Price or politics? An investigation of the causes of expropriation*

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Expropriations of foreign direct investment in developing countries are typically blamed on political and economic crises in those countries. Developing a new database of expropriations in the minerals sectors of developing country exporters, I show that expropriations were correlated with mineral price booms and that democratic governments were more likely to expropriate. No link is found between expropriations and political or economic crises, except at independence. A better explanation of expropriation would be opportunistic behaviour by host governments when profits of investments are high. In two developed countries, Australia and Canada, expropriations are also found to occur during price booms.

Key words: expropriation, foreign direct investment, natural resources.

1. Introduction

Between 1967 and 1974, governments in many major copper-exporting developing economies wholly or partially nationalised the foreign-owned copper mines in their countries. These countries included Chile, Peru, Zaire and Zambia. A similar wave of expropriations occurred among the major bauxite-exporting developing countries during 1974 and 1975, including the Dominican Republic, Guinea, Guyana, Jamaica and Suriname. Since the 1980s, there has been no act of expropriation among the same copper and bauxite exporters.

Expropriation here means any act by which a government seizes a greater share of an investment project than it was entitled to under the contract with the foreign investor. The meaning of expropriation will be expanded upon below.

What caused these sudden episodes of expropriation? Why were expropriations occurring in different countries at the same time? And why did these expropriations stop occurring? This article provides evidence that these expropriations were caused by the high real prices of copper and bauxite and that real output prices are a strong predictor of expropriation across the minerals sectors in both developing and developed countries.

Before the late 1960s, real prices of minerals had been on a downward trend for nearly a century. The downward trend had created an environment of pessimism around the production of minerals in developing countries, well illustrated in the words of H. W. Singer (1950, p. 577) at the American Economics Association meeting in 1950:

> It is a matter of historical fact that ever since the seventies [1870s] the trend of prices has been heavily against sellers of food and raw materials in favour of sellers of manufactured articles.

This environment dramatically changed during the mineral price booms of the late 1960s and early-mid-1970s. Price booms created an expectation of higher future prices and imminent worldwide shortages. Paul Ehrlich's *Population Bomb* appeared in 1968 and forecasted food riots in the United States by the 1980s. The Club of Rome published *Limits to Growth* in 1972 forecasting mineral shortages in the near future.

In the new environment of high and (predicted) rising prices, investment contracts based on export taxes appeared to developing countries as very bad deals, since investment profits rose to a much greater extent than did export tax revenues. Developing countries remedied this situation by expropriating existing investment and by switching to contracts based on profit-sharing. Prain (1975) estimated that copper exports in which the governments held any equity comprised only 2.5 per cent of world exports in 1960, but by 1970 this share rose to 43 per cent. By 1970, Prain (1975, p. 223) notes:

> [m]ore than a quarter of the world's copper was being produced by mines totally owned by the government, 12 per cent by companies in which the government had a majority interest, and 5 per cent in which the government had minority interests.

The international environment underwent another change at the end of the 1970s. The minerals sectors entered a price slump that lasted throughout the 1980s and 1990s with a few exceptions. The expected high prices and worldwide shortages never eventuated. In these decades, there was no incentive to expropriate for host countries as mine profitability was low.

2. Definition of expropriation

In this article expropriation is defined as any act by which a country gains a greater share in the output of an investment than it was entitled to under the original contract between the foreign investor and the country's government.

Expropriation includes:

- seizure of capital, including mining equipment, reserves of the mine, or mining rights (a complete seizure of domestic assets of the foreign company is known as 'nationalisation')

- compelled sale of mining company shares to the government or domestic nationals; or
- raising taxes on company revenues or profits

where this act was not a part of the original agreement between the foreign investor and the government. To qualify as expropriation, the tax increases in the third form of expropriation must be aimed at the investment, rather than economy-wide increases.

It is difficult to determine which of these forms of expropriation is more common and how large the total level of expropriations has been, as existing data on expropriations of foreign direct investment is incomplete. Williams (1975) compiled data on nationalisations of foreign investment, only a subset of all expropriations. For the period 1956–1972, Williams found that the value of assets seized by developing country governments was US$10 billion (in 1972 values) or nearly 25 per cent of the total stock of foreign direct investment at the end of 1972. The level of total expropriations would obviously be a higher percentage of total foreign investment.

3. Three models of expropriation

This section presents three competing models of expropriation. From these models a regression model is developed to test the predictions of each.

3.1 The contract model of expropriation

Models of foreign direct investment (FDI) in the economics published works that have considered the possibility of expropriation tend to fall into two camps. The incentive-compatible contract papers such as Atkeson (1991), Thomas and Worrall (1994), and more recently Schnitzer (1999, 2002) develop contracts which are expropriation-proof. The random expropriation papers such as Eaton and Gersovitz (1984), Cole and English (1991), Raff (1992) and Veugelers (1993) consider equilibria in which expropriation occurs with a positive probability. The model of Cole and English will be used here.

Cole and English (1991) developed a model of expropriation of FDI in a country that is subject to stochastic shocks to production. Using the Cole and English notation but replacing their stochastic variable z_t with the output price of the FDI, P_t, the production function in per capita terms of an FDI in a host country is:

$$y_t = P_t f(k_t) \tag{1}$$

where y_t and k_t are the per capita level of output and capital in the FDI. Assuming that host countries maximise the present value of expected utility, Cole and English modelled host country's expropriation decisions as trading off the present value of extra revenues gained today and in the future from

expropriation to the loss of future reinvestment and so productivity, assuming that foreign investors would not reinvest after expropriation.

Cole and English (1991) then defined the expropriation set which is the set of values for P_t for which the expected present value of expropriation exceeds the expected present value of not expropriating the FDI. Assuming a case of a constant relative risk aversion utility, where the utility of present consumption, c_t, is:

$$u(c_t) = \frac{c_t^{1-\gamma} - 1}{1 - \gamma} \tag{2}$$

Cole and English showed that there are three cases for the expropriation set, corresponding to whether the risk aversion parameter, γ, is greater than one, less than one, or equal to one.

In the case where γ is less than one, the host country will expropriate when output prices are high. They call this the 'opportunistic' explanation of expropriation. This was also the prediction of the model in Section VI of Eaton and Gersovitz (1984) and in Raff (1992). In the case where γ is greater than one, the host country will expropriate when output prices are low. Cole and English (1991) call this the 'desperation' explanation of expropriation. In the case where γ is equal to one, utility is logarithmic, and expropriation either always occurs or never occurs. The third case is not considered as expropriation of FDI and seems to occur only occasionally.

Probabilistic interpretations of the two cases in Cole and English (1991; 'the contract model') are as follows: (i) opportunistic explanation: the probability of an expropriation increases in years in which the real price of the output mineral is high ('boom years'); or (ii) desperation explanation: the probability of expropriation increases in years in which the real price of the output mineral is low ('bust years').

3.2 The political revolution model of expropriation

This model of expropriation states that expropriations follow on from and are a result of political revolutions in a country, typically a former colony. Kobrin (1980, p. 74) labelled these expropriations 'mass expropriations' and described them as 'typically associated with sweeping and violent upheavals, which transformed the basic governmental structure and political-economic ideologies of the nation involved.'

Typically, the political upheavals that led to this change in the balance of power between the colony and its master were radical, and it was these changes that were widely believed to be the principal cause of expropriation. A survey of executives of 233 US companies in the 1970s gave the most commonly cited explanation for government expropriation to be, from Basche (1979, p. 8), '[p]olitical change involving not only a change of political leaders and

government personnel – but also, more fundamentally, a change in political and social ideology.'

If this explanation were the true model of expropriations, one would expect that expropriations occur at the same time or shortly after radical changes in political and social structures in a developing country. In probabilistic terms this model yields the hypothesis that the probability of expropriation increases if there was a political crisis involving a large change in the political structure of that country in that year.

3.3 The political risk model of expropriation

Published work exists, mainly within business school journals, which seeks to explain expropriatory actions by governments on the basis of the macroeconomic and political environments in those countries. This theory draws from both politics and international business and attempts to calculate what it terms 'political risk' to international business. A review of this published work is contained in Kobrin (1979).

In the political risk published work, expropriatory behaviour is driven by political pressure on the domestic country government. However, the political risk model proceeds further than the political revolution by investigating the forces behind political pressures to expropriate.

The explanation behind this model is that under criticism from either opposing political forces, the media and/or popular forces, host governments expropriate foreign investments. An expropriation could have a symbolic value, using foreign investors as a scapegoat for domestic troubles, or an expropriation might have a real effect, by raising government tax revenues or reducing the balance of payments.

One such source of political pressure might be poor economic performance within the domestic economy. Another source of political pressure might be the balance of payments. In probabilistic terms this model yields the hypotheses that: (i) the probability of expropriation increases if domestic real gross domestic product (GDP) growth was low that year; and (ii) the probability of expropriation increases/decreases if the domestic balance of payments as a percentage of GDP was worse that year.

3.4 Review of the empirical published work

The empirical published work on expropriation of foreign investment is not well integrated into the theoretical published work. This failure stems from the fact that the empirical published work comes out of work in the political revolution and political risk areas that have no formal model at their foundations. The existing empirical published work is then a set of regressions where the choice of variables included is based on whether a plausible argument can be made that the variables might be expected to influence expropriations.

The political revolution model of expropriation has not been truly tested. However, Jones (1980) found some support for a relationship between domestic unrest and expropriation, whereas Jodice (1980) did not. The political risk model has been directly tested with Knudsen (1974), Jones (1984), and Picht and Stüven (1991) finding a negative correlation between real GDP growth and the probability of expropriation. However, Jodice (1980) and Picht and Stüven (1991) draw opposing signs for estimates of the relationship between balance of payments difficulties and expropriations. The results of the current published work, on the whole, have been weak.

4. The data and the regression model

In order to test these three models of expropriation, a database of government expropriations for seven major minerals from 1960 to 2002 was constructed. This database is available on the author's website. The minerals selected were bauxite, copper, lead, nickel, silver, tin and zinc. These minerals were selected because they are important minerals for developing countries' export revenues and for developed countries' industry.

The countries in the sample are the eight largest developing country exporters for the period 1965–1975 for each of these minerals. (Former) Communist countries were excluded as these countries were not sufficiently linked to the world mineral markets over this period.

Any seizure of assets, demand for equity stake or increase in taxes by the host government that was not a condition of the original contract was considered to be an expropriation. Information on host government activities in the minerals sector was gained from various issues of *US Bureau of Mines Minerals Yearbook*. An observation in this database is whether an expropriation took place in a foreign-financed project for that mineral, in that country, in that year.

Out of the total of 2408 observations of commodity–country–years, there were only 50 cases of expropriation. Out of these 50 cases, 20 were acts of seizure of company assets, 12 were uncontracted increases in the equity share held by the host government, and 18 were uncontracted increases in taxes on the mining companies. Two events that were government-mandated increases in workers' wages were classified as tax increases, as these effectively raised company costs much as a new tax. Separate regressions were run for each form of expropriation, but the results were not qualitatively different, so only the pooled regressions are presented. Of the 27 countries included in the database, expropriations occurred at least once in 18 of the countries.

Table 1 sets out these acts of expropriation by mineral and by decade, as well as average real prices of the seven minerals. Real prices of minerals were obtained from the United States Geological Survey 'Historical Statistics' website. These real mineral prices were then normalised to have a mean of one over the period 1960–2002. All subsequent references to 'price' are the normalised real price.

For the purposes of testing the contract model, a definition of boom years and bust years is needed – years when a real mineral price was significantly

Table 1 Number of expropriations in selected country/industries by mineral and by decade (number of expropriations)

Mineral	1960–1969	1970–1979	1980–1989	1990–2002	All years
Bauxite	1	15	0	0	16
Copper	5	6	0	0	11
Lead	1	1	0	0	2
Nickel	0	0	1	0	1
Silver	1	2	0	0	3
Tin	2	11	0	0	13
Zinc	2	2	0	0	4
All minerals	12	37	1	0	50
Ave. minerals price	1.03	1.32	1.09	0.67	1

above or significantly below its long-term average price. None of the empirical results depended on the critical value chosen, so values 66 per cent and 150 per cent of the long-term average price were arbitrarily used as the definition of bust and boom years.

Three different measures of 'political crisis' were constructed. Out of the 27 developing countries in the database, 15 became independent after 1955. A dummy variable called 'Newly Independent' is used to indicate whether that country became independent recently. Often, gaining independence can be a lengthy process, so an immediate correlation between independence and expropriation might not be expected. In this dataset, the largest level of economic and statistical significance was found to be within 5 years of gaining independence.

A second measure of political crisis is a large change in the institutions of the country. A dummy variable called 'Constitutional Crisis' is used to indicate that change. The data on constitutional crises is derived from the Polity IV database described in Marshall and Jaggers (2001).

The Polity IV database contains indices for the level of democracy and autocracy of the political institutions for each country–year. A combined measure for each country–year is derived by subtracting the autocracy score from the democracy score to generate a scale of −10 (least democratic) to 10 (most democratic) for the country's institutions in that year. This index is labelled 'Democracy'. The Democracy index coverage does not include the countries of New Caledonia and Suriname, and nor does it include countries in years in which those countries were colonies. A constitutional crisis in any country–year is indicated by a change in this combined index of three points or more from that of the previous year, according to Marshall and Jaggers (2001). Smaller thresholds for crises and lagged crises were examined, but did not significantly affect the analysis.

A third measure of political crisis is whether there was a change in the chief executive in that country in that year. A dummy variable called 'Change in Government' is used to indicate a change in the chief executive. Data on changes in executives was obtained from Beck *et al*. (2001) and from Banks *et al*. (2003) to narrow the change down to a particular year.

Table 2 Sample statistics

		Overall			Between-country	No. of
	Mean	SD	Min.	Max.	SD	observations
Expropriation	0.021	0.14	0	1	0.03	2408
Constitutional crisis	0.12	0.32	0	1	0.09	2211
Change in government	0.17	0.38	0	1	0.1	2408
Growth of real GDP	3.65	5.56	−48.8	67.9	2.01	2292
Balance of payments	−3.26	5.74	−37.1	37.6	3.48	1977
Democracy index	−0.63	6.79	−9	10	5.08	2104

SD, standard deviation; GDP, gross domestic product.

Macroeconomic data on the real growth of GDP and the balance of payments as a percentage of GDP are taken from the United Nations Statistics Division (2005) 'National Accounts' website and from the International Monetary Fund's (various years) *International Financial Statistics*, respectively. Growth of real GDP is reported as percentages. The balance of payments is normalised by presenting it as a percentage of nominal GDP. Sample statistics for the data are set out in Table 2.

A regression model can be based around the three models of expropriation. The contract model would suggest that expropriation occurs when the real output price of the project either is greater than or less than some critical value, D, which includes any punishment imposed on the country due to the expropriation.

Assume this equation is a linear function of price, an expropriation is observed in industry j and country i in year t if and only if

$$\alpha_{ijt} + \beta_{ijt} p_{jt} > D_{ijt} \tag{3}$$

where β_{ijt} will be positive in the opportunistic explanation of expropriation and negative in the desperation explanation. To increase the power of the regressions, it is further assumed that the α_{ijt}'s and β_{ijt}'s are the same across countries and industries and time.

D_{ijt} includes variables that could otherwise influence expropriation, such as the growth rate of real GDP or the occurrence of political crises. Suppose one can linearise D, so that

$$D_{ijt} = \gamma \delta_{ijt}. \tag{4}$$

Then expropriation is observed when

$$\alpha + \beta p_{ijt} - \gamma \delta_{ijt} + \varepsilon_{ijt} > 0 \tag{5}$$

where ε_{ijt} is assumed to have a normal distribution with mean zero and variance one. It is this equation that is estimated here using probit analysis. This is called the 'Expropriation Equation'.

5. Results

5.1 Evidence from summary statistics

Table 3 presents some sample statistics of the expropriation variable. Using the definition of boom year discussed in the previous section, the contract model predicts that the conditional probability of expropriation in a boom year is higher than the conditional probability of expropriation in a non-boom year. Only lead and zinc do not follow this pattern.

From all seven minerals a clear pattern arises. Although boom years constituted only 7 per cent of the total years observed, 34 per cent of the expropriations occurred in these years. Overall, a default was seven times more likely to occur in a boom year than it was in a non-boom year. An F-test that the probabilities of expropriation are the same inside a boom year as a non-boom year gives a test statistic of $F(1, 2406) = 58.8$. This hypothesis that there is no relationship between minerals price booms and expropriation is rejected at far below the 1 per cent confidence level. The dataset sample statistics do support the opportunistic interpretation of expropriation.

The desperation explanation suggested that there might be a link between low prices for minerals and expropriations. For various measures of a 'bust' year at 50 per cent, 66 per cent or 75 per cent of average real prices, the probability of expropriation is far lower for bust years than for non-bust years. The desperation interpretation of expropriation is not pursued any further, as the dataset does not support it.

If the political revolution model were correct, the probability of expropriation should be higher in years of political crisis. No statistically significant effect was found within 1 or 3 years after independence; however, the probability of expropriation is statistically different at the 1 per cent level within 5 years of gaining independence, with a test statistic of $F(1, 2406) = 12.9$. For a constitutional change and a change in executive government, the probability of expropriation coinciding with years of crisis is not statistically significant at any level, with test statistics of $F(1, 2046) = 0.04$ and 0.34, respectively. This finding is robust for several different time lags.

Table 3 Probability of an act of expropriation in selected country/industries by mineral (percentage of observations in which an expropriation occurred)

	Unconditional	In boom year	Not in boom year
Bauxite	4.7	50.0	3.6
Copper	3.2	25.0	2.1
Lead	0.6	0.0	0.6
Nickel	0.3	6.3	0.0
Silver	0.9	2.5	0.7
Tin	3.8	14.5	2.0
Zinc	1.2	0.0	1.3
All minerals	2.1	10.1	1.5

5.2 Results from probit regressions

Tables 4 and 5 present the results of probit regressions on the Expropriation Equation set up in section 4. The dependent variable is the incidence of expropriation in a particular mineral, country and year.

Table 4 tests whether the results are robust to panel data correction methods. The first column of Table 4 presents the results for a standard probit regression. Panel data corrections for probit models are problematic. No consistent fixed-effects probit estimation method exists (see Baltagi 1995, p. 181), so country-specific effects are corrected in the second regression in Table 4 through including a dummy variable for each country individually. The third column presents the results from a random-effects probit regression.

The results of the regressions for price booms are robust across the panel data corrections. No correlation is found between years of constitutional change or of executive change and expropriation, whereas there is some evidence of a positive effect between gaining independence within 5 years and expropriation. If the individual features of each country are corrected with a dummy variable as in Regression 2, the Newly Independent variable is found to be statistically insignificant, whereas a positive and statistically significant effect is found for the Balance of Payments. Because of the problems with the fixed-effects estimation and with interpretation of the random-effects model, Regression 1 is chosen as the reference model, but the Balance of Payments

Table 4 Results of the probit regressions for the expropriation equation (dependent variable is the probability of expropriation)

Regression:	(1) Standard probit	(2) Unconditional fixed effects panel probit	(3) Random effects panel probit
Price boom dummy	0.992***	1.18***	1.09***
	(0.165)	(0.199)	(0.184)
Newly independent	0.94***	0.389	0.626*
	(0.252)	(0.357)	(0.32)
Constitutional crisis	0.067	0.033	0.072
	(0.249)	(0.274)	(0.262)
Change in government	−0.066	−0.002	−0.022
	(0.201)	(0.229)	(0.217)
Growth of real GDP	−0.004	0.012	0.004
	(0.012)	(0.017)	(0.014)
Balance of payments	0.008	0.027**	0.018
	(0.011)	(0.013)	(0.013)
Constant	−2.25	–	−2.4
Observations	1906	1115	1906
Groups	–	14	24
Pseudo R^2	0.114	0.199	–
Log likelihood	−168.7	−135.5	−161

Note: ***, **, and * denote statistical significance at the 1, 5, and 10 per cent levels, respectively. Standard errors are in parentheses.

Table 5 Probit model with interaction of real price and democracy variables (dependent variable is the probability of expropriation)

Regression:	(4) Standard probit	(5) Standard probit	(6) Standard probit
Price boom	0.99***	1.07***	1.00***
	(0.19)	(0.20)	−0.27
Decade: 1960s or 1970s	1.68***	1.74***	1.42***
	(0.37)	(0.41)	(0.45)
Newly independent	0.45	0.46*	–
	(0.27)	(0.27)	
Balance of payments	0.011	0.01	0
	(0.012)	(0.013)	(0.036)
Democracy	0.048***	–	–
	(0.01)		
Democracy and price	–	0.039***	0.033*
Interaction		(0.01)	(0.017)
Constant	−3.52	−3.58	−3.31
Observations	1895	1892	1075
Pseudo R2	0.246	0.253	0.18
Log likelihood	−137.5	−136.1	−68.2

Note: ***, **, and * denote statistical significance at the 1, 5, and 10 per cent levels, respectively. Standard errors are in parentheses.

variable is retained as it does have explanatory power in one form of the regression.

One potential problem with the Newly Independent variable is that 11 of the countries in the sample became independent in the 1960s and 1970s, and so the issue of independence may become confused with worldwide factors special to those decades. To try to capture the effects of worldwide factors in the 1960s and 1970s, I introduce a dummy for those decades.

Table 5 explores the form of Regression 1 with several variants. Regression 4 in Table 5 introduces decade dummies for the 1960s and 1970s and tests for the effect of democracy. An interaction variable between real minerals price and the level of democracy of a country is used in Regression 5. In Regression 6, the dataset is restricted to only those countries that were independent before World War II, in order to determine whether the price boom effect is unrelated to questions of independence.

The coefficient of price booms and the decade effect of the 1960s and 1970s are positive, statistically significant and robust across the specifications. Adding the democracy variables reduced the explanatory power of the independence variable. Achieving independence up to 5 years prior did have a positive effect, but it was only statistically significant at the 10 per cent level once the interaction effects of democracy are taken into account and was not significant if the democracy variable is included. The coefficient of the balance of payments does not have a statistically significant effect across any of the variants. The coefficient of democracy and the coefficient of interaction of democracy and real price are positive and statistically significant at the 1 per cent level. All of

the results are robust to the restricted dataset of those countries that were independent before World War II.

5.3 The significance of price and contract form

The probit regressions explored the relationship between the output price of a foreign direct investment and the behaviour of the developing country government in which the investment operates. This revealed a strong positive relationship between the price and the probability of expropriation by the government. As the period of the 1960s and the 1970s saw many more price booms than the period of the 1980s and 1990s, this can partly explain why there were so many more expropriations during the early period. The lone recorded expropriation in the 1980s and 1990s occurred in the nickel sector in the Dominican Republic in 1987–1988 when the real price of nickel almost tripled the previous year's average.

There is strong support for the opportunistic explanation of expropriation in this dataset. Comparing the predicted probabilities of expropriation from Regression 5 in Table 6, price booms had a large effect on the probability of expropriation in the early period and a lesser impact in the later period. There has also been a distinct change in the behaviour of developing country governments from the early period, as revealed by the large and significant coefficients on the decade dummy. Even taking into account the lower prices in the late period, governments are now less likely to expropriate than in the early period.

Given a tendency to expropriate in times of high prices or profitability, the most stable form of FDI contract may then be a pure 'resource rent tax' contract similar to that proposed by Garnaut and Clunies Ross (1975). Under this contract government tax revenues are derived solely from a profits tax where the rate of tax of profits may even be progressive in the level of profits. By granting a large portion of the revenue stream of the project to the government in the good states, this contract lessens the incentive to expropriate. The cost is that the developing country government bears a large part of the price and output risk of the contract, which the government may have problems hedging against.

Extreme cases of these new contracts are the 'service contracts' some mineral companies have signed with developing countries. Under these contracts, mining companies explore, develop and even produce from an ore body for a flat fee from the host government. The host government owns all the capital in the project and bears all of the price and output risk of the project. These projects bear no risk of expropriation.

5.4 The significance of politics and political crises

The political revolution model of expropriation is strongly rejected by these data, except to the extent that gaining independence is found to have had a

Table 6 Predicted probability of expropriation using the estimated coefficients from the expropriation model (predicted probability in per cent)

Using the estimated coefficients from Regression (1)

Price boom	Newly independent	
	No	Yes
No	1.2	9.5
Yes	10.4	37.5

Using the estimated coefficients from Regression (5)

	Not newly independent					
	Decade: 1960s and 1970s			Decade: 1980s, 1990s and 2000–2002		
	Democracy index			Democracy index		
Price boom	−10	0	10	−10	0	10
No	1.3	3.3	7.4	0.0	0.0	0.1
Yes	6.1	22.1	50.4	0.1	0.6	4.2
	Newly independent					
	Decade: 1960s and 1970s			Decade: 1980s, 1990s and 2000–2002		
	Democracy index			Democracy index		
Price boom	−10	0	10	−10	0	10
No	3.8	8.4	16.1	0.0	0.1	0.3
Yes	13.8	37.8	68.1	0.2	2.0	10.2

Note: All other variables held at their period averages. Assumed value of real price during boom years is 2 and during non-boom years is 1.

significant effect. Expropriations do not necessarily coincide with or follow from significant political changes or from periods of internal war or civil strife. Political language of 'sovereignty' and 'revolution' may thus just be cover for actions motivated by more mundane considerations.

The results of the regressions in Table 4 suggested that the fact of gaining independence was a significant contributor to expropriation. However, in Table 5, once account is taken of the worldwide factors in the 1960s and 1970s and account is taken of the contribution of democracy to expropriation, the economic and statistical significance of independence falls away.

The importance of the democratic nature of the country's institutions stands in stark contrast to the irrelevance of constitutional crises within those institutions. The more democratic the institutions of the country, the more likely it was to expropriate, as shown in Table 6. Table 5 suggests that this relationship between expropriations and democracy comes through the interaction between price and democracy. The more democratic the political institutions of the host country are, the more sensitive to price is the decision to expropriate.

Yet the data on political change did not reveal any link between change in executive and expropriation, thus expropriation is not caused by turnover of political power. This fact supports the idea that it is the higher potential for turnover among political interest groups in a democracy that leads to a higher discount rate among those groups and thus leads to a higher tendency to expropriate in those countries, rather than the actual turnovers of power.

A different explanation might be that contained in Tornell and Lane (1999). One interpretation of their model is that interest groups take turns ruling a country. These interest groups all derive benefits from a common resource, but the party in power has the option of taking the whole resource for itself. If the interest group currently in power does not trust future interest groups not to expropriate when they come into power, the current interest group will expropriate now rather than wait and let a future interest group expropriate. Democracies, in this case, would be very prone to have governments that expropriate.

These results indicate a negative relationship between political freedom and security of property rights, at least for foreign investors. Barro and Lee (1994) found a positive relationship between political freedom and growth of real GDP for a group of 116 countries from 1965 to 1985. The traditional explanation for this result would be that democracy restricts the actions of government and thus promotes property rights. Bohn and Deacon (2000) used this argument when they discovered that democracy and aggregate investment were positively correlated. However, the results in this article suggest that political freedom and property rights may not be positively related. Democracy may lead to less stable property rights, particularly for foreign investors.

5.5 The (in)significance of macroeconomic factors

The macroeconomic variables from the political risk model appear to have little predictive power in this dataset. Neither real GDP growth nor balance of payments have a statistically significant relationship to expropriation at even the 10 per cent level of confidence, except in the problematic fixed effect probit regression in Table 4. There is no support for the political risk model of expropriation in this dataset.

6. Are developed countries immune to this pressure?

No features of the contract or political risk models are predicated on the host country being a developing economy. The political pressures that were mentioned as a possible explanation for expropriations are not particular to developing countries alone. In fact, the democratic nature of political institutions in most developed countries may make them more prone to expropriation if the link between democracy and expropriation uncovered in the previous section is correct.

However, past empirical studies, including all of the articles summarised in section 3, consider only expropriations that occurred in developing countries. Is this focus justified?

Australia and Canada are two developed economies that are also large minerals exporters. Searching through various issues of the *Minerals Yearbook* in the same seven minerals extraction sectors as were examined in the developing economies, 11 acts of expropriation either by state or federal governments in Australia and Canada were found between 1960 and 1996.

The conditional probability of expropriation given a boom year is 9.3 per cent, whereas it is 1.33 per cent given a non-boom year. An *F*-test for the equality of the probabilities of expropriation for boom years and non-boom years is $F_{1,592} = 16.0$ and so rejected at 1 per cent significance. Australia and Canada were more likely to expropriate the value of foreign direct investments during periods of high real prices for the output of the projects. This suggests that developed countries do not behave very differently from developing countries in this respect.

An interesting point to note is the role that the federal structure of the Australian and Canadian constitutions may have played in the expropriations. Of the 11 expropriations reported, four were by state or provincial governments. In one case, that of the Canadian copper industry, the Canadian federal government reacted to a rise in provincial taxes by introducing a limited federal tax write-off of provincial taxes.

The federal nature of the Australian and Canadian constitutions grants much wider powers to state governments than does a constitution styled on that of the United States. These broader powers of taxation mean that in the Australian and Canadian cases, there are two independent governments that can expropriate the value of the same foreign investment. The foreign investment is then a common resource of the two governments, which may lead to the same 'voracity' effect as was described in the previous section.

7. Conclusion

Some answers for the questions posed in the introduction can now be provided. The waves of expropriations seen in the developed world in the 1960s and 1970s were a result of the high real prices for the minerals at the time, as well as, to some extent, the wave of independence across developing countries. The combination of high real prices and the low profit-sharing of the contracts at the time gave the host governments large incentives to expropriate. Developed countries are no different from developing countries in this regard, as Australia and Canada had a similar history of expropriation during times of high prices.

The standard explanation for expropriation – that of political or economic crises within the host country – is incorrect for expropriations within the minerals sector. However, politics is an important explanatory factor in expropriation as democracies were observed to be far more prone to expropriation than dictatorships.

Facing uncertainty over future minerals prices, the best defence for foreign investors against expropriation is to maintain a large domestic ownership/profit share in the project. Such contracts lessen the gap between the value of a firm in expropriation and the tax revenues of the domestic government from the project, and thus the temptation to expropriate.

Returning to an era of depressed mineral prices and little expectation of future price rises in the 1980s and 1990s, the decisions by those developing countries that expropriated in the past now look terrible. Contracts based on profit-sharing in an era of low profits generated little tax revenue, and nationally owned mines did not generate revenues needed for reinvestment.

This new depressed environment has generated a relatively recent response by developing countries to divest themselves of minerals assets. The question remains, however, about the behaviour of developing country governments if the world moves into another period of rising mineral prices in the future. The recent shift to democratic political institutions in many developing countries may cause problems in the future if mineral prices begin to rise.

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