Lao PDR Development Report 2010
Natural Resource Management for Sustainable Development

Development with a Rapidly Expanding Natural Resources Sector: Challenges and Policy Options for Lao PDR

This paper was prepared by Milan Brahmbhatt and Ekaterina Vostroknutova. Research assistance from Somneuk Davading and Keomanivone Phimmahasay is acknowledged with thanks. The paper expresses the views of the authors and not necessarily those of the World Bank, its Executive Directors, or the countries they represent.

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The extent of Lao PDR’s substantial natural resource wealth has only recently been accurately assessed. The rapid expected growth in the development of this natural resource wealth over the next decade is likely to have an increasing influence on most aspects of Lao PDR’s economic development. In the last five years, driven by a volume expansion and the surge in commodity prices in 2005-2008, mining and energy has become the largest exporter and the fastest growing sector. Fiscal revenues from mining and hydropower have surpassed aid grants in 2007, and mineral and non-mineral fiscal balances have decoupled by up to 2 percent of GDP (Figure 1, Figure 2).

Revenues from the natural resource sector are dramatically altering the government’s fiscal position. Natural resource fiscal revenues have risen from 3 percent of total revenues in 2001 to around 18 percent in 2008 (Figure 1). So far the government has taken the fiscally prudent course of saving virtually all of the increase in natural resource revenues, resulting in a sharp fall in the overall fiscal balance together with a nearly stable non-natural resource fiscal deficit (Figure 2). These developments and policy implications are discussed in Vostroknutova et al. (2010).

The rapid growth of the natural resources sectors has transformed Lao PDR’s economic landscape and is having a strong impact on its balance of payments. The Lao PDR Development Report¹ and its background studies measure the extent of the expansion in the natural resource sector. In particular, they note that the contribution made by mining and energy production to GDP rose from around 2.5 percent before 1997 to 12 percent in 2008, contributing over one-fifth of real economic growth over that period, and is now projected to contribute half of all real economic growth by 2015. Mining and hydropower exports reached over 60 percent of merchandise exports by 2008 and are projected to reach 80 percent by 2011 (Figure 4). The highest direct impact has been on the balance of payments. In their early stages of construction, large projects contribute to a current account deficit, but after construction they contribute to a current account surplus. A similar process takes place on the capital account side with inflows of FDI and outflows of benefits. Such switches in the direction of the balance of payments impacts exacerbate volatility that is also associated with the natural resources’ fiscal account (Figure 3).

Even more significant economic changes are likely to lie ahead as natural resources activity continues to grow. As the figures above and Table 1 indicate, potential reserves of gold and copper are estimated to be 5 to 8 times the size of the currently proven reserves. Hydroelectric power production is expected to quadruple as major projects come on stream, led by the Nam Theun 2 project that became operational in 2010. Additional hydroelectric potential could double that level.²

Table 1: Inventory of Mineral Resources and their Potential

<table>
<thead>
<tr>
<th>Minerals</th>
<th>Proven reserves, tons</th>
<th>Potential (est.), tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper, `000t</td>
<td>1,676</td>
<td>1,530</td>
</tr>
<tr>
<td>Gold, t</td>
<td>72</td>
<td>35</td>
</tr>
<tr>
<td>Silver, t</td>
<td></td>
<td>321</td>
</tr>
<tr>
<td>Tin, t</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hydropower</th>
<th>Installed capacity, MW</th>
<th>Production, Gwh/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing plants</td>
<td>660</td>
<td>2,252 (2009)</td>
</tr>
<tr>
<td>Total, including potential</td>
<td>6,717</td>
<td>31,282</td>
</tr>
</tbody>
</table>

Note: In the absence of reliable nationwide data, it is impossible to estimate the potential stock of minerals. Larsen (2010) uses more conservative assumptions than Marutani (2006).

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Challenges of Natural Resource-based Development

In general, an increase in wealth resulting from the discovery of a natural resource or a permanent rise in the terms of trade is a positive development. It leads to a new equilibrium with higher incomes and higher consumption of both non-tradables and tradables (with the latter being available to a greater extent than before, through imports). Moreover, the rents collected by the government from mineral resources can be invested in public goods and other development expenditures that would have been unaffordable in their absence. Analyzing the historical development of several European countries and the United States, Gelb and Associates (1988) concluded that “there is evidence that, at least in some cases, high-rent activities... have provided an important stimulus to growth.” (See also the historical review in Lederman and Maloney, 2007a).

There is, however, a long tradition of economic research that argues that these obvious gains may have come at the expense of growth in the long term. This theory is based on the idea that manufacturing and other non-resource tradables possess specific long-term, growth-enhancing qualities such as the presence of positive technological spillovers, learning by doing effects, or increasing returns to scale in production. Another aspect of this argument relates to resource depletion and employment. Given increasing returns and costly, time-consuming learning in manufacturing, the economies would struggle to rebuild their sources of growth after they have depleted their natural resources. Called “Dutch disease” for its effects on the manufacturing sector (see Box 1), this syndrome affects labor-intensive industries more than capital-intensive ones and increases capital intensity in general, as found by Ismail (2010). It may also increase unemployment as it did originally in the Netherlands and the United Kingdom.

Significant natural resource wealth has therefore become a “curse” for development in many countries. Exporting large amounts of natural resources can negatively affect the economy through the balance of payments, the reallocation of production factors or the spending effect, and a possible debt overhang.

Box 1: “Dutch Disease”

The recent boom in primary commodity prices has once more stimulated interest in the issue of “Dutch disease.” This term refers to changes in the structure of production that are predicted to occur in the wake of a favorable shock, such as the discovery of a large natural resource or a rise in the international price of an exportable commodity that is perceived to be permanent. Such structural changes can be expected to include, in particular, a contraction or stagnation of other tradable sectors of the economy and to be accompanied by an appreciation in the country’s real exchange rate. Where the booming sector is oil or minerals, the declining tradable sectors would include manufacturing and agriculture, according to the theory.

In principle, such changes in the structure of production should be welfare improving, reflecting changes in demand associated with an increase in national income. However, these changes can have negative effects if the declining sectors have some special characteristics that would stimulate growth and welfare in the long term, such as increasing returns to scale, learning by doing, or positive technological externalities. Concerns about Dutch disease can also arise in countries that have enjoyed large, sustained inflows of private capital or foreign aid.


Some countries, however, have managed to turn this wealth into blessing, thanks to adequate government policies and institutions building. Some economies were able not only to achieve strong productivity growth in their natural resource sectors but also to diversify into new, technologically sophisticated manufacturing and services sectors, resulting in steady and robust income growth over many decades. Many of today’s developed countries – for example, Canada, the United States, several Scandinavian economies, and Australia – used to be heavily dependent on natural resources. Studies of these economies suggest that the existence of strong public and private institutions

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3 This section draws heavily on Brahmbhatt et al. (2010).
for learning and innovation and a relative lack of artificial monopolistic barriers to adopting new technology were particularly important in their ability to use natural resources as a springboard to long-run success (Maloney, 2007 and Blomstrom and Kokko, 2007). Several present-day developing economies have also been able to combine a rich natural resource base with substantial economic diversification and growth, for example, Brazil, Chile, Malaysia, and Thailand.

Based on experience elsewhere, the view we have taken in this paper is that the expected expansion of the natural resource sector in Laos can, if carefully managed, help to accelerate the country’s economic and social development. However, the increasing importance of natural resources in the economy will raise difficult policy challenges that, if not carefully handled, could harm Lao PDR’s long-run development. In this paper, we outline these challenges and suggest ways to address them based on international best practice and recent analytical work.

Methodologically, we faced an unusual problem since, while natural resources will play a large part in Lao PDR’s future development, the country has so far had relatively little experience of its own with the effects of such development. Therefore, we draw on the experience of other countries to a greater extent than is normally the case in country reports of this kind. This section will begin with an overview of the empirical relationship between natural resources and development across countries before looking more closely at some of the main ways in which natural resources might have an adverse impact on the Lao PDR economy and their policy implications.

Impact on Growth and Productivity

Our survey of the large and rapidly growing empirical research uncovered a striking division of opinions on the impact of resource abundance on growth:

- Some researchers have shown that an abundance of point-extraction resources (such as minerals) and commodity price booms can have a negative impact on growth in the long run. The influential studies by Sachs and Warner (1995 and 2001) initiated the recent period of interest in this subject and are representative of a number of studies that have found that natural resource abundance has a strong negative impact on growth. Sachs and Warner found that a 10 percentage point increase in the ratio of natural resource exports to GDP in a cross-section of countries between 1970 and 1990 was associated with as much as 0.4 to 0.7 percent lower annual per capita GDP growth.

- Others have found -- on the contrary -- that natural resource wealth is good for growth and development in the long run and have conducted extensive robustness checks to confirm this result. Lederman and Maloney (2007b) challenged the robustness of Sachs and Warner’s findings on a number of grounds, including the econometric drawbacks associated with the use of cross-section data and the need for a measure of natural resource abundance that is better grounded in economic theory. Their study used panel data for five-year periods over the 1975 to 1999 time span and measured resource abundance as net exports of natural resources per worker. In this framework, they found natural resource abundance to have a positive effect on growth.

Some recent work has found that commodity price booms do indeed have positive short-run effects on growth but that the impact on growth is significantly negative in the long run, suggesting the existence of a long-run natural resource curse. Collier and Goderis (2007) attempted to reconcile the disparate results of recent research, in particular between cross-section studies that have found strong evidence of a natural resource curse and time-series studies that have found that primary commodity booms are generally positive for growth. They adopted a panel cointegration methodology that allowed
them to disentangle the short-run and long-run effects of commodity prices on growth, looking at 130 countries over the 1963 to 2003 period.\(^4\) There are some crucial qualifications to their finding, though.

First, the study found that the negative long-run impact of commodities is entirely due to non-agricultural commodities – oil, other energy commodities, and metals and minerals. The impact of agricultural commodity price increases is statistically insignificant. This finding (which replicates those of earlier studies) is certainly of interest for Lao PDR, with its large expected revenues from copper and gold. Oil and minerals are point-source extractive resources that are expected to generate larger and more concentrated resource rents than most agricultural crops, whose production is often spread out geographically and which are much more open to competitive entry. This finding then points to the possibility that large natural resource rents can create incentives for poor economic management in countries with weak governance, which, in turn, can result in lower economic growth.

Second, Collier and Goderis explored the role played by governance by dividing their sample into good and bad governance countries.\(^5\) The results were striking. They found that non-agricultural commodity price increases have a negative and statistically significant impact on growth only in countries with bad governance while such price increases have a statistically significant and positive relationship with growth in countries with good governance. Agricultural commodity prices do not have a statistically significant relationship with growth in either good or bad governance countries.

Therefore, while disagreeing in the cross-country framework, both streams of literature agree that resource abundance only becomes an asset and has a positive impact on growth when coupled with investment in technology, education, and skills, as well as with sound macroeconomic management and good governance.

One of the negative consequences of the “Dutch disease” (see Box 1) in the long run is the temporary or permanent redistribution of labor to less productive sectors. If, for example, tradable goods production has increasing returns to scale and can increase productivity faster than non-tradables or natural resource production, then such redistribution will have negative impact on growth. Many researchers have argued that manufacturing, in particular, has special characteristics such as increasing returns to scale, learning by doing, or more abundant technological spillovers. The Dutch disease may then lock the country into a less dynamic growth path. If the rise in natural resource income is temporary, there may be significant adjustment costs entailed in, first, running down the manufacturing sector and then later, when natural resources are depleted, in having to build it up once more.

Other analysts point to evidence that productivity growth in mining, agriculture, and services is not inferior to that in manufacturing and question whether manufacturing really possesses such special characteristics (Lederman and Maloney, 2007a). However, these studies do not take into account the human capital development, technological spillovers, and learning by doing (van Wijnbergen, 1984) that manufacturing activities bring to the developing countries. Because of their much higher employment, they increase the potential for growth and the versatility of the labor force.

\(^4\) The variable studied is an index of commodity prices weighted by the share of commodity exports in the country’s GDP.
\(^5\) A country with an International Country Risk Group (ICRG) rating greater than 75 is classified as good, and those with a lower score are classified as bad.
The evidence on the shrinking of the manufacturing sector in response to terms of trade shocks has been somewhat mixed.\(^6\) Most recently, however, Ismail (2010) found much stronger evidence for Dutch disease effects, with a 10 percent increase in an oil windfall associated with a 3.4 percent fall in value added across manufacturing sectors. Such effects are larger in those economies that are more open to capital flows and that have less capital-intensive manufacturing sectors.

Determining how large the tradables sector would have been in the absence of the natural resources is difficult. Using the Chenery and Syrquin (1975) approach, Brahmhatt et al. (2010) estimated a norm for the size of the tradables (manufacturing and agriculture) sector for all countries over time, controlling for per capita income, population, and time trends. Figure 6 shows the difference between the actual size of the tradables sector and the norm for both resource-rich and non–resource-rich countries. On average, in resource rich countries the tradables sector (as defined) is around 15 percent of GDP lower than the norm.

Therefore, Dutch disease is not dangerous as an equilibrium phenomenon and if it is expected to last indefinitely. However, its dynamic effects and those arising from the fact that resources are exhaustible can create negative consequences, with volatility playing a key role. In the following two sections, we look at these issues.

**Long-run Effects of Spending and Exchange Rates**

Apart from being a prerequisite for the Dutch disease, exchange rate overvaluation can have additional negative effects on productivity growth. Exchange rate effects come from the effect on relative prices of tradables (see below). Rodrik (2007) has argued that real exchange rate overvaluation may exacerbate market failures that hinder firms from innovating and entering new lines of production. This is important because of evidence that there is a strong association between a country’s long-run growth rate and its ability to master new export products and to export a diversified basket of products (Hausmann et al., 2007 and Lederman and Maloney, 2007b).

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\(^6\) Sala-i-Martin and Subramanian (2003).
There is reasonably robust evidence that terms of trade increases cause real exchange rate appreciation in natural-resource-rich countries (Spatafora and Warner, 1995). Figure 5 illustrates the correlation between real effective exchange rates and terms of trade changes.

To study these effects, a basic Dutch disease model divides the economy into three sectors: resource, non-resource tradable, and the non-tradable (Corden and Neary, 1982). There is the natural resources sector, which in the case of Lao PDR refers to minerals like copper and gold. There is the non-natural resource tradable sector, which in the case of Lao PDR can be defined to include the manufacturing and agricultural sector. The prices for both the natural resource sector and the non-natural-resource tradables sectors are set in the world market. Finally, there is the non-tradables sector, including government services and a number of other service sectors whose prices are set in the domestic economy. The real exchange rate is defined as the price of non-tradables relative to the price of tradables and can therefore be affected by any relative price movements between these two sectors. There are generally two types of effects leading to a real exchange rate appreciation: a resource movement effect and a spending effect.

The resource movement effect takes place when a boom in the natural resource sector attracts capital and labor from other parts of the economy, which tends to reduce output or productivity in those other sectors. In particular, reduced output in the non-tradables sector causes the price of non-tradables to rise relative to those of tradables, whose prices are set in the world market. However, this effect is not likely to be very important in Lao PDR where production in the mining and hydro sector is of the “enclave” type and is unlikely to draw in large quantities of labor and capital from the rest of the Lao economy. This is because production in the natural resource sector is conducted using highly capital- and technology-intensive methods and usually with capital, technology, and skilled labor imported from abroad. Since there is a large under-employed or under-productive workforce in Lao PDR and since most local labor in natural resource production is attracted from subsistence agriculture, this process should generate productivity gains and have a positive instead of a negative effect. However, several authors have warned that, in small transition economies where scarce skilled labor may be attracted into mining instead of other industries this effect may have stronger consequences than usually thought (Carneiro, 2007).

The spending effect is a likely source of negative growth effects from natural resource extraction in Laos. It comes into play when increased domestic income from the booming natural resource sector leads to higher aggregate demand for domestic goods (as well as for imports). Increased spending leads to higher prices and output in the non-tradables sector. Wages in the economy will tend to rise, squeezing profits in the non-natural-resource tradables sector (“manufacturing”) where prices are fixed at international levels. Output in this sector will fall while imports will rise. This is a likely potential source of Dutch disease effects in Lao PDR, as Figure 2 also suggests. Similarly, fiscal policy can also have a long-term impact on the exchange rate.

There are several instances when fiscal policy can have permanent effects on the exchange rate that can result in appreciation. If the government were to collect all of the benefits from the natural resources windfall, the appreciation would occur through the spending effect. As discussed in Vostroknutova et al. (2010), the presence of an exhaustible resource adds an inter-temporal dimension to the problem of the allocation of resources. The possibility of capitalizing the windfalls allows for a change in the relative prices of tradables and non-tradables through higher ownership of foreign assets by the private sector with the aim of smoothing consumption and the corresponding adjustment in the current account. Such adjustment would take place if foreign and domestic goods are

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7 The role of the hydropower sector is more complicated, but we tend to think that within this model it belongs to the second group because it is a renewable resource.
8 The model assumes full employment of resources. The extent of both the resource movement and spending effects would be alleviated to the extent there are unemployed resources in the economy.
not perfect substitutes. What could bring about exchange rate appreciation? Capital inflows may trigger a real exchange rate appreciation even before the natural resource revenues materialize. In particular, investments in the sector start several years before the revenues start flowing. The increased openness of the economy and realization of the bilateral interests also brings about increased aid inflows that can cause real exchange rate appreciation.

More complex effects can arise if the government uses resource revenues to pay off debtor where the private sector has access to foreign and domestic capital markets, but these are not going to be relevant in Lao PDR. A depreciating pressure on the exchange rate may occur if the private sector rebalances its portfolio substituting the public debt for foreign assets, through the capital account. While this is unlikely in Laos at its current level of financial sector development, it could happen if the government used its revenues from resource extraction to retire public debt as opposed to reducing taxes or increasing spending. In terms of volatility, the higher the speed of extraction, the greater the size of the initial jump appreciation and the sooner the current account and the real exchange rate will change direction. Foreign debt has a large impact on the exchange rate when resource windfalls materialize, and for countries with high initial debt levels, depreciation is also possible (see Givazzi et al., 1988).

Real exchange rate changes can affect growth through the external balance, the supply of exports, and the production of tradables versus non-tradables. Among many studies establishing the negative relationship between real exchange rate appreciation and growth, Rodrik (2007) found that among developing countries a 10 percent increase in real exchange rate overvaluation reduces annual long run growth by 0.2 to 0.3 percent (see Figure 7). Other recent studies that have had broadly similar results include Aguirre and Calderon (2005) and Johnson et al. (2007). Rodrik (2008) found that industrial activity has a higher effect on growth than do exports or the trade surplus. He estimated that a one standard-deviation increase in industrial shares would increase growth by 1.6 percentage points, while the corresponding increase in export shares would boost growth only by 0.7 percentage points, though the latter result is not robust (Figure 7). Rodrik concluded that the effect of the exchange rate on industrial production is the most way in which the disequilibrium real exchange rate affects growth. Other papers have also showed a link between exports and growth (for example, Mah, 2005) although not in an equilibrium framework. Thus, the empirical evidence in favor of the importance of the real exchange rate for growth is quite strong, even though we may not understand the precise mechanisms by which this occurs.

Figure 7: Currency Undervaluation and Growth

Figure 8: Debt, Inflation, and Growth in Emerging Market Economies, 1970-2009


Source: Reinhart and Rogoff (2010).

9 We measured exchange rate misalignment in this study as the difference between the market exchange rate and the purchasing power parity exchange rate adjusted for per capita income levels.
Economic Volatility and Over-borrowing

It has been suggested that economic volatility is the main channel for a natural resource curse. The volatility of commodity prices has been shown to be statistically higher than that of manufacturing products (Jacks et al., 2009). Natural resource prices and revenues tend to be volatile due to the low short-run elasticity of supply of the natural resource output with respect to prices. If spending in an economy is closely related to its natural resource revenues, then spending will also become more volatile. Spending volatility will drive volatility in the real exchange rate (through the spending effect described above). There are, however, other important channels through which volatility affects growth.

A large body of empirical work now exists that documents the adverse impact of economic volatility on investment and growth. Among other types of volatility, that in real exchange rates has often been found to have a particularly clear adverse impact on economic performance (see Loayza et al. (2007) for a recent survey of the evidence). Serven (2003) documented the impact of real exchange rate volatility on investment.

Importantly, Aghion et al. (2006) observed that the extent to which real exchange rate volatility reduces growth depends critically on a country’s level of financial development. It is only in countries with low financial development that real exchange rate volatility has a significant impact on growth. They suggest this is because such volatility tends to exacerbate the negative effects of domestic credit market constraints and imperfections.

Recently, van der Ploeg and Poelhekke (2009) have shown that economic growth depends negatively on volatility of unanticipated output growth. This result held independently of initial income, investment, human capital, trade openness, natural resource dependence, and population growth. Moreover, they found that, among resource-rich countries, those that are landlocked and have a less developed financial sector have experienced more negative effects from volatility. In terms of macroeconomic policy, the authors also showed that current account restrictions raise volatility and depress growth, while capital account restrictions lower volatility and boost growth.

Commodity dependence can exacerbate macroeconomic uncertainty through a structural channel whereby export concentration leads to terms of trade volatility that is then manifested in economic growth volatility. Using a cross-country sample between 1980 and 2005, Lederman and Xu (2009) tested this “structural transmission channel” versus “government’s incapability to manage external volatility” due to institutional weaknesses and found it to be valid and superior to the latter.

By fostering over-borrowing in anticipation of an upcoming natural resources boom, commodity price volatility may affect growth, in addition to the above channels. High commodity prices in the 1970s encouraged many resource-abundant countries to use their resources as collateral to borrow abroad and to finance large investment projects and high public consumption. When prices plunged in the 1980s, these countries were left with balance of payments crises and unsustainable external debt levels (Manzano and Rigobon, 2007). The term “debt overhang” is used to describe countries where debt levels are too high with respect to their output and growth, usually due to commodity busts or “sudden stops” in foreign capital inflows. In some oil-exporting countries, extreme volatility of expenditures amplified by debt overhang problems, rather than Dutch disease, has been the reason for low growth (Pang et al., 2007 on Nigeria).

There is a strong negative relationship between high levels of debt and reduced growth. A recent study by Reinhart and Rogoff (2010) looked at emerging market economies after the debt crisis in 1970 that was induced by commodity price collapse. In these countries, when external debt reached above 60 percent of GDP, annual growth declined on average by 2 percent, and for high levels of debt, growth was cut in half. Inflation also sharply increased when debt reached levels above 90 percent of GDP (Figure 8).
Policy Matters

The actual impacts of natural resource volatility will depend to a large extent on policies. Ideally, a government would adopt a consistent macroeconomic policy framework encompassing exchange rate, monetary, and fiscal policies. Such a policy package should take into account the “impossible trinity”\(^\text{10}\) of macroeconomics that states that it is impossible to have all three of the following at the same time: a fixed exchange rate, free capital movement, and an independent monetary policy. The government would then define targets and objectives for each of these policy areas.

In particular, the quality of governance and of the institutions for natural resource management is crucial for a successful policy mix. Natural resource abundance reduces growth in countries that are characterized by poor governance, in part because of the tendency of the governments in these countries to pursue excessively high levels of public consumption (Collier and Goderis, 2007). Such spending draws workers away from productive activities and into low productivity public employment, encourages rent seeking, and fosters real exchange rate appreciation. The latter is one of the main ways in which Collier and Goderis (2007) found that poor governance affects growth. Governance issues related to Laos’ natural resources are studied in Barma et al. (2010).

A sustainable fiscal policy that also defines a debt level that is consistent with a country’s economic growth target should include the goal of using natural resource revenues in a sustainable way. As discussed in Vostroknutova et al. (2010), a fiscal policy that prudently restricts government spending out of natural resource revenues to a permanently sustainable level will help to ensure that the country has enough foreign assets and credibility in global financial markets to help it to ride out adverse commodity price shocks. A fiscal policy that smooths government spending over time will also help to sever the link between natural resource volatility, on the one hand, and expenditures and real exchange rates on the other. Vostroknutova et al. (2010) also considered the case for an “optimal” fiscal rule, with higher expenditures, which is more appropriate for a developing country where developing needs are large, and where the permanent income rule would be too restrictive.

Choosing the most appropriate anchor for monetary policy is especially important for managing volatility in commodity exporting countries. Fiscal policy will be coordinated with monetary policy when sterilization of spending or mitigation of a commodity price boom is required. For example, inflation targeting has been an extremely successful instrument, but it can result in a monetary policy that is so tight that it puts appreciation pressure on the exchange rate when commodity prices increase.

It is also important to coordinate monetary and fiscal policies with the existing exchange rate regime. For example, while a nominal dollar peg was successful in several stabilization programs in Latin America in 1980s and 1990s, it would be less useful for stabilizing domestic commodity prices during a boom. The pre-crisis trend was to move away from nominal exchange rate targeting and monetary aggregates and towards inflation targeting, and most recently there has been discussion of targeting asset prices (for industrialized nations), domestic commodity prices (for commodity exporting countries), flexible CPI or production price targeting, or even nominal income or nominal GDP targeting. While CPI inflation targeting has worked in many countries, it has been shown to be less successful in stabilizing relative tradables/non-tradables prices in commodity-exporting countries. Frankel (2009) showed that targeting of a more specific price index that has higher share of export commodity prices and/or production prices (such as the Producer Price Index, the Export Price Index, or the Copper Price Index) would have been more appropriate although more difficult to administer or make transparent to the general population.

\(^{10}\) Based on the Mundell-Fleming model (see Blanchard, 2006).
International capital flows also exacerbate volatility, especially if it originates from terms of trade shocks. Calvo and Reinhart (2002) described the “fear of floating” and showed that exchange rates are less volatile than reserves. In particular, fearing that capital inflows may distort relative prices and exacerbate weaknesses in the financial system and feed bubbles, governments may prefer to accumulate reserves instead of letting their currency appreciate. Hausmann and Rigobon (2003), Kaminsky et al. (2005) and Calvo et al. (1996) have all studied the problems that countries receiving large capital inflows would need to address. Most importantly, these papers identified volatility and the occurrence of sudden stops as the main sources of risk.

Building resilient institutions is a very important component of an effective policy package. This includes good governance and efficient public management systems (including debt management), domestic financial sector and debt markets, a medium-term expenditure framework, and consistent fiscal, monetary, and exchange rate policies.

In particular, developing the domestic financial sector will strengthen resilience to volatility. Aghion et al. (2006) as well as the studies cited above showed that the presence of a deep enough financial sector helps to smooth volatility. Specifically, the study offered empirical evidence that real exchange rate volatility can have a significant impact on the long-term rate of productivity growth, but this effect depends critically on a country’s level of financial development. For countries with relatively low levels of financial development such as Laos (see the next section), exchange rate volatility generally reduces growth, whereas in financially advanced countries, there is no significant effect. Aghion et al. (2006) also offered a simple monetary growth model in which real exchange rate uncertainty exacerbates the negative investment effects of constraints in the domestic credit market.

Box 2: Natural Resources, Governance, and Growth

There are two broad ways in which the interaction of natural resources and governance can affect growth. First, the discovery of natural resources or a natural resource boom can induce a deterioration in governance, for example, by stimulating greater corruption or by provoking more intense political or bureaucratic battles between powerful interest groups for control and redistribution of natural resource rents, leading even to armed conflict or civil war. Tornell and Lane (1999), for example, modeled a “voracity effect” in which an improvement in terms of trade suppresses growth by provoking a struggle between powerful groups, leading to a more than proportional increase in unproductive fiscal redistribution. These theories suggest an unconditional negative relationship between natural resource abundance, governance, and growth. However, the empirical evidence on this is mixed. A cross-section study by Sala-i-Martin and Subramanian (2003) found that natural resource abundance has its principal effect on growth via its adverse impact on institutional quality. On the other hand, a panel data study by Collier and Goderis (2007) did not find statistically significant evidence that natural resources directly worsen governance or institutional quality.

However, even if natural resource abundance does not worsen governance, it is possible that the quality of existing institutions could strongly condition the quality of the economic policies that countries use to deal with natural resource abundance, that is, with how natural resources affect growth. There is considerable evidence in support of this theory. Mehlum et al (2006) suggested that, in countries with “grabber-friendly” institutions, a natural resource boom will lead to a shift of resources away from productive activities and into unproductive rent-seeking. In countries with “producer-friendly” institutions, on the other hand, a natural resource boom causes resources to move into productive activity. In the empirical part of their study, Mehlum et al included an interaction term between natural resource abundance and institutional quality. They found that the negative impact of natural resources on growth steadily falls as institutional quality improves, until, when institutional quality is sufficiently high, the natural resource effect becomes positive. Robinson et al (2006) developed a model where, in countries with weak institutional controls on the use of clientelism and patronage to influence elections, a natural resource boom creates incentives for politicians to spend the resulting revenues to increase public sector spending and employment to improve their chances of staying in power.

Excessive public spending indeed appears to be at the heart of economic mismanagement in the wake of natural resource booms. As we explain more fully elsewhere in the paper, it is a key factor in the appreciation of the real exchange rate and the loss of competitiveness that often occurs in the wake of natural booms – the so-called
Dutch disease. Having studied natural resource booms in the 1970s and 1980s, Gelb and Associates (1988) concluded that “spending levels should have been adjusted to sharp rises in income levels more cautiously than they actually were.” Vostroknutova et al. (2010) looked into this issue in more detail.

The likelihood that poor governance lies at the root of the so-called natural resource curse is of course an important consideration for Lao PDR as prepares for its own natural resource boom. Barma et al. (2010) looks into governance-related challenges for Laos in more detail.

**Inter-generational Equity**

**Intergeneration equity and the sustainability of resource extraction should be at the forefront of a country’s resource development strategy.** In addition to challenges of economic management, development based on natural resource revenues also raises important ethical or normative issues. Should today’s generation receive all the benefits of the country’s gold and copper reserves or should their grandchildren also be able to share in the benefits? More generally, how should the benefits of the nation’s non-renewable natural resources be distributed between present and future generations? Linked to the question of inter-generational equity is the question of the sustainability of the country’s economic strategy. The interpretation of the concept of sustainability is not easy, and it is possible to offer a wide range of definitions.11 A commonly used (though not necessarily adequate) definition of a sustainable strategy is one that allows future generations to achieve at least the same level of welfare or utility as the present generation.

**Fiscal policy plays a central part not only in the economic management of natural resources but also in addressing the equity and sustainability issues raised by natural resources.** Of course, even this definition of sustainability may be inadequate. For example, it may be that no amount of additional physical capital could adequately compensate future generations for a total loss or degradation of the country’s natural environment. If so, additional restrictions should then be included in the nation’s sustainability strategy.

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Does Laos Have Dutch Disease?

Based on the analysis so far, several indicators of the presence of Dutch disease can be discerned in Laos. These include a real exchange rate appreciation, a decline or a slowdown in the growth of the tradable sectors, sharp growth in the services sector driven by domestic spending or relative price changes, growth in non-tradable prices reflected in wages, housing, or services markets, and to some extent a rise in inequality.

The sectoral decomposition the Lao economy is unusual for its income group. Even though the manufacturing sector is relatively large, the standard classification includes production activities related to mining and quarrying and is therefore biased upwards to some degree. Agriculture accounts for a much larger share of GDP than in other countries, and the services sector is about the smallest in the same income group. This composition shows that there is some scope for growth in the non-tradable sector (see Figure 9).

Figure 9: Share of the Manufacturing, Services, and Agriculture Sectors in GDP and Metals Exports in Total Exports versus a Logarithm of Per Capita GDP, 2000-2006

Source: World Development Indicators, World Bank.
Growth, Productivity, and Diversification

Structural changes in the sectoral composition of output have been taking place in the Lao economy. These have included a slowdown in manufacturing sector growth and in the growth of non-tradables at the expense of agriculture. These changes might be indicative of Dutch disease, but they might also reflect the structural changes that happen when a country is becoming industrialized and its income is growing. Several factors however, suggest these changes need to be closely watched.

A negative correlation between growth in natural resource developments and growth in the manufacturing sector can be seen in the data (see Figure 11). Because the aftermath of the resource boom coincided with the global economic crisis, it is unclear if the correlation is caused by the joint movement of natural resource sector expansion and after-crisis effects or by the export boom alone. This dynamic could suggest a crowding-out effect, but in fact it can be explained by a series of independent events. The Asian crisis caused a slowdown in manufacturing growth, but at the same time several hydropower stations came on stream, causing the natural resource sector to grow faster. After the Asian crisis, as manufacturing recovered, fewer mining or hydro projects came on stream. More recently, manufacturing has been growing driven by food processing and small assembly industry, while the relative decline is fully attributed to the global economic crisis of 2008. In terms of labor or capital movement, no significant crowding out of manufacturing activities by the resource sector has yet been observed. This is mainly due to the fact that mining employment is limited, and the workers are usually drawn from rural areas (Fenton and Lindelow, 2010b), while natural resource projects are financed by FDI, which would not have otherwise have been forthcoming.

The services sector usually grows alongside a natural resource boom, as the relative price of services increases, and growth in the services sector has speeded up in Laos in the past five years (Figure 11). However, this service sector growth has moved alongside manufacturing growth, driven by transportation, construction, and tourism. While growth in construction was fueled by government spending, growth in transportation and tourism was mostly due to external factors.

Figure 10: Sectoral Contribution to GDP (percent)

Source: World Bank staff calculations based on official data.

Figure 11: Growth Rates by Sector

Source: World Bank staff calculations based on official data.

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12 This country-specific productivity analysis was heavily constrained by data availability and quality. Production-based data on GDP by sector exist, but there are no data on employment by sector or any reasonable break-down of investment. Investment and capital formation data are poor even at the macro level. The Investment Climate Surveys of 2006 and 2009 are therefore the only source of data on productivity, but these surveys focused mostly on the manufacturing sector and cannot provide data on long trends in productivity.
Labor productivity in Laos is lower than would be expected given its income group, and total factor productivity stagnated between 2005 and 2009, the years of the natural resource boom (Figure 12 and Figure 13). However, it is higher than in most land-locked countries with the same income level (Enterprise Survey, 2009). Firms in Laos are exhibiting higher capital intensity than their competitors (Figure 12). Profitability is also higher than predicted by the country’s income group (Figure 13). The market structure in Laos is such that firms are either exporting or produce for domestic market. Usually, productivity in domestic firms increases as a result of the experience that they gain from exporting part of their product, but in Laos this is not the case. Domestic firms face little competition and do not export, while exporting firms export most of their output. The exporting sectors consist mostly of garments and wood and wood processing, while domestic businesses consist mostly of food processing (and services).

**Figure 12. Wages in Comparison to Value Added Are Very High for Exporters**

<table>
<thead>
<tr>
<th></th>
<th>Exports</th>
<th>Non-exporters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Labor Costs</td>
<td>0.6</td>
<td>0.3</td>
</tr>
<tr>
<td>Capital Productivity</td>
<td>1.9</td>
<td>0.7</td>
</tr>
</tbody>
</table>

**Figure 13. Profitability is Very High**

(pre-tax median return on sales, percent)


Manufacturing exporters in Laos are less profitable than non-exporters, suggesting that the natural resources boom has had a negative impact on export competitiveness. In 2005, this situation was explained mainly by a higher regulatory burden on non-exporters than on exporters, but as this was corrected in 2009, inefficient domestic markets and declining export competitiveness due to the natural resource boom seem to be the main reason. In general, Lao firms are very profitable, and domestic firms are more profitable than exporters, while exporters face higher labor costs. While wages are on average almost three times lower in export sectors, unit labor costs, defined as ratio of wages per worker to value added per worker, are twice as high for exporters as for non-exporters. And while productivity differences might be attributable to the sectors-related differences (since exporters and non-exporters are essentially in different sectors), this could not be true of unit labor costs.

These signs suggest that exporters suffer from relative price adjustments between tradable and non-tradable sectors as well as from entry restrictions into the domestic market that constrain competition. These constraints include limited access to finance, explicit import restrictions, and cumbersome licensing or other discretionary regulations.

As productivity stagnated, real wages grew, in both in the private and public sectors (Figure 14 and Figure 15). While this was part of a long-term plan of the government (Barma, 2009), the fast

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13 Measured as returns to sales.
growth of public sector wages has been fueled by the large increases in spending made possible by the natural resource revenues. The lack of competition in domestic markets also allowed firms to shift labor cost increases onto consumers by increasing the prices of non-tradables. This goes to show that consumption from the new revenues has been high, which is one more possible sign of Dutch disease.

Figure 14: Productivity Stagnated …
(Current TFP as a Percentage of TFP in 2005)

Figure 15: …But Real Wages Grew
(median real wages, thousand kip per month)


Source: LECS3 and 4.

Note: Wages are deflated by local prices.

Usually strongly associated with growth in the non-resource sectors, the Lao export basket remains undiversified, is comparatively unsophisticated and is dominated by products with low value addition. Also, it does not appear to be catching up with Laos’ regional neighbors in terms of sophistication.14

Figure 16: “Sophistication” of Export Basket versus Per Capita GDP

Source: Record and Nghardsaysone (2009).

Figure 17: Value Added per Worker is Slightly Lower than Expected Given Per Capita Income

Source: World Bank Enterprise Surveys and World Development Indicators.

14 Record and Nghardsaysone (2009).
Exchange Rates

The country’s real effective exchange rate appreciated by 50 percent between 2001 and 2009, with half of the adjustment coming since 2005 when resource exports became significant (Figure 19). While the sharper appreciation lagged behind copper price increases, the real exchange rate has not been generally overvalued in comparison to its medium-term equilibrium level based on macroeconomic fundamentals (IMF, 2009, and IMF, 2006, for the methodology). Nevertheless, the economy has started to show some signs of overheating, such as fast lending growth, housing and land price increases, and a sharp increase in asset ownership (Figure 22 in the next section). The significant percentage of GDP capital inflows, most of which come from the resource sector, have put pressure on the exchange rate (Figure 18). Information on the property markets is mainly anecdotal. However, fast lending growth (up to 80 percent according to World Bank, 2009) can be attributed mainly to government spending on the South East Asian Games and as a stimulus package to preempt the impact of the global crisis, which increased the budget deficit by nearly 5 percent of GDP in 2009.

Volatility

Economic volatility induced by natural resources in Lao PDR is related mainly to the price of copper and to a lesser extent the prices of gold, other metals, and electricity. The reason for the small role played by electricity is in the way in which hydropower contracts are written. The developers mostly make agreements with EGAT, which sets a price for electricity for, on average, 20 years in advance. Therefore, in this paper, we mostly study mineral prices. Within minerals, copper accounts for the lion’s share of exports and volume produced (Figure 19), and therefore is the most likely source of volatility for the economy. Gold prices behave similarly to those of copper, as metal prices have been shown to be driven mostly by fundamentals. The prices of metals have been found to be correlated.

Laos’ underdeveloped financial sector makes it particularly vulnerable to exchange rate volatility, as discussed in the previous section. For countries with relatively low levels of financial development, such as Laos (Figure 21), exchange rate volatility generally reduces growth, whereas in financially advanced countries, it has no significant effect.
Equity

**If the government of Lao PDR makes the ethical judgment that future generations should share in the benefits of its natural resources, how should this be achieved?** A rather crude approach might be simply to leave a lot of gold and copper in the ground for future generations to develop. A more sophisticated approach would be to view Laos’ non-renewable natural resources as part of its overall stock of capital, in other words, all assets that can contribute to income generation. These include, in addition to its mineral resources, Lao PDR’s renewable natural resources (such as its forests and rivers), its physical capital stock (such as existing machinery and buildings), and its intangible capital (including human capital, social capital, and other factors such as the quality of its institutions). Therefore, one possible definition of a sustainable development path would be one that leaves to future generations at least as much total capital per capita as is being enjoyed by the present generation so that future generations can achieve at least as much welfare as the present generation. According to this definition, Lao PDR could run down its mineral resources fairly quickly (say in the next few generations) so long as it saved and re-invested a sufficient amount in other forms of capital to meet the sustainability rule. In practice, ensuring adequate savings from the country’s natural resource revenues will come down to establishing appropriate fiscal rules requiring the government to do so.

**Resource wealth can increase inequality.** As Fenton et al. (2010) have discussed, it is well documented that natural resource exploitation has often significantly increased income inequality (see also Gystafson and Zoega, 2003 and Auty, 2001, among others). There are several ways in which mining and hydro could increase inequality. First, employment and other economic opportunities associated with mining and hydro tend to favor communities located close to dams or mines, especially where preferential employment is a part of any benefit-sharing arrangement. Even within these favored communities, it is likely that some households will be quicker than others to avail themselves of these opportunities. These are often the better-off households who are better educated and have labor available. This effect can exacerbate existing inequalities. Second, if public expenditures favor better-off communities or favor urban over rural areas, there is even a danger that increased revenues could increase inequality of access to services and, over time, incomes. If allocation of resources is inefficient, civil conflict is one of the dangers; Bannon and Collier (2003) estimated that in countries with no natural resources the probability...
of civil conflict is only 0.5 percent, whereas in countries where commodity exports constitute around 25 percent of GDP, the risk of civil war is more than 25 percent.

**Lao PDR has not yet seen a sharp rise in economic inequality; the Gini coefficient rose only slightly between 2002/3 and 2007/8 (Figure 23) and is now close to the level that prevailed in 1997/8.** The correlation with natural resource wealth is inconclusive. Figure 23 shows that inequality increased in the post-crisis period and has decreased during periods of stable growth. Engvall et al. (2009) showed that the inequality dynamics have largely been driven by the volatile consumption of those in the highest quintile, which to some extent supports the theory that conspicuous consumption is driven by capital inflows. Some evidence for this is the fact that the ownership of luxury goods and cars doubled between 2003 and 2008 and is almost five times higher in Vientiane than in the poorest districts. It is possible that the increased rate at which mining and hydro resources are now being exploited will mean a continuation in the increase in inequality over the next five-year period. The background papers by Barma et al. (2010) and Gibson and Carlsson Rex (2010) explore some policies that would ensure that the public financial system and benefit-sharing mechanisms are set up in a way that minimizes these negative effects.

![Figure 22: Asset Ownership...](image1)

![Figure 23: … and Inequality Trends](image2)

*Source: Engvall et al. (2009).*

**Policy**

This analysis has shown that there are sufficient reasons for policymakers in Lao PDR to be concerned about the effects of a natural resources boom. While the impact has not so far been very pronounced, as commodity prices continue to recover, it is possible that a boom will start to have negative effects on tradable goods sectors and therefore on long-run growth. Policymakers should take these concerns seriously even though the underlying mechanisms are not well understood at this time and the data are not sufficient to explore them in detail. As we have argued in general in the preceding discussion, these effects are not inevitable, but they will depend on the quality of the economic policies used to manage a natural resource boom, which in turn will be influenced by the broader governance and institutions of the country.

The actual extent of appreciation and Dutch disease effects will depend to a large degree on policies. A major part of the increased domestic income from the natural resource sector in Lao PDR will be fiscal revenues, whether from taxes, royalties, or dividends on public stakes in the natural resource
development projects. The extent of the spending effect and of any potential Dutch disease in Lao PDR will therefore primarily depend upon the fiscal policy followed by the government and, in particular, the extent to which the government expands public spending. Other policies are also important and are discussed in the next section.

**Conclusions and Policy Recommendations**

Even with a relatively short history of large-scale natural resource extraction, there have already been signs of a loss of export competitiveness and other Dutch disease effects in Lao PDR. Even though the real exchange rate appreciation did not lead to overvaluation in comparison to its medium-term equilibrium level based on a macroeconomic balance approach, differences in productivity and profitability between exporters and non-exporters are evident, and wage growth has been observed in the absence of productivity increases. It has also been observed that growth in the manufacturing sector growth has been slowing down.

In the view of the planned increase in the extraction of natural resources, it is important for the government to introduce policies to mitigate any resource-induced volatility as much as possible. Such policies might include a coordinated fiscal and macroeconomic policy that does not overheat the economy, the development of the financial sector, the diversification of the non-resource economy, and trade facilitation, as well as improving the investment climate in non-extractive industries. These policies to mitigate fiscal volatility are discussed in more detail in Vostroknutova et al. (2010), while the diversification policies are discussed in Record and Nghardsaysone (2009). Growth constraints and more detailed analysis of the economy are discussed in Davading (2010).

In countries with debt levels above 60 percent of GDP, and especially in the aftermath of a commodity price boom, growth rates are negatively correlated with debt level. If a government borrows against future dividends or against equity stakes that are not tied to actual project outcomes, this is not good for growth. The relationship between debt sustainability and fiscal policy is straightforward and should be managed carefully to avoid debt overhang. However, introducing fiscal rules on spending is not enough. Efficiency in the use of resource revenues and a carefully prioritized public investment program are also crucial for achieving growth. The related fiscal policies and resulting debt levels are discussed in detail in Vostroknutova et al. (2010).

The lack of reliable high-frequency macroeconomic data has dramatically reduced our ability to estimate the potential impact of large-scale natural resource extraction in Laos and to make macroeconomic predictions. However, these estimations will be essential for the government to adopt the best policies for managing the effects of natural resource development.
References


