A Static CGE Model of the Mongolian Economy

RESEARCH PROPOSAL

Presented to

Partnership for Economic Policy (PEP)

By

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Mongolia

2014-05-28

SECTION A – For all projects

1. Abstract (100 to 250 words)

The abstract should state the main research question, the context and its relevance in terms of policy issues/needs in relation to PAGE thematic foci, complete with a brief description of the data that will be used.

The Mongolian economy is becoming increasingly dependent on the mining sector so that movements in the international price of mineral products could have disturbing effects on the well-being of the households. In this research, we would study these effects on the economy by developing a PEP standard static CGE model and come up with policy implications.

2. Main research questions and contributions

Explain the focus (or key questions) of your research and its policy relevance.

2.1. Explain why you think this is an interesting research question and what the potential value added of your work might be (knowledge gaps). You might want to explain whether or not this question has been addressed before in this context (including key references), and if so, what do you wish to achieve (in addition) by examining the question again?

In the current project, we would like to adopt the PEP-1-1 model for the Mongolian economy and study the short-run effects of mining shocks on the economy and well-being of various types of households who earn income in different labour markets and receive dividends and transfers.

Recently the Mongolian economy has experienced a remarkable cyclical volatility. Between 2010 and 2012, there was an economic boom due to high mineral prices and huge flow of FDI. Every Mongolian received lump-sum cash transfer of 500000 MNT for the government. In addition, every university student received 70000 MNT for every month. However, all these have stopped as the economy is currently experiencing an economic downturn due to low mineral prices and reduced flow of FDI. The government is struggling to meet its revenue task, unemployed workers in the mining sector are moving to other sectors and the balance of payment is about to experience a crisis.

In this project, we would like to analyse the impact of the shocks to the mining sector on the economy – growth, unemployment, the balance of payments, income distribution and poverty etc.

The shocks are unexpected changes in the international price of minerals such as copper and coal. This should shed a light on the actions can be taken by the government in terms of government spending depending on the magnitude of the shocks within its own ability and the legal framework. Basically we will consider both adverse and positive mineral price shocks in the following 3 cases.

1. Full stabilisation – i.e., given the current state of government debt and budget deficit, the relevant fiscal laws allow the government to adjust its spending with complete flexibility to mitigate the effect of shocks
2. Partial stabilisation – i.e., given the current state of government debt and budget deficit, the relevant fiscal laws allow the government adjusts its spending within certain limits
3. No stabilisation – i.e. the government is unable to respond to the shocks as the relevant laws do not allow – for example, the debt has reached its limit or the current deficit is already over the limit.

Regarding the relevant work, there are two recursive dynamic CGE models: the one is developed by Fisher et al., (2010) (a global model like GTAP model) and the other is developed by Galindev (2013) (a small open economy model). Both models operate on the GEMPACK programme developed by Centre of Policy Studies at Victoria University in Australia. The disadvantage of both models is that there are a representative household and only one-type of labour so that it does not take into account of the effect of any shocks on different labor markets and income distribution.

The following part contains the literature review concerning the effect of resource boom on the well-being of nations. There are many theoretical and empirical studies concerning the effect of natural resources on the economy. It is mainly about the curse and blessing of natural resources.

The curse of natural resources is a paradoxical issue that the resource-rich countries are those with poor economic development. How does an economy that is endowed with rich natural resources experience a lower rate of development, while others less rich show an accelerated rate of growth? From the economic point of view, the most popular explanation with greater empirical support is based on the Dutch disease - the experience of the Netherlands in the 1960s when the discovery of natural gas reserves in the North Sea led to both an expansion of the energy sector and a deindustrialization of the economy that ultimately led to a recession. It is expected that a positive shock in the natural resource sector of a country causes a reallocation of its productive factors, focusing on those economic activities that benefit from this shock and tending to a decrease in the industrial sector. At the same time, there would be a currency appreciation and a loss of international competitiveness.

Empirically, Rodriguez and Sachs (1999) and Sachs and Warner (2001) find the negative relationship between natural resource endowment and the rate of production growth. Collier and Goderis (2007) finds empirical evidence that a natural resource boom has positive effects on the level of production in the short term but has adverse effects in the long term by using cointegration

techniques with panel data. By using the VAR methodology, Hutchinson (1990) studies the cases of Norway, the United Kingdom and the Netherlands and concludes that there is a valid prediction of a contraction in the industrial sector in the short term, but in the long term there is no evidence that prolonged boom effects will have adverse effects on growth. Guidi (2009) uses a similar methodology for the study of the oil boom in the United Kingdom, identifying a positive relationship between increasing the oil prices and manufacturing and services output and a negative relationship regarding salaries in both sectors. Olusi and Olagunju (2005) applies the VAR methodology to the case of Nigeria, confirming the existence of the Dutch disease.

Other explanations of the natural resource curse are about misguided government policies to invest in specific sectors or projects and/or to protect and subsidise non-resource sectors that are weakened by the resources boom (Stevens, 2003). In the medium-term, subsidies that protect a sector against international competition or aim to make it competitive aggravate the problem because they reduce the incentive to remain competitive. Furthermore, the costs of such protection on other tradable sectors are well established (Gregory, 1976; Crowley and Martin, 1982; Parmenter, 1986; Centre for International Economics, 2003; Econtech, 2003; Productivity Commission, 2008). The cost of such protection eventually becomes financially unsustainable when the boom ends and a country's earnings from natural resources fall. There are many countries that applied failed protectionist strategies such as Bolivia, Guyana, Chile (for a time), as well as Zambia, Zaire, and Congo (Sarraf and Jiwanji, 2001). In many cases subsidies have also failed to meet their specific objectives – i.e., they were invested in other sectors. Examples of these misguided investments abound. According to Shaxson (2005), in sub-Saharan Africa the 1970s resources booms created big problems such as extravagance, waste and expansion of the state.

Theoretically, there are some contributions. The Dutch disease model include those of Corden (1984) and Stijns (2003). The models consider a small open economy that produces three types of goods: two tradable goods whose price is determined exogenously in the international market and a third non-tradable good whose price is determined by the domestic market through the balance between supply and domestic demand. A positive shock to the natural resources sector will have a negative effect on the tradable sector decreasing its competiveness. This effect is also observed in Fisher et al. (2010) and Galindev (2013) which are CGE models for the Mongolian economy.

There are some studies that discuss turning the curse into the blessing with the help of other factors – e.g., Bravo-Ortega and De Gregorio (2005), Gylfason (2001), Murshed (2004) and Stijns (2006). Bravo-Ortega and De Gregorio (2005) develop a theoretical model able to explain how a high level of human capital can reduce the effect of the natural resource curse and test this hypothesis by using data for several countries. Gylfason (2001) obtained similar evidence for a sample of countries and Stijns (2006) studies the link between natural resource abundance and human capital accumulation. Murshed (2004) studied the role of institutions in the natural resource curse, noting that different types of resource endowments (minerals, oil, coffee, cocoa, etc) have different effects on institutional quality. Mehlum, Moene and Torvik (2006) develop a theoretical model which

explains the influence of institutional quality on growth rates of an economy with an abundance of natural resources. According to this model, quality institutions can promote productive activities to the detriment of resource hoarding. Using data on institutional quality, they find that those countries with poor institutional quality are the most likely to suffer the natural resource curse.

A good way to see the positive impacts of mining sector growth on economic development is to look at case studies of countries that are considered as having benefited from natural resource abundance. Given that the focus of this impact assessment is on a developing country, it is worthwhile to consider the experiences of Botswana and Chile in managing the growth of the mining sector (e.g., Maehle 2012).

- Botswana has invested its mineral revenues wisely, mostly on education, health, roads and basic infrastructure, which has promoted growth and mitigated the effects of 'Dutch disease'.
- The cornerstone of Chile's fiscal policy framework is its structural balance rule (World Bank 2010). The rule serves to maintain fiscal discipline and insulate government expenditures from copper price fluctuations and business cycles. Independent panels of experts produce long-term estimates of the copper price and GDP trend to use in the calculation of the structural balance target for the budget, which is reviewed every year (Sinnott et al. 2010). Actual revenues above the structural revenues are saved into a Pension Reserve Fund and a Social and Economic Stabilisation Fund, the proceeds of which are wholly invested abroad in conservative and liquid assets. The rule enabled the government to avoid spending pressures during the mining boom when it ran large fiscal surpluses. In the mid-2000s, actual fiscal surpluses grew to 9 per cent of GDP while expenditures were kept at 1 per cent (World Bank 2010).
- A secondary factor that enabled Chile to benefit from natural resource abundance was successful trade diversification policies. Export diversification became part of an overall development strategy to promote several strategic sectors (such as forestry) for export markets, and private-public partnerships were promoted.

Mongolians have learned a lot about the experience of other countries. Our main concern is how to prevent from the curse of natural resources. Politicians have understood that the best way to reduce the effect of Dutch disease is to follow the good examples of Botswana, Chile and Norway and set up Fiscal Stabilization Fund and Sovereign Wealth Fund. The former was legalized in 2012 and the government budget has been conducted in accordance with the law since 2013. Galindev (2013) examines the effect of the law on the economy using a CGE model and finds that the volatility of the most variables are reduced due to the law. Although it is not legalized, the effect of a simple form of Sovereign Wealth Fund is simulated Fisher et al. (2010) and it is found that the fund would mitigate the effects of structural adjustment on the Mongolian economy due to the booming mining sector which would lead non-mining tradable sectors to weaken.

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2.2. Describe the specific policy issues/needs that your research aims to address; how your potential outcomes/findings may be used in policy making?

- Justify timing of your research in terms of policy and socioeconomic needs/context – e.g. reference to existing/planned/potential policies at the national level.
- Evidence of previous consultation with potential users (e.g. policymakers and key stakeholders) to help define your research question is strongly encouraged. Include a list of names, institutions and email addresses when possible.

Mongolia is a fast growing yet under developed country. For example, it grew at 17.3 percent in 2011, 12.5 percent in 2012 and expected to grow at around 13 percent in 2013. The consensus of IMF, World Bank and Oxford Economists on the Mongolian GDP growth is averaged at 9.5 percent until 2022. The impetus of such fast growth is the mining boom. This year, one of the biggest copper and gold mines in the world, Oyu Tolgoi, is up and running by Rio Tinto LLC which will produce almost a half of Mongolian GDP a year. (http://www.turquoisehill.com/s/Oyu_Tolgoi.asp) From next year, Tavan Tolgoi coal mine which is equally influential as Oyu Tolgoi is increasing its production up to 50 million tonnes of coal and export it to China. At the current price it means to bring 3 billion USD of export income to Mongolia which is about 70 percent of the government budget. (http://en.wikipedia.org/wiki/Tavan_Tolgoi)

Although it looks as if the economy will be growing fast, it is becoming increasingly dependent on the mining sector. Our recent history suggests that when the mining sector is so influential, short-run volatility in the prices of the mineral products can have a disturbing effect on the economy.

Under such volatile circumstances, the concept of inclusive growth is a natural phenomenon. There are many questions to ask. For instance, what will happen to income inequality? What will happen to the structure of the economy – i.e., the effects on the other industries such as agriculture, education and manufacturing etc.? What will happen to labour markets? What policy should we advise the policy makers to alleviate poverty and reduce income equality?

At the moment, the Mongolian economy is experiencing a downturn due to a low flow of FDI and low mineral prices. The government is negotiating with the parliament to increase the debt ceiling from 40 percent to 70 percent of GDP to fight a possible recession. But the opposition party in the parliament that it is too much debt. We have no idea how much people and businesses will suffer from this downturn. This indicates that policy makers should understand that such events are frequent and volatile and hence should be prepared. In other words, the government should create some flexibility in its actions – i.e., keeping the debt rate below the ceiling and budget deficit low and possibly negative. We hope that our results will provide a scientific ground to policy makers in their actions. Our findings will strengthen the importance of the fiscal stability law and reduce the incentive to overspend during good times.

Good policies need good analyses and findings to base on. To address the questions above, we need a concrete framework. By adopting the PEP-1-1 model with multiple households and different types of labor, we believe to provide such as a base. In other words, we will see the effect of the ups and downs in the mining sector on the other sectors, employment and income distribution. The results from the model will guide us on what to do to improve the well-being of the households. For example, it will tell us how much flexibility the government should have in terms of its revenue and expenditure to provide sustainable growth.

3. Methodology

Presentation of the specific techniques that will be used to answer the research questions and how exactly they will be used to do so. Explain whether you will use a particular technique normally used in other contexts or whether you intend to extend a particular method and how you will do so. Explain if these methods have already been used in the context you are interested in (including key references).

We would like to learn and apply the PEP standard single-country static CGE (PEP-1-1) model for the issues arising in the Mongolian economy, particularly the one we mention in the previous section.

As mentioned above, there are two CGE models for the Mongolian economy – Fisher et al., (2010)

and Galindev (2013). Both models have single households and one-type of labor so that they do not discuss issues regarding income distribution and poverty.

The advantage of the PEP-1-1 model over the other CGE models for the Mongolian economy is: 1) it has multiple households so that we are able to discuss the effects of shocks on income distribution and poverty, 2) there could be more than one type of labour – i.e., labour can be divided into different types so that labor market policies could be assessed.

To examine the effect of mining shocks on the economy, we will need to introduce a rule for the government expenditure into the model designed to stabilise the economy within the legal boundaries. There could be two extreme cases – full stabilisation (i.e., the law allows the government to borrow/save as much as needed) – no stabilisation (i.e., the law does not allow the government to borrow during bad times as one of the requirements has reached its limit such as the debt). Then there could be many intermediate cases with partial stabilisation. The results from simulating the model in these different scenarios will generate important policy implications.

4. Data requirements and sources

This is a critical part of the proposal. The key issue is to explain the reason for the use of the particular data. You must establish that they are ideal for the question you wish to address. Please consult the "**Guide for designing a research project proposals**" for more detail.

To run a CGE model, we need a Social Accounting Matrix (SAM) or an Input-Output (IO) table of an economy which provides the fundamental interactions of economic agents such industries, households, the government, investors and foreign sector. In Mongolia, the National Statistical Office (NSO) has compiled two IO tables since 2000: for the 2005 and 2010. Both IO tables have 55 industries - the intermediate consumption matrices are 55x55 for both domestic and imported sources and net-taxes matrices are also 55x55 for both domestic and imported sources.

We have the 2010 IO table compiled by the NSO which has the following structure.

		Users				
		Industries	Household	Investor	Government	Export
	Size	N	1	1	1	1
Domestic product	N	USE (Domestic flow, User)				
Imported product	N	USE (Imported flow, User)				
Domestic sales tax	N	Tax (Domestic sales tax, User)				
Import sales tax	N	Tax (Imported sales tax, User)				
Import tariff	N	Tariff (Imported)				
Labor	1	USE				
Capital	1	USE				
Production taxes	1	Taxes				

To apply the PEP-1-1 model for the Mongolian economy, we need to construct the SAM using available data from various sources.

There is no SAM for the Mongolian economy which is split in a way that we would like to use in the proposed study. So we have studied the possibility of converting the IO table into the SAM with multiple households and differentiated labour. We now understand that constructing a SAM is an important piece of work, on its own and it is the first attempt in Mongolia.

We find that the NSO conducts Household Socio-Economic Survey (HSES) every month and summarises the results annually. We have obtained 2010 HSES data based on over 12000 households which has the information that we can use to split households into different types. The information has income sources for each household and their consumption expenditure on different products.

Under the guideline of the resource person, we will focus on 2-3 types of households – rich and poor or rich, middle-income and poor. The split will be consistent with the findings by the NSO. It is worthwhile mentioning that Gerege Partners LLC is currently working on a project which examines the effect of inflation on households. This project involves HSES data so that we are gaining experience in processing the data. We hope that this will help us to process the database in constructing the SAM.

We have also learned that Labor Force Survey (LFS) is a part of HSES so that we can get the information on the labor market status of the same households – i.e., by industries, occupations and average salary. In terms of industries, they could be allocated into up to 55 industries. The occupational types can be up to 10. However, given the advice of the resource persons and other PEP annual conference participants, we will focus on 2-3 types of labor. Although the number of industries can be 55, we will focus on a smaller set of industries with separated mining industries which are aggregated in the current IO table.

To complete the SAM, we also need the government budget and balance of payments data. We have found out that such data is available for 2010.

To run simulation, we need to do a descriptive analysis on the prices of mineral products. This will give us an idea about the magnitude of the shocks.

We will also need to understand the Mongolian Fiscal Stability Law which together with the current status of the government debt and budget deficit will give us a range for the flexibility of the government policy in case of shocks.

5. Policy influence plan (or research communication strategy)

- Identify potential users of your research findings, including policymakers and other key stakeholders. Provide a list of institutions and, whenever possible, specific individuals to be targeted for effective policy influence. Please also indicate whether you have already made contacts within the institution

- How, in the elaboration and execution of your project (from design to dissemination), will you consult/communicate with these users to both gather their inputs and keep them informed of your project (expected contributions and uses), in order to increase chances of your findings to be taken-up into policymaking?

You can refer to **PEP's research communications strategy and guidance** to have a better idea of what is expected in terms of activities for policy outreach and dissemination.

Institution	Contact	Target
Ministry of Labor	No	Mr. Sanjmiyatav. Ya
Ministry of Finance	No	Mr. Gantsogt. Kh
Mongol Bank (the central bank)	No	Mr. Boldbaatar. D
Economic Research Institute (ERI)/ National University of Mongolia (NUM)	Yes	Dr. Batdelger. T

- Mr. Sanjmiyatav is the Labor Minister. Gerege Partners LLC has worked closely with the Institute of Labor Studies (ILS) at the Ministry of Labor. Mr. Chimeddorj, the director of ILS, is very keen to develop a CGE model at his institute and an approval from the ministry. He has agreed to link us with the minister as CGE modelling is already in their agenda.
- Mr. Boldbaatar is the director of Monetary Policy and Research Department at the central bank of Mongolia. He is a member of monetary policy committee. Every month, the monetary policy committee decides on the interest rate considering the economic conditions. For this decision, he needs information from different sources and needs to understand possible consequences of mining shocks. We target him as Dr. Batdelger, our team member, is also a non-staff member of the Monetary Policy committee.
- Mr. Gantsogt is the state secretary of the Ministry of Finance. We will make a contact with him and introduce him what we will be doing. As being educated in a western country, we hope that he will be interested in CGE modelling as our model will be the most relevant to the government financial planning conducted by this ministry.
- Dr. Batdelger is the head of department at NUM, the director of ERI and the member of the project team. He is currently the national advisor to the project implementing a DSGE model at the Central Bank.

In addition, both Gerege Partners LLC and ERI comment on the economic life in Mongolia via various channels of media and in workshops and conferences. We conduct economic analyses (a CGE model, an input-output analysis) and consult government organisations with different economic modelling.

6. List of team members

Indicating their age (or whether they are under 30), gender, as well as relevant/prior training and experience in the issues and research techniques involved (start with lead researcher).

Note that PEP favors gender-balanced teams, composed of one senior (or experienced) researcher supervising a group of junior researchers, including **at least 50% female researchers** contributing substantively to the research project. PEP also seeks gender

balance in team leaders and thus positively encourages female-led research teams. (Each listed member must post an up-to-date CV in their profile on the PEP website – refer to "**How to submit a proposal**")

Name	Age	Gender (M,F)	Training and experience
Ragchaasuren Galindev	38	M	PhD in economics from the University of Manchester, has been a lecturer in economics at Essex University and Queens University Belfast since 2003. He has published his research in peer-reviewed journals. He has been doing CGE modelling since 2010. He is a founding member of Gerege Partners LLC which is a consulting company founded in 2009. He is currently working on the project entitled "Labour Market Forecasting System in Mongolia" as a team leader.
Telmen Tur	40	F	BSc in mathematics from National University of Mongolia, BSc in financial economics from SAN university and post graduate diploma in accounting from National University of Mongolia. She has been as a senior analyst on many projects undertaken by Gerege Partners LLC since 2009. She is currently the financial director of the company.
Tsolmon Baatarzorig	22	F	Obtained her BSc in international economics from School of Economic Studies at the National University of Mongolia in 2013 and has worked for Gerege Partners LLC since August 2013. She is currently working on the project entitled "Labour Market Forecasting System in Mongolia" as an analyst. She is currently working on the HSES database to examine the effect of inflation on households.
Dr. Tuvshintugs Batdelger	39	M	PhD in economics from Boston University, professor of economics and head department of economics at National University of Mongolia, the director of Economic Research Institute, a non-staff member of Monetary Policy Committee. He has considerable experience in CGE modelling. He is currently working as a national advisor on a project implementing a DSGE model at the Central Bank.

7. Expected capacity building

Description of the research capacities that team members (and potentially their affiliated institutions) are expected to build through their participation in this project.

This is an important aspect in the evaluation of proposals and should be presented in some detail. What techniques, literature, theories, tools, etc. will the team and their institutions learn (acquire in practice) or deepen their knowledge of? How will these skills help team members in their career development? Also indicate which specific tasks each team member would carry out in executing the project.

Although both Gerege Partners LLC and ERI have developed CGE models, only a few of us have gained some experience. The proposed project will enable more researchers from both institutions as well those from other organisations such as the National University of Mongolia and Institute of Labor Studies and more to learn and deepen their knowledge of CGE modelling through workshops and seminars that will be organised by us.

Mongolia is a democratic country and its labor market is quite flexible so that experience and knowledge that the team members and other workshop participants will acquire will give them an advantage in the labor market and careers.

Name	Task
Dr. Galindev	Team leader, to improve his CGE modelling expertise, train workshop participants
Ms. Tur	Data analyst, to learn and become an expert on CGE modelling
Ms. Baatarzorig	Data analyst, to learn and become an expert on CGE modelling
Dr. Batdelger	Advisor, to improve his CGE modelling expertise, to train workshop participants
Other beneficiaries	
ERI researchers	Through discussions and training workshops organised by us, they will learn and improve their knowledge of CGE modelling and GAMS
NUM economists	Researchers at the National University of Mongolia will learn and improve their knowledge of CGE modelling through training workshops organised by us
ILS researchers	Researchers at the Institute of Labor Studies will be able to attend training workshops organised by us as they will be developing their CGE model in the future

8. List of past, current or pending projects in related areas involving team members
Name of funding institution, title of project, list of team members involved

Name of funding institution	Title of project	Team members involved
UNDP	Integrated Macroeconomic Modeling: T21 model for the Mongolian Economy	Dr. Galindev worked as a national consultant
National Development and Innovation Committee	The Effect of Tavan Tolgoi Coal Mine on the Mongolian	Dr. Galindev was the lead researcher

(currently the Ministry of Economic Development)	Economy: alternative scenarios (raw coal, washed coal, coke and liquid coal) in a multi-sector CGE model	
Oyu Tolgoi LLC, Rio Tinto LLC	"The Development of the Oyu Tolgoi Copper Mine: an assessment of the macroeconomic consequences for Mongolia"	Dr. Galindev as a national consultant (joint with Brain Fisher, Tuvshintugs Batdelger, Andrew Gurney, Michael Begg, Bat Buyantsogt, Esmedekh Lkhanaajav, Burmaa Chadraabal)
Institute of Labour Studies	"Labour Market Forecasting System in Mongolia"	Dr. Galindev and Ms. Tsolmon are currently working as key reseachers.
Economic Research Institute	"The effect of Chingis Bond on the Mongolian economy"	Dr. Batdelger
Economic Research Institute	"Mongolia's economic prospects and challenges"	Dr. Batdelger
Economic Research Institute	"National Development Policy and planning: a comparative analysis"	Dr. Batdelger

9. **Describe any ethical, social, gender or environmental issues or risks that should be noted in relation to your proposed research project.**

No such issues or risks.