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Policy Challenge and Single-Sector Growth Model Application of Resource-Rich Developing Countries: Case of Mongolia

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Abstract

This paper evaluates whether natural resource export revenue of Mongolia reduces the interest rate spread using single-sector model and studies the cases that decreased their interest rate spread successfully. The results suggest that the difference in the quality of natural resource's expenditure is the key factor of developing stable economy. As witnessed by the examples of Botswana and Sierra Leone, natural wealth can become both of a blessing or a curse depending on the effectiveness of economic and political policies. In other words, if Mongolia spends its resource revenue ineffectively, its fame on the international market will be lost and leads to be pegged with high interest rate. Finally, the paper suggests some policy recommendations for the optimal spending of the windfall revenue based on the result.

JEL Classification: C54, E63, F34, H63, O13, P48, Q33

Keywords: Interest rate spread, Single-sector model, Macro prudential policy, Resource-rich country

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1 Introduction

Most developing countries tend to be capital scarce and face an interest rate premium in borrowing from international credit markets. It therefore becomes one of the main factors that lead these economies to have a stable, high domestic interest rate.

Mongolian commercial banks' interest rate is decreasing in recent years, but it is still at the high level. In 2012, Mongolia sold its government bond worth 1.5 billion USD on the international market. At the trade, 500 million USD, five-year bond was sold at its launch price of 4.125% yield and 1 billion USD, 10-year bond was sold at 5.125%. The interest rates of this bond are about 4 percent higher than the world interest rate, because of the country risk. Besides, Mongolia is a natural resource abundant country with mineral deposits such as Oyu Tolgoi mine counted as the largest undeveloped copper and gold reserve in the world, Tavan Tolgoi mine one of the biggest coal mines in the world and other big mines of copper, coal, iron and zinc. In 2009, the Government of Mongolia signed an investment agreement covering the construction and operation of a copper, gold mine at Oyu Tolgoi with Ivenhoe Mines Mongolia Inc. In other words, Mongolia expects a windfall revenue from its natural resources.

Several studies, particularly, Frederick and Anthony (2009) have examined the impact of windfall revenue on interest rate/risk premium and determined the optimal policy for resource-rich countries. As a result of these papers, windfall revenue in a developing economy reduces the interest rate spread depend on foreign debt reduction and optimal policy involves cutting distortionary taxation in order to raise investment and wages. In theoretical view, a country with low foreign debt has a small risk of default and can borrow on international markets at the world interest rate. But some some paper suggest empirically that there is a positive relationship between exports of some resource-rich economies and their interest rate spread (Central bank of Chile, 2002).

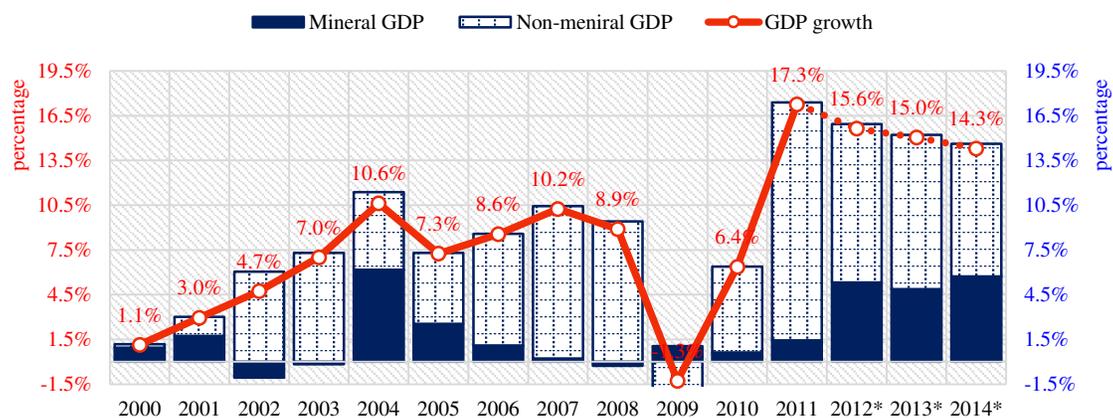
This paper aims to evaluate whether natural resource export revenue of Mongolia reduces the interest rate spread using single-sector model and studies the cases that decreased their interest rate spread, successfully.

2 Overview of the Mongolian economy

2.1 Real sector

Recently the Mongolian economy has been growing rapidly, about 8.5% year on year, for the last 8 years. Even though the economy was relatively small with GDP of US\$ 1.3 billion in 2000, it has increased quickly during the decade and reached US\$ 14.4 billion by the end of 2011.

Figure 1. Mineral and Non-mineral GDP



As the global economic downturn occurred in 2009 economic growth slowed to -1.3%. The most suffered sector during the crisis was mineral sector as a result of the copper price decline starting from 2007 where the scope of the downturn in mineral GDP growth was very low and its contribution to GDP has become almost invisible 2007 to 2008.

After crisis growth reached 6.4% in 2010 and 17.3% in 2011, which is the highest annual growth ever accounted for the last 20 years. Mining sector growth was 3.6% and 8.7% respectively in the years mentioned above.

In terms of expenditure, it is also expected that GDP will grow dramatically as a result of the investments made in the mining sector, such as mining related equipment, plant, and fuel in the next few years. Even though big mining projects such as Oyu Tolgoi will not come on stream until 2013, other small mining projects are likely to increase the country's production and export. Furthermore, this positive trend in the mining sector will provide further growth in demand as tax income from the sector supports government expenditures, particularly on social welfare, so as the consumption.

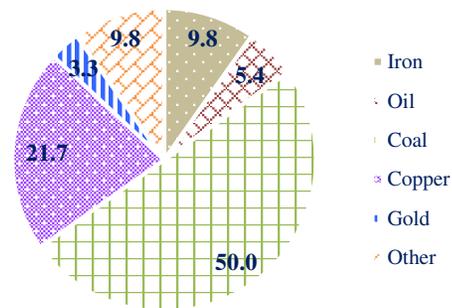
2.2 Mining sector

Mongolia is a country with vast natural resources and is heavily dependent on their extraction. Especially, copper, gold, coal and uranium are dominant resources. As of 2011, total mineral exports were equivalent to about 40% of GDP. The two main export commodities, copper and coal currently compose almost 70% of total export earnings. The mining industry in Mongolia is expected to grow and develop in the near future, not only because of reserves, but also because of its proximity to, and trade with China, which is expected to sustain its growing demand for mineral commodities.

Figure 2. Export shares by commodities



Figure 3. Share of Commodities to Export



Similar to other resource dependent countries Mongolian current account is very sensitive from international market's resource price.

Figure 4. Export shares by countries

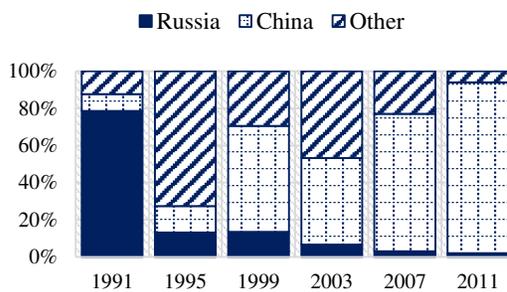
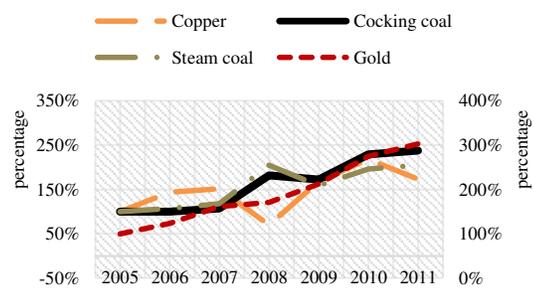


Figure 5. Commodity Price Indices (2005=100)



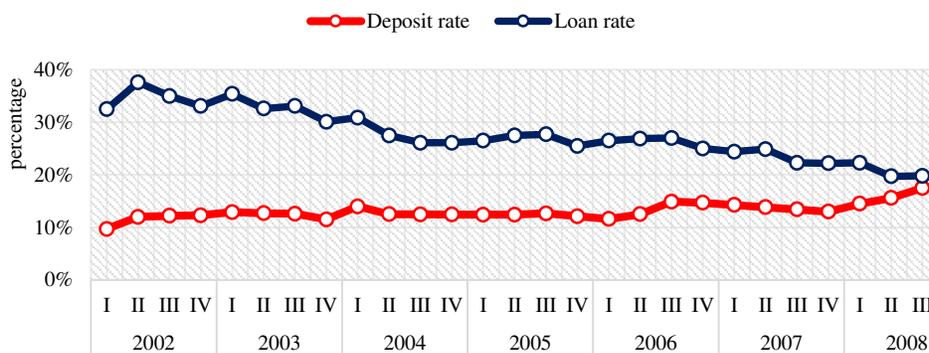
Mongolia faces challenges to develop the mining sector responsibility, not only in terms of the environment and industry practices, but also economically in order to avoid a widening trade deficit and high inflation which could result from rapid economic growth. Also, it will be important to consider Chinese mineral policy and mineral needs.

Also Oyu Tolgoi and other projects are expected to start out in 2013. However, Mongolian mining sector investment mainly focuses on copper, coal and gold, but there are still several feasible resources if the government provide infrastructure.

2.3 Interest rates

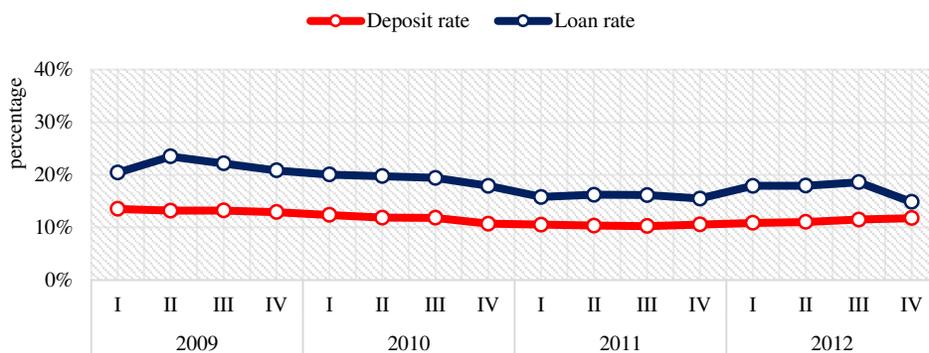
According to “Commercial banks’ interest rate spread in Mongolia” in 2006, as banks’ marginal operation cost, risk cost decreases the loan interest rate tends to fall. Major drawing back factor to decrease loan interest rate considerably is inefficient competition on loan sources.

Figure 6. Deposit rate and loan rate in domestic market (2002-2009)



Decrease in the loan interest rate to 18 unit percent played the main role to shorten the spread. In 2010, Mongolian central bank implemented projects to reduce spread which based complete researches on interest rate spread. But according to statistics interest rate have not changes seriously.

Figure 7. Deposit rate and loan rate in domestic market (2009-2012)



Domestic loan and deposit rates are stable around 14.9% and 11.7%. Comparison to the other countries is illustrated below.

Figure 8. Deposit rate comparison

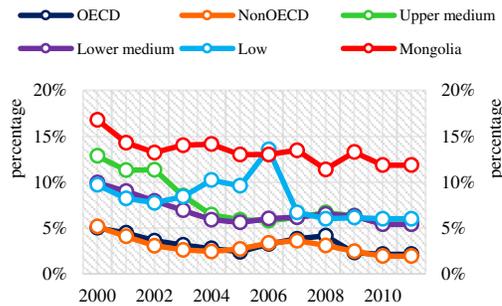
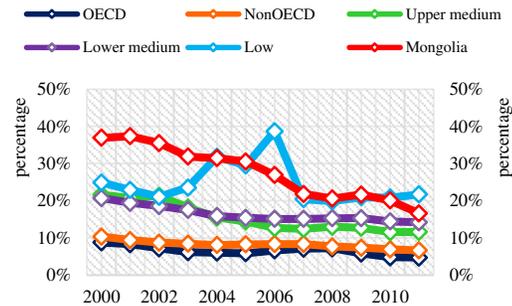


Figure 9. Loan rate comparison



3 Literature review

In this section, it will briefly discuss three major literature fields, including world and domestic framework.

3.1 Determinants of the interest rates

The starting point for analyzing the determinants of the deposit interest rate is a model of Hannan, Berger (1989, 1991). The deposit base model suggests the optimal deposit interest rate to commercial banks. This model also emphasizes competition, growth rate and market share of depositary market and other macro indicators which considered to setting up interest rate level.

The first theoretical model of the optimal spread (loan interest rate – deposit interest rate) based on banking financial intermediation activity showed initially by Ho and Saunders (1981) which is called “Dealership”, then lately extended having money market’s uncertainty, interest risk, and different type of loan and deposit into the model by Mcshane, Sharpe (1985), Allen (1988) and Angbanzo (1997). Lately extended by Maudos and Guevara (2004). The model’s specialty is to show banking operational risk, operating cost, activity’s size, degree of risk aversion and market structure affecting spread.

According to the literature in Mongolia, Boldbaatar (2006) and Gan-Ochir (2006, 2009) used the model mentioned above to define the determinants of Mongolian commercial banks’ interest rate and suggested policy options.

3.2 Natural resources and interest rates

The main literature that shows the characters of interest rate in resource-rich country is studied by Frederick and Anthony (2009). They used simple single-sector model to show the temporary windfall decreases the interest rate spread. Then in 2011 they extended dependence of interest

rate by resource size options. Also, there are several literatures about interest rate affects economic environment by systematically adversely. For example, Edward (1984), Klein (1995) and Klein & Barners (1997) confirm economic growth, export and other major variables are important determinants of interest rate. Some economists indicate higher capability of lending reduce the interest rate spread (Cantor and Packer, 1996; Eichengreen and Mody, 2000).

Also, Martin Uribe and Vivian Z. Yue (2005) determines the relationship between world interest rate, domestic interest rate spreads and macroeconomic major variables in developing countries. In this article they emphasized several characters. (1) US interest rate shocks explain about 20% of movements in aggregate activity in emerging economies. (2) Country spread shocks explain about 12% of business cycles in emerging economies. (3) In response to an increase in US interest rates, country spreads first fall and then display a large, delayed overshooting; (4) US-interest-rate shocks affect domestic variables mostly through their effects on country spreads; (5) The feedback from emerging-market fundamentals to country spreads significantly exacerbates business-cycle fluctuations.

In Mongolia, there are several studies concern mining sector impacts on economic development but have not done any research concentrated on interest rate.

3.3 Natural resource curse and Optimal policy

The mining sector has either positive or negative impacts on economic development. By starting the supply of natural resources, the GDP and NI for per capita will probably increase and requires to borrow capital and import labor from international market. Moreover, the contribution of the mining sector to GDP will increase, dramatically.

In practice, some countries which had not controlled the one sector's imbalanced effect to economy face big issue to handle single sector dominance. We can sum up studies about the adverse effect of the mining sector is called "Dutch disease", very interesting study field. The natural resource curse is a paradox that resource-rich countries' growth rate is slower than natural resource scarce countries (Humphreys et al., 2007).

For example, tigers of the East Asia (Hong Kong, Republic of Korea, Singapore and Taiwan) maintained very high growth rates from 1960-1990, in contrast resource-rich Latin America stagnated or declined (Weinthal and Luong, 2006). The literature in the 1990s and early 2000s emphasis that an abundance of natural resource acts as a drag on economic development (Sachs and Warner, 1995; Gylfason et al., 1999; Sachs and Warner, 2001; Neumayer, 2004).

There are several guidances and interpretations to avoid the natural resource curse. The first explanation is that resource revenue tends to increase a fight over existing resources, which leads to poor institutional quality and lower economic growth. Hausmann and Rigobon (2003) claim that the lower growth is generated by the presence of common-pool problems or uncertainty

related to property rights over the resource income, which leads to inefficiencies in usage of existing resources. This is called “institutional impact of natural resources”, some empirical evidences claimed that natural resources (in particular, oil and minerals) exert a robust negative and nonlinear impact on growth via their harmful impact on institutional quality (Sala-i-Martin and Subramanian, 2003). On the other hand, countries that export fuels, minerals, plantation crops, and coffee or cocoa do worse across an array of governance indicators, even when controlling for other potential determinants of governance (Isham et al., 2005).

A second explanation is that resource rents are volatile, due to the low price elasticity of natural resource supply. The relationship between the volatility of resource rents and growth (Ramey and Ramey, 1995) and investment (education) are negative (Aizenman and Marion, 1999), (Flug, Spilimbergo, and Wachtenheim, 1998). Hausmann and Rigobon (2003) argue that the major cause of this negative effect is the existence of financial market imperfections, as a result of which, volatility leads to a higher cost of capital, lower investment, and lower welfare.

A third explanation is the hypothesis commonly known as “Dutch Disease”. As mentioned before Corden (1982) and Corden and Neary (1984) summarized the Dutch Disease hypothesis as the notion that an exogenous increase in resource prices or in resource output results in real exchange rate appreciation and a decline in the manufacturing sector.

The assumption of the “Dutch Disease” model following Corden and Neary (1984), differs a *resource movement effect* from a *spending effect*. The production output decline is up to “direct de-industrialization.” While the price of manufacturing goods is constant, the decline in services output leads to excess demand for services and therefore to an increase in the price of services. The result is an increase in the price of non-tradable relative to tradable, via an appreciation of the real exchange rate.

It is important to emphasize the spending effect than a movement effect of resource in developing countries. The resource movement effect only occurs if factors are sufficiently mobile between the mining and non-mining sectors, which is unlikely in Mongolia given that the mining sector employs relatively few workers and labor mobility is low in general. However, the spending effect happens regardless of whether the mining sector employs any labor at all. The spending effect occurs simply because higher oil prices generate higher wages and/or profits in the mining sector, thus raising aggregate demand in the economy.

The tendency of volatility is one of the main reasons of the slower growth rate led by de-industrialization. Hausmann and Rigobon (2003) spotted that the smaller the manufacturing sector, the more difficult it is for the economy to absorb shocks. If there is no manufacturing sector, economy will turn to only one employer who represents service sector. Moreover, shocks will have to be absorbed by expenditure switching and increased unemployment, implying increased volatility. As argued above, lower the growth rate slower to change imperfect financial

markets. However, it does not explain why growth would be permanently lower. That is why manufacturing sector has not rebuilt during times of low commodity prices.

But recent literatures prove that there is a chance to turn the natural resource curse (Sub-Saharan, Latin American countries) into blessing (Chile, Botswana, Nigeria and Austria). Only interpretation of the arising resource curse is non optimal policy. Furthermore, inefficient policy is caused by low institutional quality, bad governance and slow development. In other word, by improving quality of institution we can deserve positive effect of natural resource (Collier and Goderis, 2008).

4 Single-sector model of the resource-rich country

4.1 Benchmark model

In this section, we will consider the relationship between interest rate and windfall revenue. First, in an open small economy, we assume that domestic interest rate and world interest rate are equal. So that the country can lend infinitely from the world capital market. This economy has exogenous and constant non-resource output Y . Consumers have no assets and simply receive a lump-sum transfer or citizen dividend T from the government so their consumption is $C = Y + T$.

Only the government can access international capital market, foreign debt represents national debt. If temporary windfall comes to the economy, the foreign debt function change can be written as below.

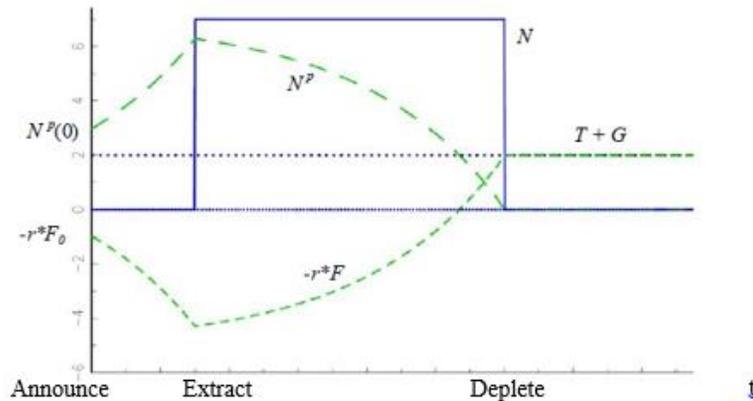
$$\dot{F} = r * F + G + T - N = r * F + G + C - Y - N \quad (1)$$

Where F foreign debt, G government expenditure, C consumption, T transfer to household and N windfall. According to the permanent income hypothesis, when anticipated windfall occurs small open economy responds as Figure 10. Where N^P permanent income, N anticipated temporary windfall's function.

T, G government total expenditure $r * F_0$ debt service. The flow of revenue is announced at date of $t = 0$ which we refer to as the date of extraction and ceases flowing, or is depleted, at some later date.

Permanent resource revenue N^P rises as the date of extraction comes closer, and falls once extraction begins, going to zero when the windfall ends. Which means paying off foreign debt. If the country's initial debt is F_0 flow cost of debt service is $r * F_0$. As paid off all debt by windfall revenue, country should build up SWF to keep on earning a permanent income. Eventually government overall expenditure will agree with the interest rate revenue of SWF.

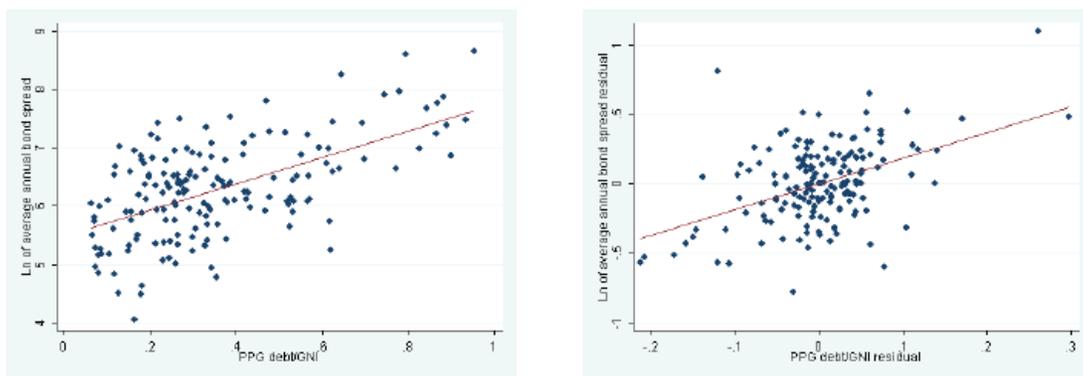
Figure 10. Use of Sovereign Wealth Fund to manage temporary windfall revenue according to the permanent income hypothesis



In summary, the permanent income hypothesis suggests that the country runs a current-account deficit when it anticipates future windfall revenue, then pays off foreign debt and builds a SWF by running a current-account surplus during the temporary windfall. Total spending (public consumption plus citizen dividends) increases immediately upon news of the windfall. The foreign assets that are built up at the end of the windfall generate just sufficient interest revenue to finance the permanent rise in public spending. This policy of borrowing, then saving and finally living of the return on the SWF, thus transforms an anticipated, temporary windfall revenue into a permanent increase in aggregate spending, where the amount devoted to citizen dividends and private consumption decreases with the weight given to public consumption.

We have to consider the assumption that the domestic interest rate is equal to world interest rate. Unfortunately, most developing countries face higher domestic interest rate due to scarcity of capital. Thus, developing countries have higher domestic interest rate, lower infrastructure investment, income per capita and wage. We assumed that the interest rate premium depends positively on the national debt. Empirical evidence is plotted in Figure 11.

Figure 11. Interest rate spreads and “public and publicly guaranteed debt”

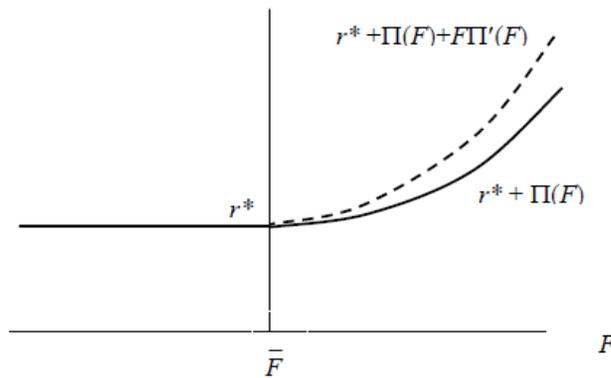


According to the relationship between the interest rate spread and public debt we can obtain following equation.

$$r = r^* \text{ for } F \leq \bar{F} \text{ and } r = r^* + \Pi(F) > r^* \text{ for } F > \bar{F} \geq 0 \quad (2)$$

Where, $\Pi(F)$ is the interest rate premium and \bar{F} is the debt threshold. Below from \bar{F} , the country is a price taker at the world rate of interest. And $\Pi(\bar{F}) = \Pi'(\bar{F}) = 0$ and $\Pi'(F) > 0$, $F > \bar{F} \geq 0$ in other word premium function is positively related to debt and at the threshold debt the premium is equal to zero. Figure 12 portrays supply schedule from the international capital market.

Figure 12. The cost of foreign borrowing



Turnovsky (1997) and other economists declare that the supply schedule of foreign debt slopes upwards for all (F) in open small economy. For steady state debt equal to threshold debt (\bar{F}) and the domestic interest rate agrees with world interest rate (r^*).

4.2 Single-sector model of developing country

To see the windfall effect on economic major variables, specially on interest rate, we considered a simple model which ignored absorbing expenditure, an appreciation of the real exchange rate and its adverse impact on the traded sector or from supply bottlenecks in particular domestic sectors such as construction. Also, there is no market failure and uncertainty. The economy has non-resource sector, which consists of government driven public and foreign-owned private sectors.

4.2.1 Household

The most developing countries are capital scarce. So household will receive income from wage and government transfer. The government will smooth consumption by adjusting lump sum tax and transfer.

Household utility function,

$$U = \int_0^{\infty} ((C^{1-1/\sigma} + \psi G^{1-1/\sigma})/(1 - 1/\sigma)) \exp(-\rho t) dt \quad (3)$$

C consumption, G government expenditure, ρ time preference and σ intertemporal substitution coefficient. To finance the government expenditure and transfer, government will borrow D from the international capital market.

$$\dot{D} = rD + G + I_s + T - \tau Y - N \quad (4)$$

As stated above government debt depends on the domestic interest rate r , government expenditure G , investment on public sector I_s , transfer T , tax rate τ , and windfall income N . Analysis is simplified by working with net government assets defined as the stock of public infrastructure minus government debt.

$$B = S - D \quad (5)$$

The budget constraint is

$$\begin{aligned} \dot{B} &= r(B - S) + N + \tau * Y - G - T - \delta_s S \\ B(0) &= B_0 \end{aligned} \quad (6)$$

The initial value of net government assets is fixed at B_0 .

The no-Ponzi game condition must be satisfied so initial net government assets *plus* the present value of the stream of future income taxes and resource revenue must cover the present value of the stream of future spending on public consumption, government transfers and infrastructure services.

$$\lim_{t \rightarrow \infty} B(t) \exp\left(-\int_0^t r(v) dv\right) = 0 \quad (7)$$

Using a utility function and budget constraint, the Pontryagin function will be defined as follows:

$$H(\tau, T, G, S, \mu) \equiv \left(\frac{[W(S, \tau) + T]^{1-1/\sigma} + \psi G^{1-1/\sigma}}{1 - 1/\sigma} \right) + \mu[\{r^* + \Pi(S - B)\}(B - S) + N + \tau Y(S, \tau) - G - T - \delta_S S] \quad (8)$$

The first order conditions:

$$H_\tau = C^{-1/\sigma} W_\tau + \mu(Y + \tau Y_\tau) = 0 \quad (8.1)$$

$$H_T = C^{-1/\sigma} - \mu = 0 \quad (8.2)$$

$$H_G = \psi G^{-1/\sigma} - \mu = 0 \quad (8.3)$$

$$H_S = C^{-1/\sigma} W_S + \mu[\tau Y_S - \{r^* + \Pi(D) + D\Pi'(D) + \delta_S\}] \quad (8.4)$$

$$r^* \mu - \dot{\mu} = H_B = \mu[r^* + \Pi(D) + D\Pi'(D)] \quad (8.5)$$

If the government can make lump-sum transfers to consumers, then it is optimal to set the income tax rate at zero. From that from (8.1) and (8.2) together with $W_\tau = -Y$ condition satisfies. The optimal level of public consumption follows from (8.2) and (8.3) as $G = \psi^\sigma C$.

As satisfying first order conditions

$$W_S(S, 0) = r^* + \Pi(D) + D\Pi'(D) + \delta_S \quad (8.4')$$

The optimal path of consumption:

$$D > \bar{D}, \dot{C} = \sigma C[\Pi(D) + D\Pi'(D)] \quad (8.5')$$

$$\dot{C} = 0$$

Hence, in a capital-scarce economy the optimal consumption paths are tilted towards the future to redeem government debt, lower the interest rate, boost public and private capital accumulation and thus spur the process of economic development.

4.2.2 Firm

Non-resource production function is defined as follows, depends on labor, which is normalized, private capital K , public infrastructure S and standardized technological advance A . The production function satisfies neoclassic production function's properties.

$$Y = AK^\alpha L^{1-\alpha} S^\gamma \quad (9)$$

We are including infrastructure, education, health and other things in public stock. Government controls public sector and foreigners own private capital sector. They can reach a world capital market at world interest rate r^* and pays τ fraction of their income to the government as income taxation.

Profit maximization condition in private sector:

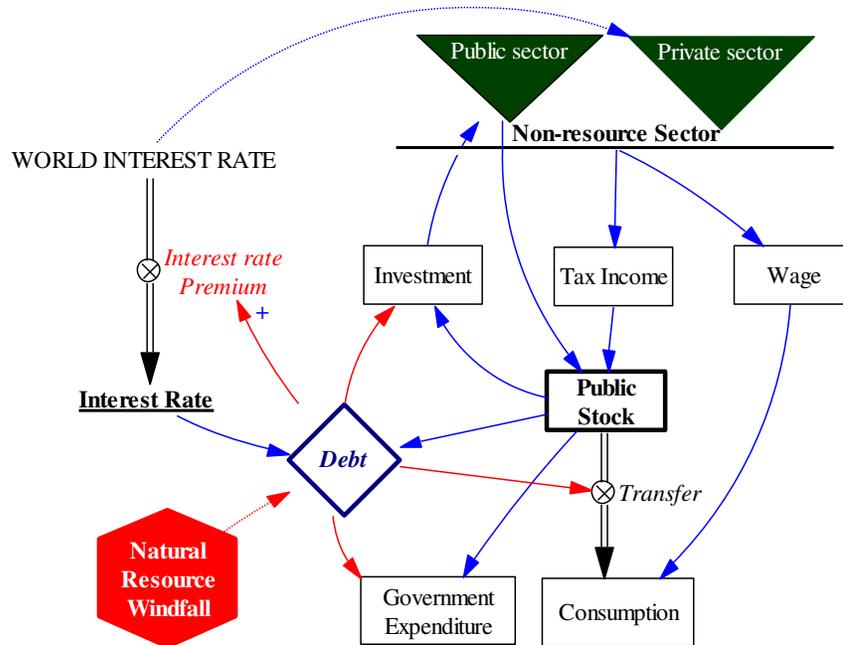
$$(1 - \tau)f_k(K, S) = r^* + \delta_k \quad (10)$$

As we see profit maximization condition private capital depends on public stock and taxation portion $K = K(S, \tau)$. Thus we can find wage and output as below.

$$\begin{aligned} W(S, \tau) &= (1 - \tau)[f(K(S, \tau), S) - K(S, \tau)f_k(K(S, \tau), S)] \\ Y(S, \tau) &= f(K(S, \tau), S) \end{aligned} \quad (11)$$

And we draw transitional mechanism of the single-sector model in Figure 13 by using Vensim program.

Figure 13. Transmission mechanism of the model



4.3 Parameter calibration

The parameters of the model are calibrated to the Mongolian economy based on the existing literature.

Table 1. Calibration

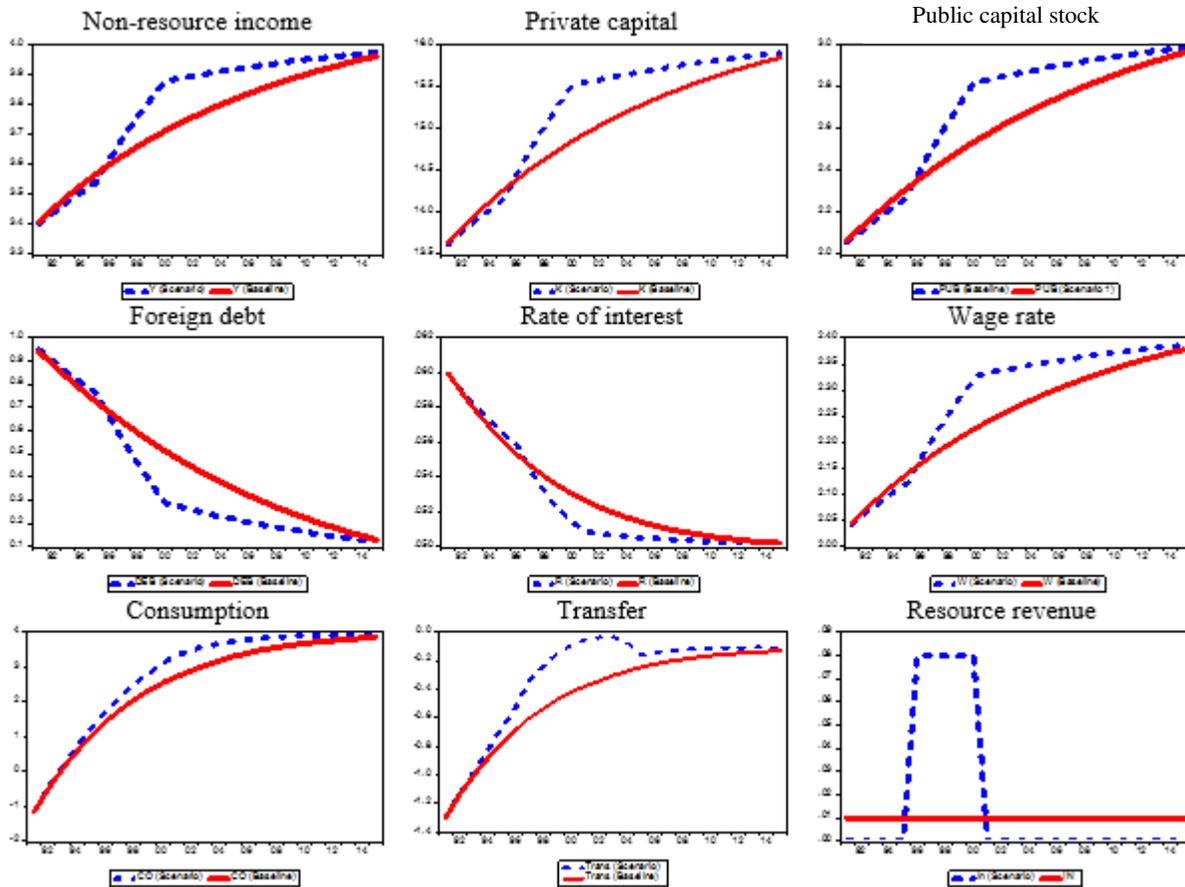
Descriptions	Parameters	Values
Private capital contribution to output	α	0.40
Public stock contribution to output	γ	0.25
World interest rate	r^*	0.05
Time preference parameter	ρ	0.05
Intertemporal substitution elasticity	σ	0.75
Private capital depreciation	δ_k	0.05
Public sector depreciation	δ_{pub}	0.05
Debt threshold	$\bar{D} = \bar{F}$	0.00
Government expenditure	G	0.00
Income tax rate	τ	0.00
Population growth	n	0.00
Technological advance	$arate$	1.00

4.4 Simulation

In this section, the calibrated model is used to analysis the effect of an increase in windfall revenue to the economy.

Solid lines in Figure 14 are the major economic variables' path of no shock and dashed line indicates temporary anticipated small windfall. The economy starts out at national wealth, B_0 and with positive initial debt. Thus, the economy smoothly converges to its stationary state by accumulating assets, decumulating foreign debt, falling domestic interest rate and rising income and consumption. The windfall effect equal to 8% of long run output. To simplify model, we assumed threshold as zero. The effect of windfall is divided into three sections. First period is between announcement of resource deposit to extraction (period 0 to 6). According to permanent income assumption consumption will increase, so transfer and consumption will jump upward. But the overall transfer is negative because the economy can't finance public infrastructure. Thus, they have to finance it by borrowing from foreign and debt will flatten. Following higher domestic interest rate and lower public, private capital and non-resource income. Second period is between extraction to depletion of resources (from the period 7 to 11). Revenue flow reduces debt rapidly and decreases premium and increases non-resource sector, wage and consumption.

Figure 14. Temporary Windfall revenue and lump-sum transfers



Finally, after depleting resource, optimal use of the windfall involves increased consumption from the date at which the resource is discovered, and faster asset accumulation (debt decumulation) from the date windfall revenue flows. Higher public and private investment brings forward the economy’s development path.

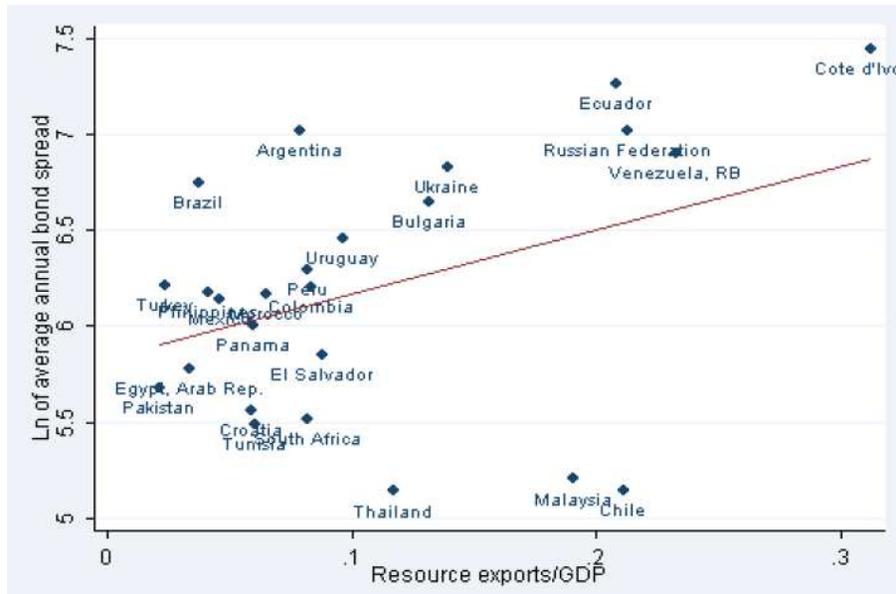
5 Quality of the natural resource allocation

5.1 Interest rate in natural resource abundant country

In the previous section we showed theoretically how to create a rapid economic growth by decreasing interest rate strongly because of natural resource. However, from the experiences of resource-rich countries, the interest rate premium increases while the exports of mining products increases.

Frederick and Anthony (2009) studied the relevance between natural resource and interest rate premium and defined it using a logarithm average of interest rate premium of 25 countries’ and the size of the natural resource revenue in the GDP shown in Figure 15.

Figure 15. Relationship between interest rate spread and natural resource



From Figure 15, one can see the positive relevance between natural resource and interest rate premium which high interest rate remains while natural resource export increases through observed countries. Thus, it conflicts with our previous single-sector model results. Therefore, it is possibly because of the management of the natural resource revenue, and we introduce natural resource optimal policies in the following sections.

5.2 Possible channels of resource curse

There are a number of explanations of the abundant natural resource tends to decrease economic growth. The most valid ones are direct economy definition or non-effective macroeconomic policies and political economic definition or unsuccessful institutions.

5.2.1 Dutch disease

The Dutch disease is often described as the main effect of the mining sector on the overall economic development. According to Weinthal and Loung (2006), in economy the Dutch disease occurs through the excessive amount of revenue from the sudden increase of natural resource exports. This flow of revenue leads to an appreciation of the real exchange rate. Also production factors, labor and capital, make movement to non-tradable developing sectors - retail trade, services and construction. Thus, the effect of real exchange rate appreciation and labor force movement reduces the competitive ability of agriculture and other industrial sectors.

Without appropriate macroeconomic policies, an increase in the demand of labor and capital in the services and construction sectors tends to accelerate domestic inflation. So these

short-term macro changes affect the country's economic growth by decreasing economic diversity. This makes the country's exports, government income and labor more dependable on the only mining sector. Thus the economy, which is dependent from one sector gets more fluctuant since the price of commodity products is cyclical.

Definitions of the negative impact of mining sector dependency on the economy distinguish the effect of related economic structural changes, particularly in the industrial sector. Particularly, when the size of the industrial sector in aggregate economy declines both demand and supply of skilled employee simultaneously decrease and therefore the country's human capital lowers. In addition, it is controversial that having abundant natural resource tends to supplant education and training. Recent studies have identified that the reverse relation between the public expenditure on education relative to national income, school enrollment and natural resource abundance. But it hasn't yet observed in countries such as Australia.

Other definitions concentrate on government policies to invest in specific sectors or projects and protect non-resource sectors that are in recession, weakened by the resource boom (Stevens, 2003). Subsidies that protect non-mining sectors from international competition, or purpose of improving competitiveness, does aggravate the matter in the medium term because they reduce the incentive to remain competitive. Moreover, protecting other tradable sectors in the same way is highly expensive (Gregory, 1976; Crowley and Martin, 1982; Parmenter, 1986; Centre for International Economics, 2003; Econtech, 2003; Productivity Commission, 2008). The cost of such protection becomes financially unsustainable when the sudden growth of the mining sector disappears and a country's natural resource profit decreases. There are several countries such as Bolivia, Guyana, Chile (temporarily), Zambia, Zaire and Congo applied this protection strategy and failed (Sarraff and Jiwaji, 2001).

There are a number of cases that many countries failed to reach the main purpose of granting subsidies, and main reasons of the failure are that the most countries invested in the military, in projects that offered very low rates of return and also invested in capital intensive industries rather than labor intensive manufacturing industries better suited to the production capability of a country. In 1970, Sub-Saharan Africa's natural resource boom created many problems (Shaxson, 2005). For instance, in Nigeria, the Ajaokuta steel plant, which built in 1979 for several billion dollars, did not produce any steel in 25 years. In 1975-1983, Nigerian capacity utilization in the manufacturing sector fell from 77 per cent to 50 per cent, then to 35 per cent by the mid-1980s. In other words, two thirds of investment in the manufacturing sector, mostly financed by the government, has been wasted.

5.2.2 Revenue volatility and borrowing

As discussed above, the strong dependence of a country on the natural resources sector resulting from Dutch disease intensifies the cyclical nature of economic growth. The particular example is government revenue.

The government income volatility has three main reasons – rate of extraction varies over time, time variability of payment and price fluctuations of natural resources. Furthermore, it is possible that income volatility depends on political instability, conflict and concentration of exports. This concentration can increase the fiscal balance fluctuation and decrease the terms of trade sharply.

For example, copper ore is Mongolia's main export and in the past Erdenet mine constituted about one quarter of government income. During the 2009 global financial crisis, the copper price fall contracted Mongolian economy by 1.6 percent which reached 8.9 percent in 2008.

Variable earnings increases instability of government income and thus it is difficult to make decision in the long run. Adjustments in fiscal expenditure restrain private investment and disturb the government budget. Moreover, even fiscal expenditure is stable at a certain level, it is hard for governments to make budget cuts (Weinthal and Luong, 2006). During the bust, governments often borrow rather than lowering their spending and in the process governments owe large amount of debts.

Bolivia is one of the countries that have been caught in such debt trap. During 1979-1983, Bolivia's real exchange rate doubled, thus non-mining sectors' became uncompetitive and their share of exports decreased suddenly (Sarraff and Jiwanji, 2001). Bolivia protected its manufacturing sector, produced uncompetitive products and the efficiency of new investments was low. Also the most part of the natural resource income was spent on consumption rather than investing.

Excessive borrowing occurs also during booms not only during busts. There are many examples of countries that followed the strategy of borrowing based on their natural resources. During 1970s, when commodity prices were high, developing countries were able to borrow from the international capital markets. After that in the 1980s, when prices start to fall, those countries became unable to pay their debts.

5.2.3 Policy failures

As mentioned before mining sector development leads to an economic damages by Dutch disease and has negative effects on the economy through wrong policies - inefficient investment, trade barriers and rent seeking. By sudden export growth, the government increases its investment expenditures on noneffective projects that politicians offered. Trinidad and Tobago is

an example of a country faced difficulties of lowering subsidies when GDP growth was negative in 1981 (Sarraff and Jiwaji, 2001).

Generally, sudden growth of natural resources tends to create rent seeking (Dietz et al., 2004). Thus the technological development and labor skill decreases. Sub-Saharan Africa is a region with excess bureaucracies and rapidly increasing civil service salaries (Shaxson, 2005). In sub-Saharan Africa, national oil companies and state-owned companies, that were built in the boom years, encourages the powerful political groups in order to protect their economic interests.

Beside the direct cost of noneffective investments and subsidy programs, these policies spirals inflation and reduce private saving and investment indirectly. In fact, there is a strong statistical relation between investment and saving rates (Dietz et al., 2004).

Gylfason and Zoega (2002) and Atkinson and Hamilton (2003) demonstrated a phenomenon, abundant resource leads a country to unstable consumption surplus in the future and GDP growth decline, using panel data of a large number of countries.

5.2.4 Political-economic explanations

The policy failures defined earlier prove that country's institution and governance are vitally important for defining development path. The impacts of the many harmful economic policies such as excessive consumption and borrowing, a failure to invest in human capital and value-adding infrastructure, and misguided government intervention have been well-studied for the recent years.

Now there is a widespread acceptance of the institution and its functioning are strongly related to natural resource, economic policies and economic performance (Murshed, 2004). Therefore, good institution is possibly related to good economic performances such as savings, investments and economic growth (Atkinson and Hamilton, 2003).

There are many channels showing that bad institution leads to a resource curse and below is the summary (Boschini, 2007).

- Rent seeking and corruption
- Institutional malfunctioning
- Existence of conflict

The researchers accept that governance, including property right, contract and law enforcement, the rule of law and administrative capacity is crucial to determining natural resource effects on the economic development. For example, according to Ahmed (2008) following politic-economic factors Australia to avoid the resource curse:

- High responsibility of government and public service
- Well-defined property rights, strong legal and other institutions and low corruption
- Relatively low domestic and international conflict over natural resources

5.3 Policy solutions against resource curse

Number measures have been proposed and adopted by countries to deal with the commodity cycle (Davis, et al., 2003 and Sachs, 2007).

5.3.1 Stabilizing institutional failure

Although, many institutions have been implemented to reduce the impact of global market volatility on producer countries, most of them have failed and have had a negative effect to the economy.

A. Marketing boards

Marketing boards are systems, requiring that all sales of commodity products go through the government. The purpose of the marketing board is to stabilize the price of commodities. When world price is low, the government creates stock by purchasing from exporters and when the price gets higher, the government starts spending. Unfortunately, the stabilization process turned out to taxation of the agriculture sector and subsidization of the industrial sector. So the marketing boards failed because the industrialization did not occur and the agricultural sector shrank.

B. Other government stockpiles/reserves

In some countries, the government maintains stockpiles/reserves under national security, such as the American Strategic Petroleum Reserve. One drawback is that there was a political influence on the government decisions of resource management. It also has effects of decreasing incentives of private citizen's reservation.

C. Producer subsidies

In developed economies the primary producing sector has some political power and the reserves mainly perform as a subsidy rather than taxation. For example, in Germany, the coal miners get subsidies, in the United States oil companies pay preferential rents.

D. Price controls for consumers

Developing countries aim to protect consumers from the increase in the prices of food and energy by political forces. Export controls are the main policy tools for the crop or mineral producer country. But this can increase prices in the international trade.

E. OPEC and other international associations/cartels

Logically, producer countries should cooperate in order to raise the price level or decrease price volatility. Most attempts forming international associations failed within a few years. Although,

the only association endured is OPEC, the attempt of reducing price fluctuation or increasing average price level remains uncertain.

5.3.2 Devices to share risks from price fluctuations

In this part we examine the macroeconomic policies to minimize the medium-term fluctuation costs associated with the Dutch Disease, and micro economic policies to minimize the risks from short-term price fluctuations of commodity.

There are three promising approaches for avoiding the short-term volatility risks. Firstly commodity producers who sign contracts with foreign companies, secondly producers that do their own selling, and thirdly the government dependent on commodity revenues.

A. Price setting in contracts with foreign companies

Price setting in contracts with foreign companies is often encounters dynamic inconsistency problem (Helm, 2010). At first the price is set by, but after world price increases, the government wants to renege. Because government doesn't want to give all the profits to the company and gives strong political pressures.

But it is a "repeated game", this government renegotiation lowers the interest in investments to the foreign companies and can have large transaction costs, such as interruptions in the export flow.

It has become familiar now, it is necessary to make a contract dependent on future terms to avoid this inconsistency (Humphreys, Sachs, and Stiglitz, 2007). Indexation is important for apportioning the risks of gains and losses and renegotiation costs.

B. Hedging in commodity futures markets

Commodity producers sell their commodities on international markets and thus face the risk of a rise or fall in the dollar price of export. Usually commodity producers can hedge the risk by selling on the forward or futures market. Hedging eliminates the additional costs of renegotiation when world price changes abruptly.

C. Denomination of debt in terms of commodity prices

The government or mineral-producing company to index its debt to the price of the commodity is never used before. The balance of payments crisis would not have happened if the debts had been indexed to the commodity prices for Ecuador, Indonesia, Iran, Mexico, Nigeria and Russia.

It is true that a market needs a certain level of liquidity, the usual answer for why commodity producing countries haven't tried to index their bonds or loans to the price of export commodity is that there would not be sufficient demand.

5.3.3 Monetary policy

In the previous sections, we discussed institutions for risks of short-term price volatility, this time we will consider macroeconomic managements of medium-term volatility. We begin with monetary and exchange rate policy to manage the Dutch disease.

A. Managed floating exchange rates

Both fixed and floating exchange rates have their advantages. The main advantages of fixed exchange rate are that it reduces the costs of international trade and it is a nominal anchor for monetary policy which helps the central bank achieve low-inflation credibility. The main advantage of floating exchange rate for a commodity producer is that it often provides automatic accomodation of terms of trade shocks.

Therefore an intermediate exchange rate regime such as managed floating or a target zone is appropriate for the middle-size and middle-income countries. In the booming decade that began in 2001 many followed the intermediate regime, in between a few commodity producers in the floating corner (Chile and Mexico) and a few in the firmly fixed corner (Gulf oil producers, Ecuador).

It is vitally important for developing countries, institutions tend to have lower credibility than in developed countries, that the public expectations of inflation be anchored by some nominal target by which the central bank asks to be judged. If the exchange rate is not to be the nominal target, then some other anchor variables should be chosen.

B. Alternative nominal anchors

In the past, there were three factors that stabilize the nominal anchors. They are: price of gold from the 19th century gold standard, money supply, the choice of monetarists and national income.

For small and open countries, Central bankers considered Inflation Targeting to be the preferred approach to fixed exchange rates. However, Inflation Targeting has a particular disadvantage for commodity producing countries which is not robust with respect to changes in the terms of trade. Fall in world market conditions for the export commodity, it has a negative impact on both the balance of payments and the level of economic activity. Loosening monetary policy would boost net foreign demand and restore external and internal balance.

The proposal of keeping the local-currency price of the export commodity stable has pointed out before and it moderates swings in the real value of export revenue, expressed in terms of purchasing power over domestic goods and services, it would reduce the tendency for governments to increase spending excessively in boom times and symmetrically cut it in busts. The proposal has the disadvantage of fully transferring the burden of exogenous fluctuations in world commodity prices to variability in domestic prices of non-commodity exports, if the

non-commodity export sector is not small, or if policy-makers want it to become larger. However, the important point of this proposal is to include export commodities in the index and exclude import commodities, whereas the CPI does it the other way around.

5.3.4 Institutions to make national saving procyclical

Some of the most important ways to cope with the commodity cycle are institutions to insure that export earnings are put aside during the boom time, into a commodity saving fund, perhaps with the aid of rules governing the cyclically adjusted budget surplus.

A. Reserve accumulation by central banks

Through foreign exchange intervention, central banks accumulate international reserves during booms in order to spend in busts. But holding the assets in the form of foreign exchange reserves has few disadvantages: the reserves do not earn a high return, increases in reserves can lead to rapid monetary expansion. Thus a central bank that already has enough reserves should consider selling some of the foreign exchange to the country's Natural Resource Fund. But if the Central Bank has political independence and the NRF does not, that may be a reason to leave the reserves where they cannot be raided.

B. Budget deficit rules: The Example of Chile

In June 2008, the Chilean President Michele Bachelet, and Finance Minister Andres Velasco, resisted intense pressure to spend the soaring receipts from copper exports, which widely resented public. However, one year later, in 2009, when copper prices fell abruptly the government increased spending sharply, using the assets that it had acquired during the copper boom, and thereby moderating the downturn. Saving for a rainy day made the president and minister heroes. Chile has achieved what few commodity-producing developing countries have achieved: a truly countercyclical fiscal policy.

There are several rules of Chilean fiscal policy, such as targeting the overall budget surplus -- originally set at 1% of GDP, then lowered to 0.5% of GDP, and again to 0 in 2009. But those attempts have failed, because they are too rigid to allow the need for deficits in recessions, counterbalanced by surpluses in good times.

Circumstances that Chilean government can run a deficit larger than the target are:

- Output falls from the potential, in a recession, or
- The price of copper is below its medium-term (10-year) equilibrium,

with the key institutional innovation that there are two sides of experts whose job it is each mid-year to make the judgments, respectively, what is the output gap and what is the medium term equilibrium price of copper. As the expert panel ruled that most of the price increase was temporary, so that most of the earnings had to be saved in the copper boom of 2003-2008, when,

as usual, the political pressure was to declare the increase in the price of copper permanent thereby justifying spending on a par with export earnings, the fiscal surplus reached almost 9% and the country paid down its debt to a mere 4% of GDP and it saved about 12% of GDP in the sovereign wealth fund. This allowed a substantial fiscal reduction in the recession of 2008-09, when the stimulus was most extremely needed.

Commodity-producing countries could usefully apply variants of the Chilean fiscal device. Given that many developing countries are more prone to weak institutions, the principle of a separation of decision-making powers should be retained: the rules as interpreted by the panels determine the total amount of spending or budget deficits, while the elected political leaders determine how that total is allocated.

C. Commodity Funds or Sovereign Wealth Funds: Sao Tome and Principe

Many natural resource producers have Commodity Funds, to invest savings for future welfare, often in global portfolios. However, it has been pointed out that the commodity fund does not necessarily do anything to ensure that politicians will not raid the fund when it is flush. As the Norwegian State Petroleum Fund (now called the Norwegian Pension Fund), there should be some standard recommendations - the funds are transparent and professionally run, and that they be given clear instructions that politics should not interfere with their objective of maximizing the financial well being of the country. The commodity fund of Sao Tome and Principe established in 2004, also includes extensive restrictions, managing how the oil revenues are to be saved, invested, or spent. There can be advantages in spending the commodity funds for education, health, or retirement support for a future generation. Humphreys and Sandhu (2007) recommend that spending goes through the regular budget in order to avoid any politician's private interest.

D. Lump sum distribution: Example of Alaska

By Alaska's state law the Alaska Permanent Fund saves earnings from the state's oil sector, must equally distribute half of the investment earnings on a per capita basis. The idea is that the citizens know how to spend their money better than their government. This system gives Alaskans a sense that they are the Fund stakeholders. Sala-i-Martin and Subramanian (2003) suggest that Nigeria should also distribute its oil earnings on an equal per capita basis.

E. Reducing net private capital inflows during booms

Other ways of reducing balance of payments surplus and facilitating national saving, when foreign exchange reserves are piling up to high levels are (i) the government deliberately to pay the short-term debt, (ii) remove any remaining controls on the ability of domestic citizens to invest abroad, and (iii) place controls on short-term capital inflows.

F. Efforts to impose external checks: Example of Chad

As in some countries if the executives ignore the law and spend what they want, all these institutions can fail. The investment agreement on a new oil pipeline between Chad and the World Bank in 2000 stipulated that Chad would spend 72 per cent of its oil export earnings on poverty, such as health, education and road-building, and save 10 percent in a “future generations fund.” Reflected in the agreement ExxonMobil was to deposit the oil revenues in an escrow account at Citibank and the government was to spend them subject to oversight by an independent committee. However, the government, one of the two most corrupt in the world, reneged on the agreement when money started to come in. Perhaps it may be that well-intentioned politicians spend oil wealth quickly out of fear that their successors will mispend whatever is left. It is important that international oil companies commit to make known how much they pay governments for oil, so that the public at least has a way of knowing when large sums disappear. Such legal mechanisms adopted by Sao Tome and Principe void contracts if information relating to oil revenues is not made public.

6 Conclusion

However, the interest rate of Mongolian commercial banks is declining relatively stable in recent years, it is still at a high level. This becomes a restricting factor to get opportunities of low cost and long-run financing. One of the solutions for this problem is to accumulate assets from the global market, which is not a popular experience in Mongolia.

The possibility of accumulating additional financing based on their natural resources is always open for countries that have abundant resources such as Mongolia. According to the literature, Frederick and Anthony (2005) studied that for resource-rich country the rapid increase of commodity exports decreases interest rate of its bond in the international markets. Also, Martin Uribe and Vivian Z. Yue (2005) examined the relationship between world interest rate, country spreads, and economic condition across developing countries. Unfortunately, this field of study is totally neglected in Mongolia. Theoretically, abundant natural resource is a condition to lower the interest rate premium with high speed, however, natural resource abundant developing country cases illustrate that this relationship has not been observed. In other words, spread did not fall or it was still at a high level when the mining sector revenue grows excessively.

The tendency of those countries to spend the resource revenue inefficiently, thus lose their opportunity to develop the economy and credibility in the world market is mostly the main reason of this phenomenon.

Mongolia has accumulated substantial capital based on large mining projects such as Oyu Tolgoi, Tavan Tolgoi, and expects windfall revenue from this sector in the future. Thus, the urgent problem is to define the optimal spending policy of mining sector revenue.

In this paper, we tried to determine whether a resource exporting revenue of Mongolia reduces its interest spread by using single-sector model and suggest the macro prudential policy to spend its mining sector revenue optimally based on the experiences of resource blessed countries.

As a result, we emphasize policy failure of resource-rich countries and recommend the solutions to divide risks related to world commodity price volatility, appropriate monetary policy regime for resource-rich countries, institutions to make national saving procyclical, and efforts to impose external checks. In particular:

1. Include in contracts with foreign purchasers clauses for automatic adjustment of the price if world market conditions change.
2. Hedge export proceeds in commodity futures markets.
3. Denominate debt in terms of commodity prices.
4. Allow some nominal currency appreciation in response to an increase in world prices of the commodity, but also add to foreign exchange reserves, especially at the early stages of the boom when it may prove to be transitory.
5. If the monetary regime is to be Inflation Targeting, consider using as the target, in place of the standard CPI, a price measure that puts greater weight on the export commodity, such as an index of export prices or producer prices.
6. Avoid excessive spending in boom times, allow deviations from a target surplus only in response to output gaps and long-lasting commodity price increases, as judged by independent panels of experts rather than politicians.
7. Commodity Funds should be transparent and professionally run, with rules to govern the payout rate and with the insulation of the managers from political pressure in their pursuit of the financial well being of the country.
8. When spending resource wealth, consider the lump-sum distribution on an equal per capita basis.
9. An external agent could be mandated to provide transparency and to freeze accounts in the event of a coup.

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