economy, bringing inflation down from around 200 percent in the 1970s to 20 percent in the 1980s. Liberal market reforms were also implemented in this period to foster productivity growth and competitiveness (see Lagos, 1997).

Since the mid 1970s, the copper sector in Chile has been characterized by mixed public and private ownership. The sector's legislation and regulations are transparent and the share of private rents appropriated by the government through taxation is relatively low compared to other countries (Lagos, 2007). The public ownership ensures that a significant part of the mineral revenues is retained and re-invested in the country, while the possibility of private ownership attracts foreign direct investment into the country, with positive spillover effects, which include the transfer of technology. CODELCO has also entered into partnerships with local or foreign corporations to develop unexploited mining properties, and this has led to significant expansion, with a jump in Chilean copper production from 11 percent of the world's total production in 1970 to almost 21 percent in 1992 (Maxwell, 2004).

Contained inflation and exchange rate stability, and a relatively safe investment climate (guaranteeing property rights and with transparent legislation) have allowed for a diversified export base in Chile, with the development of traditional sectors, like fisheries, and also new sectors, including cellulose, fruit, salmon, wines, methanol, and services, including

tourism. The agricultural sector, including the wine sector, and fish farming, have been particularly dynamic, using increasingly sophisticated technology and management methods, leading to higher productivity and higher incomes, as well as backward and forward linkages for economic expansion (e.g., research and development, distribution). As a result, the percentage participation of mining and copper in total exports (in volume terms) fell from nearly 70 percent in 1976 to less than 50 percent in 2007.⁹

In 1985, Chile established a Copper Stabilization Fund (CSF) designed to smooth the impact of copper price fluctuations on the real exchange rate, and on government revenues. According to the rules, a share of CODELCO's revenues is deposited into the fund when prices rise above a certain threshold. This fund has ensured that government expenditure is de-linked from fluctuations in copper prices. In 2004, for instance, when copper prices soared, real government spending growth was limited to 5.3%, yielding a fiscal surplus and a reduction in the public sector debt, which is already relatively low (Maxwell, 2004).

After 1990, Chile's return to democracy and the ensuing political stability, with transparent and pro-market legislation and regulation, gave a new boost to investment. The mixed private and public ownership of the mineral sector has attracted continuous foreign investment to the mining sector, with positive spillovers of investment in other sectors of the economy. In 2000 budget rules were introduced to impose countercyclical fiscal policy (see Frankel, 2011, for a detailed analysis). The first rule specifies a target for the structural budget balance: this was 1% from 2000-2006 (due to the need for recapitalizing the central bank, funding pension related liabilities, and servicing external debt); 0.5% in 2007; and 0% in 2009 (given that it was determined that the external debt had been essentially paid off). The second set of rules specifies that the government can run an overall deficit larger than the target if: (i) output falls short of its long-term trend in a recession; or (ii) the price of copper is below its medium-term (10 year) equilibrium. To insulate the estimates of the two inputs that determine the breakdown of the deficit between structural and cyclical – the long term trend for output and the trend price of copper – from the political process, these estimates are commissioned to a panel of independent experts drawn from mining companies, the financial sector, research centres, and academia. If the resulting structural balance differs from the target, the government has to adjust spending plans. This framework was put to a test during the copper price boom of 2003-2008. Although political pressure would probably lead to declaring the copper price increase permanent, the independent panel of experts ruled that most

⁹ Statistics of the Central Bank of Chile.

of the price increase was temporary; hence most of the increase in earnings had to be saved. Copper prices did fall in 2009, proving the temporary nature of the price spike, and the savings accumulated during 2003-2008 could be used to alleviate the recession felt worldwide between 2008 and 2009.

Norway

An oil price rise is commonly associated with a terms-of-trade benefit for oil exporting countries. Being a major oil exporter, the fifth largest in the world, Norway is accordingly likely to gain substantially from high oil prices. Analyses of oil price shocks which include the Norwegian economy support this view. However, being an industrialized small open economy, the country also depends on trade with other OECD countries. Therefore, Norway may face significant adverse trade impulses from oil price hikes because, in contrast to other major oil exporters such as OPEC countries, where non-oil exports have been of minor importance, Norwegian non-oil exports have accounted for 25-30% of GDP since the beginning of the 1980s. In addition, with a fixed exchange rate regime, higher interest rates abroad affect the Norwegian economy. Accordingly, the overall outcome of an oil price shock has to be examined carefully.

Eika and Magnussen (2000) analysed the effects on the Norwegian economy of high oil prices that dominated during the first half of the 1980s. Because of the significant production and exports of oil, Norway received a windfall gain from the increase in oil prices. On average, real GDP increased by 2.7% per year during the 1979-1993 period, compared to less than 2% in most other Western European countries. The temporary increase in oil prices led to increased private and public consumption and to reduced unemployment. These positive effects on the Norwegian economy were still present many years after the oil price shocks. At the same time, however, it turned out that high oil prices had a rather persistent effect on demand from Norwegian trading partners: in 1993 exports were still lower than they would have been with a smooth real oil price path.

Coming to recent years, thanks to increasing oil production and high oil prices, the Norwegian government's revenues from petroleum operations increased significantly so that in the period 2000-2006, on average, oil revenue was about 18% of GDP. As a result, the general government budget surplus averaged to about 17%, whereas the non-oil budget was in deficit of about 2.8% of GDP (Jafarov and Leigh 2007). In 2007, revenues from petroleum activities reached about 23% of GDP, and the general

government budget surplus about 23%, with a non-oil budget surplus of 0.2%.¹⁰

In 1990 Norway established the Government Petroleum Fund (GPF – since 2006 called the Government Pension Fund), which has served as a model for other natural resource funds. The Norwegian government accumulates assets into the GPF from general government budget surpluses (Hannesson, 2001; Skancke, 2003; Davis et al., 2003). Since the late 1990s, the stock of assets in the GPF has steadily grown. These assets are drawn upon for two purposes: i) to smooth out the spending of volatile oil revenue, and ii) to balance current outlays with future spending. Spending is not earmarked, but there is a public consensus that the GPF should serve to alleviate the burden of future pensions' commitments which is projected to put increasing pressure on public finances due to the ageing of the country's population. The Norwegian central bank has the operational management of GPF, whose portfolio consists of stocks, bonds and fixed income instruments around the world. A transparent asset management strategy has been adopted, and financial reports are published on the central bank's website

To avoid the pressure for overspending the management of its oil wealth, Norway has adopted fiscal guidelines since 2001, which include a rule that the central government's non-oil structural deficit should be within the 4 percent expected real return on the Government Petroleum Fund assets (see Eifert et al., 2002). According to Jafarov and Moriyama (2005), the oil revenue policy has so far been effective in limiting Dutch disease effects and in protecting the budget from changes in petroleum prices and extraction rates. However, to ensure long-term fiscal sustainability, the rule may need reconsideration as it implies an expansionary fiscal policy over the next 15 years, and also in view of continuous ageing of the population.

Although Norway's paradigm has been successful and could be regarded as an example that other countries could follow, Humphreys and Sandbu (2007) have pointed out that the institutional restrictions that Norway's fund imposes on policy makers are actually extremely weak, and are therefore least likely to work in environments where the surrounding institutional framework is weak. Therefore, they emphasize that natural resource funds are not a panacea and too little is known about how they interact with a country's overall social and political institutions.

¹⁰ Source: IMF statistics.

Alaska

Alaska's oil production began in the mid 1970s with the lease of exploitation rights to oil companies. Soon after, the Alaska Permanent Fund (APF) was created, by amendment to the Constitution, with the aim of transferring revenue to future generations. According to the rules of the fund, 25 percent of all mineral-related revenues received by the state must be deposited into the APF. In addition, the fund is only allowed to invest in income generating financial assets, and only the fund's earnings can be spent, in principle. Any expenditure from the principal component of the fund requires a referendum (Asfaha, 2007). The transformation of oil revenues into a stream of financial wealth may not yield the best growth opportunities for the economy if it lacks infrastructure, capital or human capital stock, but it keeps open the option to undertake this type of project in the future, and reduces rent-seeking.

The APF grew from \$137 million at the end of 1979 to \$10 billion by 1988. It reached a peak in 2007, at about \$39 billion, but declined in 2008 due to the stock market decline that followed the global financial and banking crisis triggered by the crisis in the US mortgage market.

Part of the earnings of the APF is distributed to Alaska's residents, through the Alaska Permanent Fund Dividend Program. This program was established in 1982, as a means to spur personal interest in the protection of the oil revenues on the part of civil society. The program distributes half of the five-year average of the realized earnings of the APF, among all residents, including children, in equal amounts. Besides favouring large families, this scheme also favours lower income families, because although dividends are subject to taxation, for low income families they fall within the non-taxable base. The five year average rule for the calculation of dividends helps to stabilize the annual payout, and to insulate management from political pressure to maximize short-term dividends (Goldsmith, 2002). So far, though, there has been no study to analyse how Alaskan citizens have spent their dividend income, therefore there is no evidence to show whether private appropriation of oil/mineral revenues is more efficient than public, in the sense that there is no evidence that the public allocates the income earned in a way that maximizes the household per capita income in the long term. Hjort (2006) argues that distributing proceeds to citizens effectively amounts to expansionary fiscal policy. If citizens are myopic, or credit constrained, this can result into a higher fraction of income being spent on consumption and a lower fraction being saved. On the monetary side, the introduction of liquidity into the economy may weaken control over inflation.

The APF was complemented by a second fund, the Constitutional Budget Reserve Fund (CBRF), in 1990, with the aim of relieving fiscal pressures. The CBRF is funded by all proceeds from settlements of tax and royalty disputes between the state and oil companies, and in 2002 amounted to US\$240 million. In practice, the CBRF works as an interest-free loan to the government, which must be repaid in years of fiscal surplus (Fasano, 2000). There is an annual cap on the amount that can be drawn from this fund, but the flexibility to revise the cap upwards, means that in practice the cap does not impose fiscal discipline. In 1999, for instance, when it was perceived that the government budget deficit would exceed estimates due to lower oil prices and production, the cap was revised upwards. Despite this shortcoming, the Alaskan budget expenditure has not closely followed revenue availability during the 1990s (Fasano, 2000).

4. Conclusions

The aim of this study has been to highlight pitfalls and best practices in the management of natural resource revenues. This is important as much for countries that have been exploiting natural resources for several years now, but have failed to translate their richness into sustained economic growth, as for countries that are known or thought to possess as yet unexploited natural resources.

Israel, for instance, discovered in December 2010 that it possesses significant natural gas deposits off its northern coast. The Leviathan field, as it became known, is estimated to contain about 16 trillion cubic feet (tcf) of gas, which can potentially turn Israel into a net energy exporter. This discovery has also increased the likelihood that neighbouring Cyprus discovers sizeable natural gas fields off its southern coast, close to where the Israeli stocks have been found, and a 51,000 square-kilometer zone has been divided into 13 blocks, with the purpose of exploration. The lessons from economic theory and the experiences of other countries described in this study can help such countries set appropriate rules and institutions from the outset, to help them avoid the “traps” of natural resource wealth.

Previous empirical studies reveal that, in the medium to long run, natural-resource-rich countries do not enjoy significantly higher GDP per person. This has occurred in great part due to the absence of long-run planning and of an appropriate policy framework, which has constrained long-run growth in most of these countries. This can be also seen clearly from the country experiences discussed in this paper.

Thus, the key policy recommendations for natural-resource-rich countries relate to the sound management of natural resource revenues to ensure the

long-term sustainability of public finances. In this regard, the investment policy should take into account the fact that the resources are exhaustible and thus the benefits should be spread across generations. All this implies: (a) a solid institutional framework; (b) sound investment policies; (c) and appropriate fiscal policy rules that insulate fiscal policy from fluctuations in revenues.

- a) The setting up of a solid institutional framework, which will shield the asset management from short-term political interests and lobbies' interference. Several good examples exist, including Chile and Norway, and a considerable literature on this issue exists which can help policy makers to design institutions (see for instance IMF, 2005, Eifert et al., 2002, Devlin and Titman, 2004, Asfasha, 2007, Frankel, 2011, and other studies cited above). Such a framework will allow governments to save windfalls in periods of revenue booms, to be spent in periods of revenue slowdown.
- b) Investment policy. As has been mentioned earlier, part of the revenues should be invested in: 1) education and health as a way of boosting permanently incomes and also spreading benefits across generations but, as proposed by Auty (2007), an independent public investment evaluation unit should evaluate alternative uses of funds and judge where they can be best applied; 2) to diversify the economy so as to insulate it from specific shocks in the natural-resource-rich sector in the medium and long term. Hence, investment in other sectors where countries want to develop comparative advantages may be warranted.
- c) In addition, both fiscal and monetary policy in resource-rich countries must address the need for containing both nominal exchange rate appreciation and inflation. With respect to fiscal policy it is important to contain fiscal spending and sterilize some proportion of the revenue windfall. This will contain the increase in domestic absorption, and to a certain extent the nominal exchange rate appreciation, and inflation (this would be particularly important in the case of Cyprus, since membership in the European Monetary Union means that nominal devaluation is not an option to contain real appreciation). Revenue stabilization funds can help this process of sterilization. Another way to sterilize windfall and take the pressure from the real exchange rate is to use supernormal profits to repay public debt (Mazano and Rigobon, 2007). This will strengthen the fiscal position and give the government room for manoeuvre during revenue downfalls.

To ensure fiscal discipline, fiscal rules may be desirable, but they must be designed so as to decouple expenditure policy and the non-oil/mineral deficit from short-run fluctuations in oil/mineral prices. As mentioned

earlier, Barnett and Ossowski (2003) propose rules aimed at maintaining a constant, sustainable, non-oil fiscal deficit. An alternative is to establish rules for the structural deficit, as in Chile. One important difficulty with such and other accumulation rules, however, is that they should rely on some measure of permanent income to determine the optimal level of savings. It is important to set up a system which avoids persistently optimistic forecasts on the part of the government, with, for instance, the appointment of independent experts in charge of estimating long-term trends for natural resource prices and GDP.

Fiscal policy can also contribute to minimize Dutch disease effects by containing expenditure directed at the natural resource sector and at non-tradables. Instead, expenditure aimed at supporting the tradable non-natural resource sector and non-tradable sectors would be beneficial for diversifying the export base, and containing the rise in the price of non-tradables relative to tradables.

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