Macroeconomic and Political Determinants of Resource Nationalism

Wenhua Li1 and Tsuyoshi Adachi2
1 Graduate school of Engineering Science, Akita University, Akita, Japan
2 Faculty of International Resource Sciences, Akita University, Akita, Japan

Abstract: Resource nationalism is essentially mandatory government intervention in natural resources businesses by political or economic means in order to benefit the nation and the people. It is attacking the mining industry more and more rampantly by all kinds of means since the twenty-first century. Poor countries who count on a resource-led economic growth usually find themselves trapped into “resource curse”. The harmfulness of resource nationalism for investors is that one event can quickly escalate and lead to a chain of events which make projects commercially unavailable. In spite of historical and theoretical social investigations in the causes of resource nationalism, rare studies engaged in quantification of dominant parameters of it. The objective of this study is to find significant factors that dominate the occurrence of resource nationalism for important metal and energy resources producing countries and quantify their marginal effects. The study applies binary choice logit model for panel data using pooled method. One feature of the research is that binary data set of occurrence of resource nationalism is sorted out by authors referencing U.S. Geological Survey’s reports. The results indicate that high-technology export (% manufactured export), ores and metals exports (% merchandise exports), rule of law (world governance indicator), trade (% GDP), and natural resource rent except forest (% GDP) dominant the occurrence of resource nationalism for high and upper middle income group countries; government effectiveness (world governance indicator), policy perception index (The Fraser Institute), high-technology export (% manufactured export), and mineral rent (% GDP) dominant the occurrence of resource nationalism for lower middle and low income countries. According to our model, probability of occurrence of resource nationalism in 90 countries are predicted. Top 10 risky countries in 2012 are estimated to be North Korea, India, Honduras, Indonesia, Kazakhstan, Burkina Faso, Mongolia, Cuba, Bolivia, and Peru. The study is a primary trial of researching on resource nationalism and provides some insights for theoretical building and simulation on the issue.

Keywords: resource nationalism, binary choice logit model, pooled panel, mining countries, metals, energy resources

1. Introduction

According to Click and Weiner (2010), resource nationalism refers to a phenomenon that state control or dominance of natural resources, and the resulting potential to use this power for political and economic purposes. According to Ernst & Young (2015), resource nationalism is ranked as the fourth risky factor for mining and metal’s business of the year. In the author’s opinion, resource nationalism is essentially mandatory government intervention in natural resources businesses by political or economic means in order to benefit the nation and the people. The super profit earned from mining sector is a double-edged sword. In addition to immediate boosts to economy, it fosters dependency on natural resources, discourages investments from moving toward diversified directions and therefore limits a nation’s long term development potential. Over time, those nature resources-led economies can become too fragile to volatile price of resources commodities and even go back to poverty when productions of resources suspend or deplete.

Resource nationalism is a result of multiple factors including economic status, political situations, and very specific local conditions. Despite numerous descriptive studies on the topic (Bremmer and Johnston 2009, Butler 2013, Cawood and Oshokoya 2012a, Cawood and Oshokoya 2012b, Childs 2016, Ghandi and Lin 2015, HM 2014, Humphreys 2012, Jasimuddin and Maniruzzaman 2016, Kohl and Farthing 2012, Mares 2011, Sarsenbayev 2011, Schurman 1998, Stefan 2015, Stevens 2008, Ward 2009), the common genesis and drivers of resource nationalism haven’t been quantified at global level. It probably attributes to the vague definition boundary of resource nationalism and lacked integrated data of it. In view of the academic gap between qualitative characterization and quantitative regression on the causes of resource nationalism, the study uses econometric regression to quantify probability of occurrence of resource nationalism by its dominant variables under binary choice logit modelling of panel data. We focus on analyzing impact of domestic economic situation, quality of governance, and policy perception toward resource sector, rather than geopolitical status and specific local conditions which cannot be measured and compared at global level. We are aimed at getting some insight into predicting and comparing the probability of occurrence of resource nationalism based on easily accessible indices.
2. Method

Three steps are implemented in this study. To start with, yearly data survey from 2000 to 2013 of total 83 natural resources producing countries including oil, coal, natural gas, and metal on occurrence of resource nationalism is conducted to generate binary data for modelling, among which countries occurred at least one time of resource nationalism in a specific year are recorded as 1 for the year, otherwise they are recorded as 0. Secondly, econometric modelling under binary choice logit regression of panel data is carried out to test the significance of variables that may play a role for the occurrence of resource nationalism and the magnitude of their marginal effects. Moreover, countries are divided into two groups according to their income levels in 2013 defined by the World Bank and modeled separately to capture respective significant factors. Finally, prediction of occurrence of resource nationalism for countries during the modeling period is achieved. Respective cut-off ratios (the cut-off probability between occurrence of resource nationalism and no occurrence of it) of the two groups’ models are selected according to their respective sensitivities and specificities, and probability of occurrence of resource nationalism at global level is unified by a cut-off of 50%. Because data used for modelling is an unbalanced panel set, some periods of probability prediction are dropped out. Thus, interpolations of missing data for variables by means or trend lines are adopted to achieve continuous prediction. In addition, for countries that are excluded in modelling process but important for some specific natural resources commodities, their probabilities of occurrence of resource nationalism are estimated by simply applying the modeled equation of their income group.

We conduct a data survey among countries which had at least 5% annual GDP from natural resources rents during 2000-2013. 83 countries are remained after screening. Natural resources rents are defined as the sum of rents gained from crude oil, coal (both soft and hard coal), natural gas, and minerals (a stock of minerals including tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate) productions in this study. Detailed definitions and statistics of oil, coal, natural gas, and mineral rents as a percentage of GDP are documented by the World Bank. Data survey’s starting year is based on our interest in the currently ongoing wave of unprecedentedly widely spread resource nationalism, and ending year is limited by data availability. Information of every country’s mining status is referred to the United States Geological Survey (USGS) Minerals Information: Minerals Yearbook Volume III--Area Reports: International, where government’s policies and programs, and structure of the mineral industry are documented and updated annually. To convert the event based date to binary panel data, countries that are caught by resource nationalism of any year are noted as “1” of the year regardless of times or types of resource nationalism; countries that are not attacked by resource nationalism of a year are noted as “0” of that year.

The basic model setting is static binary choice logit regression of panel data (N=83; T=14) by maximum likelihood method. The full data set are subdivided into “high and upper middle income group” (N=46, T=14) and “lower middle and low income group” (N=37, T=14), in order to span their respective significant factors. Because relatively well-off countries prefer to put natural resources into strategical and sustainably-developmental contexts over short term economic interests, while relatively poor countries are likely to think the opposite. Following steps summarize the simulation process. Firstly variables are tested for stationarity by a unit root test and a cointegration test, and for multicollinearity by covariance analysis. And then, they are modeled by pooled, fixed effects, and random effects methods to test the significance of variables. Through trial and error, significant variables are retained in the model while insignificant ones are removed. Best performed method among pooled, fixed effects, and random effects is selected by Likelihood-ratio test and Hausman test. Finally, Marginal effects of variables are estimated under the best method.

Using modeled parameters, predicting the latent variable \( E(y_{it}) \) which represents the probability of occurrence of resource nationalism for countries can be realized. There are two steps to achieve that. Firstly, cut-off ratios should be selected for both groups of modelling. The cut-off ratio represents threshold of occurrence of resource nationalism. The principal of selecting the cut-off in the study is maximizing the sensitivity of the model, and at the same time not severely damage model specificity. Sensitivity measures the ability to pick out countries occurred resource nationalism, and specificity measures the ability to classify countries without resource nationalism correctly. Because two groups have respective cut-off ratios (C), we adjust them to 50% by introducing transforming parameter b for both groups as displayed in the Equation 3-4. Secondly, because the data set is unbalanced, we have to do some simple estimation to complete probability prediction. Two types of estimations are carried out. One is to estimate missing data of independent variables. In that case, interpolation either by trend line or average are used. Another is to estimate countries that are not included in the modelling process. In that case, we apply raw data (independent variables) of the countries to the modeled equations to calculate their probability of occurrence of resource nationalism.

\[
\begin{align}
    b &= -\ln\left(\frac{1}{e} \right) - 1 \\
    \text{Prob}(y_{it} = 1) &= \frac{1}{1 + e^{(-b \cdot y_{it})}}
\end{align}
\]  

3. Results and Discussion

For the high and upper middle income group, high-technology export as a percentage of manufactured export (HTEX), ores and metals exports as a percentage of merchandise exports (MEX), rule of law from world governance indicator (RoL), trade as a percentage of GDP represented trade openness (TOP), natural resource rent except forest rent as a percentage of GDP (RRT) and its square (SQRT) are found to be significant. Pooled method corrected by panel-robust standard error performs the best, therefore it is selected to be the right one. Moreover, HTEX and SQRT are stationary at level, others are stationary after first difference. Since the result of panel cointegration test provided evidence of long term stable proportional
relationship among variables, data at level are directly applied to regression. There is no strong correlation between variables as well, so multicollinearity is not considered to be a problem. For the lower middle and low income group, government effectiveness from world governance indicator (GE), policy perception index from The Fraser Institute (PPI), high-technology export as a percentage of manufactured export (HTEX), and the first difference of mineral rent as a percentage of GDP represented changes of mineral rent (CMRT) are detected to be significant. Pooled model is also related about likeliness. In high density, the resource nationalism of the group.

Therefore, higher HTEX makes less resource nationalism in lower middle and low income countries. Quantitatively, 1% increase in HTEX is expected to increase the probability of occurrence of resource nationalism by 0.335% in high and upper middle income countries, and decrease the probability of it by 0.776% in lower middle and low income countries. The more profits that natural resources bring about, the greedier the governments get, and thus the higher probability of occurrence of resource nationalism there will be. In high and upper middle income countries, we found that MEX and RRT are positively correlated with occurrence of resource nationalism as expected. The marginal effect of MEX is 0.211. While the marginal effect of RRT negatively correlates with RRT itself, it slightly declines from 0.865 to 0.836 when RRT increases (Figure 1). It is because that all of the surveyed high and upper middle income countries with over 30% of RRT are oil and natural gas producing countries; their energy resources sectors have already been highly nationalized during the last wave of resource nationalism. Therefore, their appeals of resource nationalism are relatively weak. Even so, RRT is still the most sensitive factor for probability of occurrence of resource nationalism in high and upper middle income countries. In lower middle and low income countries, instead of concrete magnitude of contributions of resources sectors to states’ economy, changes of contributions of mineral rents to states’ GDP (CMRT) are proved to be significantly negatively correlated with occurrence of resource nationalism. It indicates that resource nationalism in those countries is sensitive to fluctuations of the sector. As long as the mineral sector keeps on dragging a state’s GDP, the state is reluctant to make trouble. In addition, the reason that CMRT rather than CRRT dominants in resource nationalism policy making is that most surveyed lower middle and low income countries are mineral producing countries with little energy resources. Marginal effect of CMRT (-15.84) is the highest for lower middle and low income countries according to our regression results. It is the source of high volatility of probability of occurrence of resource nationalism of the group.

### Table 1. Modelling result for high and upper middle income group.

| Var.  | Scale | Coef. | Std. Err. | P>|z| | dy/dx | Std. Err. | P>|z| |
|-------|-------|-------|-----------|------|-------|-----------|------|
| HTEX  | [0,1] | 4.651 | 1.619     | 0.004 | 0.335 | 0.127     | 0.008 |
| MEX   | [0,1] | 2.935 | 0.936     | 0.002 | 0.211 | 0.072     | 0.003 |
| RoL   | [-0.5,0.5] | -2.788 | 1.181 | 0.018 | -0.201 | 0.088 | 0.022 |
| RRT   | [0,1] | 12.02 | 3.725     | 0.001 | 0.865 | 0.279     | 0.002 |
| SQRRT | [0,1] | -0.198 | 7.869 | 0.012 | -0.014 | 0.578 | 0.014 |
| TOP   | [0,1] | -1.297 | 0.622 | 0.037 | -0.093 | 0.047 | 0.045 |
| _cons |       | -3.355 | 0.598 | 0.000 |       |       |       |

### Table 2. Modelling result for lower middle and low income group.

| Var.  | Scale | Coef. | Std. Err. | P>|z| | dy/dx | Std. Err. | P>|z| |
|-------|-------|-------|-----------|------|-------|-----------|------|
| CMRT  | [-0.5,0.5] | -122.9 | 60.42 | 0.042 | -15.84 | 6.840 | 0.021 |
| GE    | [-0.5,0.5] | 11.07 | 4.967 | 0.026 | 1.426 | 0.557 | 0.010 |
| HTEX  | [0,1] | -6.018 | 2.088 | 0.004 | -0.776 | 0.235 | 0.001 |
| PPI   | [0,1] | -8.245 | 2.269 | 0.000 | -1.063 | 0.214 | 0.000 |
| _cons |       | 2.856 | 1.175 | 0.015 |       |       |       |
Besides economic factors, governance of a state and a government’s attitude toward the resource sector play roles as well. For high and upper middle income countries, Rule of Law is proved to be significantly negatively correlated with occurrence of resource nationalism. That is to say, the higher the credibility of compliance with established rules the country is, the less probability of occurrence of resource nationalism it will be. For lower middle and low income countries, we find that Government Effectiveness is significantly positively correlated with occurrence of resource nationalism. Because improving public and civil services needs financial supports from governments’ revenues. Effective functioning of governments might be largely at the expense of interference of the industry including mining. In addition, the marginal effect of GE (1.426) is almost 7 times higher than that of RoL (-0.211) in absolute value. It partially indicates that occurrence of resource nationalism is more sensitive to governance situations in lower middle and low income countries than in high and upper middle income ones.

![Figure 1. Marginal effect of RRT to probability of occurrence of resource nationalism.](image)

In addition, Policy Perception Index is proved to be negatively correlated with occurrence of resource nationalism in lower middle and low income countries. Namely, governments who welcome private capital investments are less likely to impose resource nationalism at the same time. It indicates that varied attitudes toward mining investors or governments’ acceptance to capital liberalization play a significant role in resource nationalism policy making in relatively low income countries. Specifically, 1% increase in PPI can decrease probability of occurrence of resource nationalism by 1.063%. In high and upper middle income states, governments attitude to investors largely depend on their trade openness. Countries are extremely reluctant to damage their established business value chain if they are highly relying on trade. It is proved by our model that TOP is significantly negatively correlated with occurrence of resource nationalism, although the marginal effect of TOP (0.093) is relatively small.

Cut-off ratio is found to be 9.39% for high and upper middle income group. The model for the group can correctly pick out 73% of countries imposed resource nationalism, and specify 69% of safe countries. The general correct classification rate is 69.5%. Cut-off ratio is found to be 25.50% for lower middle and low income group. The model for the group can correctly pick out 77% of countries imposed resource nationalism, and specify 76% of safe countries. The general correct classification rate is 76%. From this respect, the model for lower middle and low income group performs better.

After adjusting the cut-off ratio to 50% at global level, we are able to predict the probability of occurrence of resource nationalism by country and commodity. 90 countries’ probability of occurrence of resource nationalism are predicted including the estimated ones. 65 countries out of 90 are countries included in modelling stage limited by data availability. Rest 24 countries are predicted by applying the modelled equations. Probability of resource nationalism in North Korea is set to be 100% due to its self-isolated communism regime. Example of predicted probability of occurrence of resource nationalism in year 2012 is presented in Figures 2 and 3. From the figure, the average probability of occurrence of resource nationalism is generally higher than the level of 2012 for low risk countries but lower for high risk countries. It indicates a polarization trend of risk of resource nationalism. Namely, risky countries tend to be more risky and safe countries tend to be safer. Moreover, in general the volatility of probability of occurrence of resource nationalism shows positive correlation with the probability of occurrence of resource nationalism. It means that countries have high probability of occurrence of resource nationalism are likely to face high volatile resource nationalism policies. In all, countries passed the threshold (50%) have almost doubled from 18 countries in 2003 to 34 countries in 2012. It indicates the increased risk of resource nationalism globally.

### 4. Conclusions

A large number of social science reports were unable to summarize the common genesis of resource nationalism and form theoretical framework on the subject. The author built a binary choice logit model to achieve quantitative analysis of the impact factors of resource nationalism. The study selected 83 natural resources producing states as subject, investigated into their resource related policies during 2000-2013 and transformed these policies into binary data panel, subdivided these countries into two groups according to income level, and then modelled them respectively. Regression results indicate that High-technology export (% manufactured export), ores and metals exports (% merchandise exports), rule of law (world governance indicator), trade (% GDP), and natural resource rent except forest (% GDP) are significant for high and upper middle income group countries; government effectiveness (world governance indicator), policy perception index (The Fraser Institute), high-technology export (% manufactured export), and change of mineral rent (% GDP) are significant for lower middle and low income countries. The study is the first step from qualitative description to quantitative estimation on causes of resource nationalism. It can support primary evaluation of resource nationalism for countries and provide some insights into theoretical analysis of the issue.
Figure 2. Probability of occurrence of resource nationalism occurrence for countries have more than 40% probability in 2012. *note: numbers ‘1, 2, 3’ that follows the country’s name represent estimation methods; ‘1’ represents estimation of missing data of independent variables; ‘2’ represents estimation for countries excluded in modelling stage; ‘3’ represents special treatment to North Korea.

Figure 3. Probability of occurrence of resource nationalism occurrence for countries have less than 40% probability in 2012. *note: numbers ‘1, 2, 3’ that follows the country’s name represent estimation methods; ‘1’ represents estimation of missing data of independent variables; ‘2’ represents estimation for countries excluded in modelling stage.
References


Ernst & Young, 2015. Business risks facing mining and metals 2015-2016. Ernst & Young research.


HM, 2014. Resource nationalism a horizon scanning research paper by the resources demand and supply resource nationalism community of interest. HM Government Horizon Scanning Programme.


