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Resource Booms, Growth and Poverty in Laos - What Can We Learn From Other Countries and Policy Simulations?

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Abstract. Laos is a resource-rich economy with over 570 identified mineral deposits. Despite the likelihood that resource booms will carry both positive and negative impacts on the Lao economy, this issue has been under-researched in Laos. This study uses a computable general equilibrium (CGE) model with the goal of providing policy recommendations to mitigate the negative effects of Dutch disease. In order to investigate the impact of the mining sector on the Lao economy, we assume that the stock and productivity of capital both increase in the mining sector. We find that the higher capital stock and productivity led to increased value added, production, exports and investment in the mining sector, resulting in higher real GDP, exports and investment. Unfortunately, the associated Dutch disease effects (particularly real exchange rate appreciation) negatively impact real production and value added in agriculture, industry and government services. Suitable macroeconomic management and prudent administration of windfall income from mining are crucial.

Keywords: Mining, Dutch Disease, CGE model, Lao economy.

1. Introduction

Resource booms provide an important source of financing for low-income, developing countries. A boom can also negatively affect the economy, particularly when it is concentrated in one or a handful of sectors, or if the boom leads to a surge in government revenues. These negative Dutch disease effects occur when capital inflows lead to real exchange rate appreciation, negatively impacting the production of tradable goods (Corden and Neary, 1982). Tradable goods such as agricultural and industrial goods are the engines of long-term economic growth, and declines in these tradable sectors negatively impact growth. The national development goal of Laos is to exit from the group of LDCs by 2020 (GoL, 2004). In order to overcome poor infrastructure, human resources and productivity, the Government of Laos is enthusiastically promoting FDI, which has become an increasingly prominent source of capital in Laos. FDI inflows in 2007 were estimated at about US\$950 million, a 60% increase over the previous year. About 90% of FDI is linked to the resource industry, and has accounted for much of the increase in FDI since construction began on the successful Sepon mine in 2003. Mining now accounts for the second largest share (after hydroelectricity) of accumulated registered capital, at 18.3% of the total. However, the mining sector could have a negative long term impact on the Lao economy if non-booming sectors, namely agriculture and industry, must compete internationally under real exchange rate appreciation. A number of studies have examined the impact of resource booms and foreign capital inflows in other developing countries, including Devarajan et al (1993), Benjamin et al (1989) and Usui (1996). Despite the massive impact of foreign capital flows and the general boom in the Lao resource sector, research on the topic is scarce. One exception is Warr (2006), who used a multi-household CGE model to investigate Dutch disease effects associated with hydroelectricity generation projects. As the impacts of resource booms in the mining sector are not well understood, our main objective in this study is to use a CGE model to quantify the potential impact of resource booms on poverty and to look for evidence of Dutch disease in the Lao economy.

2. The Lao Economy and Mining Sector

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Since introducing the New Economic Mechanism (NEM) in 1986, Laos has been transitioning from a centrally planned economy to a more market-oriented economy. As a result, except during the Asian financial crisis of the 1990s, Laos has been achieving high economic growth together with low inflation. Even though Laos has been maintaining high economic growth, low inflation and a stable exchange rate, serious macroeconomic challenges remain. Firstly, Laos has faced chronic twin deficits in government spending and international trade. Secondly, there is a huge gap between savings and investment. The savings rate is low because average income is low—GDP per capita was about US\$580 in 2007 (World Bank, 2008)—and because financial sectors are underdeveloped. Thirdly, Laos also faces a high external debt burden. Accumulated external debt totaled more than 60% of GDP in 2007. Rapid expansion of the resource sectors in Laos must therefore be accounted for when considering macroeconomic management in Laos. FDI has flowed into Laos since the country introduced market mechanisms in 1986. A total of 1547 FDI projects were carried out over 1989 to 2008 with a total value of 9,525.8 million US\$ (Kyophilavong, 2009). FDI has increased sharply since 2003, and this FDI has been concentrated in the mining sector. In terms of registered capital accumulation, the energy (hydroelectricity) sector has the highest share, at about 54.4% of accumulated incoming capital. The mining sector comes next, with about 18.3% of total capital. There are about 35 operational mines in Laos, including the Sepon and Phubia mines. Since the Lao economy is constrained on both the demand and supply sides, the resources sector plays an important role in economic development.

3. Dutch Disease Hypothesis and Policy Responses

Four main aspects of Dutch disease can be detected: (1) real exchange rate appreciation; (2) declining input of factors into non-booming sectors; (3) declining exports and output in non-booming sectors, associated with; (4) declining real GDP (Corden and Neary, 1982). Data constraints lead us to look for the presence of Dutch disease in terms of real exchange rate appreciation and declining labor productivity. According to the World Bank (2011), the real effective exchange rate appreciated by a total of 50% between 2001 and 2009.¹ Labor productivity in Laos was stagnant between 2005 and 2006 relative to other countries in the same income group (World Bank, 2010). Manufacturing exporters are less profitable than non-exporters because exporters face elastic world demand and have more difficulty adjusting to higher labor and trade costs. Real wages have been growing in both the private and public sectors in recent years. In this sense, the natural resources boom can be said to have negatively impacted labor productivity, especially among manufacturing exporters. The symptoms of Dutch disease will become much more prominent as revenues from the resource sector increase over the medium run. However, Dutch disease can be avoided or mitigated through various approaches, including adjustments to fiscal policy, exchange rate policy and foreign borrowing strategies. However, the government has yet to formulate a comprehensive policy strategy to avoid or mitigate negative impacts of the booming resource sector on the Lao economy.² The Lao government should thus look into comprehensive and appropriate policy and strategies to cope with the effects of rising real exchange rates.

4. Methodology

We use a CGE model to analyze the potential impact of resource booms on the Lao economy. More specifically, we use the PEP 1-1 single-country static model, developed by Decaluwe et al (2009). The characteristics of the model are explained as follows: (1) Static single-country CGE model with 5 sectors: mining, agriculture, industry, private services and public services; (2) Multi-period, constant returns to production technologies with substitution between inputs, including intermediate inputs; CES value added production function, investment demand distinguishes between gross fixed capital formation (GFCF) and changes in inventories; (3) Imperfect substitution between domestic and foreign commodities on both import and export markets (Armington assumption); (4) Competitive markets with neoclassical macroclosure and

¹ It is important to note that the recent exchange rate appreciation may have arisen from other factors such as a weak US dollar, a government policy of de-dollarization, increased growth and improved term of trade.

² NT2 projects are regulated to allocate revenues to areas such as environment and conservation, education, health and others, but it is important to note that it is a project-based mechanism.

the small country assumption; (5) Production in the mining sector results from a combination of labor, capital and natural resources; (6) Sector-specific production function in the mining sector which incorporates natural resources as an input factor. We first extracted the Lao SAM from the GTAP database (version 7), following McDonald and Thierfelder (2004). Secondly, the 2004 Lao SAM was updated with 2009 data from sources including the Lao PDR National Statistic Center (NSC), and other sources.

5. Simulation Design and Results

The impacts of mining on an economy can generally be divided into two phases: construction and production.³ We focus on the production phase in this simulation in order to capture the impact of mining on the Lao economy, and proceed with the following simulation design.

Simulation 1: Increase capital stock in mining. Our simulation focuses on the production phase and assumes that mining activities lead to a higher level of investment through an increase in the capital stock, as per Lay, Thiele, and Wiebelt (2006). We follow Clements et al (1996) by grouping together mining and mineral processes.⁴ We assume that the supply of capital in the mining sector will increase by about 10%. *Simulation 2: Increase productivity.* Most of mining investment in Laos comes in the form of FDI from neighboring countries with relatively limited technological capacity (Kyophilavong, 2009). FDI from these more advanced countries is partnered with more advanced technology, know-how and experience than domestic mining firms or investors from neighboring countries.⁵ We therefore assume that total factor productivity will increase by 5%. *Simulation 3: Impact of mining.* Simulation 3 combines the first two simulations. We assume that capital flows into Laos originate from advanced countries with advanced mining technologies. Changing mineral prices are also accounted for.⁶

For brevity, we will focus on the results of simulation 3, a combination of simulations 1 and 2 (table 1). The presented results pertain to the impact of the (booming) mining sector on the Lao economy. The impact of mining on macroeconomic variables is presented in table 5.2. The mining sector positively impacts real GDP (+1.7%), real investment (+5.9%) and imports (4%) along with a small increase in real exports. These positive economic impacts are countered by declining overall real consumption (4%) and output (0.2%). This result is consistent with previous studies (Benjamin, Devarajan and Weiner, 1989; Higgs and Powell, 1992).

The mining sector has sector-specific effects. Improved productivity and a higher capital stock in the mining sector stimulates production in the mining and private services sectors, but output in the agriculture and government services sectors ultimately decline, a result that is consistent with factor movements expected in a situation of Dutch disease (Corden and Neary, 1982). Output in the mining sector increased by about 10%, compared to 0.5% in industry and 2% in private services.⁷ This major difference in the impacts is not too surprising because the mining sector is relatively weakly linked to the industrial and private services sectors.

Table 1: Macro effects (percent change from baseline)- real value

	Simulation 1	Simulation 2	Simulation 3
GDP	1.107	0.633	1.74
Consumption	-2.818	-1.478	-4.296
Investment	3.81	2.082	5.894
Export	0.05	-0.018	0.041
Import	3.131	1.691	4.822
Output	-0.162	-0.085	-0.248
Value added	11.218	6.12	17.338

³ Some of the studies considered both the construction and production phases (Clement, Ahammad, Qiang, 1997; Higgs and Powell, 1984).

⁴ Some studies discern between mining and mineral process, including Qiang (1999). Higgs and Powell (1992) simulated the impact of mining projects by distinguishing between the construction and production phases in a typical year.

⁵ The simulation is of the impact of the mining sector on the Lao economy and on poverty via increased employment of factors and improved TFP in the mining sector (Chand and Levantis, 2000).

⁶ Mineral prices fluctuated by more than 30% (Davis and Tilton, 2005). More recently, mineral prices dropped sharply during the global financial crisis, negatively impacting the Lao economy. We thus do not account for a price effect in this study.

⁷ This result is consistent with the results found by Bandara (1991).

6. Conclusion and Policy Recommendation

The mining sector is booming in Laos, bringing important benefits to the Lao economy, but this rapid growth in the mining sector also adversely impacts the economy through a classic case of Dutch disease. Our main objective in this paper is therefore to attempt to assess the impact of the mining sector on the Lao economy using a CGE model in order to provide policy recommendations on how to mitigate the negative impacts of rapid growth in the mining sector. The mining boom positively impacts real GDP, real exports and real investment. The mining sector boom contributes to an increase in real GDP of about 2% relative to the baseline. The rapid expansion in the sector is seen in terms of greater output, value added and consumption (of inputs) in the mining sector. Unfortunately, it is also associated with declining output, value added and consumption of agricultural and government services, reflecting the movement of production factors due to the Dutch disease in the economy. On the basis of lessons learned from other countries and the macroeconomic situation in Laos, we propose four strategies to mitigate or avoid Dutch Disease in Laos. First, given that rising windfall expenditures accelerate real exchange rate appreciation, negatively affecting production in sectors which are not booming, it is important for policymakers to strive to balance the budget and promote the production of tradable goods without neglecting important investments in human resource development, infrastructure and health care projects. Secondly, countries with rapid-growth sectors can more easily attract international finance or ODA. Increased foreign borrowing during the boom times will have a major impact on tradable goods as a result of real exchange rate appreciation. Therefore, it is important for Laos to reduce foreign borrowing during the resource boom. Any prospective borrowing should be spent on human resources, infrastructure and health care development projects. Thirdly, Laos has a high level of external debt, so any increase in domestic spending will lead to real exchange rate appreciation, negatively impacting non-boom sectors. Rapid repayment of any debts following eventual receipt of the windfall cannot be neglected. Finally, windfall revenues from this rapid growth resource sector will not flow indefinitely: setting up a windfall mining fund to set aside resources for emergency times and external shock is thus crucial.

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8. References

- [1] J.S. Bandara. An Investigation of “Dutch Disease” Economics with Miniature CGE Model. *Journal of Policy Modeling*. 1991, **13**(1): 67-91.
- [2] N.C. Benjamin, S. Devarajan. and R. J. Weiner. The Dutch Disease in a Developing Country– Oil Reserves in Cameroon. *Journal of Development Economics*. 1989, **30**: 71-92.
- [3] S. Chand, and T. Levantis, Dutch Disease and the Crime Epidemic: An Investigation of the Mineral Boom in Papua New Guinea. *The Australian Journal of Agricultural and Resource Economics*. 2000, **44**: 129-146.
- [4] K.W.Clement, H. Ahammad, and Y. Qiang. New Mining and Mineral-Processing Projects in Western Australia: Effects of Employment and Macro-Economy. *Resource Policy*. 1997, **22**(4): 293-346.
- [5] W.M. Corden. The Exchange Rate, Monetary Policy and North Sea Oil: The Economic Theory of the Squeeze on Tradeables. *Oxford Economic Paper*. 1981, **33**:23-46.
- [6] W.M. Corden, and J.P. Neary. Booming Sector and De-industrialization in a Small Open Economy. *Economic Journal*. 1982, **92**: 825-48.
- [7] G.A. Davisand, and J.E. Tilton. The Resource Curse. *Natural Resources Forum*. 2005, **29**: 233–242.
- [8] B. Decaluwe , A. Lemelin, H. Maisonnave, and V. Robichaud, The PEP Standard Computable General Equilibrium Model, Single-Country, Static Version. Poverty and Economic Policy (PEP) Research Network. 2009.
- [9] Government of Laos (GoL). *National Growth and Poverty Eradication Strategy*. Government of the Lao PDR: Vientiane. 2004.

- [10] P.J. Higgs, and A.A. Powell. Australia's North West Shelf Project: A General Equilibrium Analysis of its Impact on the Australian Economy. *Resources Policy*. 1984, **18**: 179-190.
- [11] M.M. Hutchison. Manufacturing Sector Resiliency to Energy Booms: Empirical Evidence from Norway, the Netherlands, and the United Kingdom, *Oxford Economic Papers*. 1994, **46**(2): 311-329.
- [12] S. McDonald and K. Thierfelder. *Deriving a Global Social Accounting Matrix from GTAP Versions 5 and 6 Data*. GTAP Technical Paper No. 22. 2004.
- [13] B. Pinto. Nigeria During and After the Oil Boom: A Policy Comparison with Indonesia. *World Bank Economic Review*. 1987, **1**(3):419-45.
- [14] Y. Qiang. How Different is Mining from Mineral Processing? A General Equilibrium Analysis of New Resources Project in Western Australia. *The Australian Journal of Agricultural and Resource Economics*. 1999, **43**(3):279-304.
- [15] P. Kyophilavong. *Mining Sector in Laos*. BRC Discussion Paper Series No. 18, Bangkok Research Center (BRC), IDE-JETRO. 2009.
- [16] P. War, The Gregory Thesis Visits the Tropics. *The Economic Record*. 2006, **82**(257):177-194.
- [17] World Bank. *Lao PDR Economic Monitor*. World Bank, Vientiane. 2008.
- [18] World Bank. *Lao PDR: Economic Monitor- May 2011- Update*. World Bank: Vientiane. 2011.