

Investment and Expropriation under Oligarchy and Democracy in a Heckscher-Ohlin World

Facundo Albornoz

University of Birmingham

Sebastian Galiani

Washington University in St. Louis

Daniel Heymann

CEPAL and University of Buenos Aires

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Abstract

We study the incentives to expropriate foreign capital under democracy and oligarchy. We model a two-sector small open economy where foreign investment triggers Stolper-Samuelson effects through reducing exporting costs. We show how incentives to expropriate depend on the distributional effects of the investment and on how these affect the interests of the group in power. How investment affects the incomes of the different groups in society depends on the sectors where these investments are undertaken and the structural features of the economy such as factor intensity. We characterize expropriation equilibria and show that if investment is undertaken in the sector that uses labor less intensively, democracies are generally more prone to expropriate. This result provides one possible rationalization for the wave of expropriations in Latin America under governments with a broad popular base during the 20th Century.

Keywords: expropriation; political regimes; democracy; oligarchy; foreign investments; Stolper-Samuelson.

JEL Classification: D72; D74; H71; O15; P16.

1 Introduction

There is an established consensus in the profession that attracting foreign direct investment (FDI) is a catalyst for economic development. Despite this consensus, FDI in developing economies were historically the subject of strong disagreements regarding the incentives leading to their realization, their interactions with the local political processes and their outcomes in terms of income distribution in the receiving economies. Among other determinants, the possibility of expropriation is a key variable to be considered by investors willing to invest abroad. This is especially true because international contracts are difficult to enforce and, therefore, FDI is particularly subject to expropriation risks (see Eaton and Gersovitz (1983)). Unfortunately, the literature on property rights and political regimes offers no definitive answers. While Olson (1993) and North and Weingast (1989) highlight that democratic institutions reduce the expropriation risk of investment,¹ Acemoglu (Forthcoming) emphasizes instead that the investments of the elites might be more secure under oligarchic rule than under democratic governance. Following this line of reasoning, if FDI benefits the economic interests of those elites it might be more secure in an oligarchic society than in a democratic one. We contribute to this debate by exploring how the distributional effects of foreign investment determine the incentives to expropriate foreign investment under different political organizations such as democracy and oligarchy. We model the economic and political aspects of foreign investments and show that the incentives to expropriate under Democracy or Oligarchy depends on how foreign investment affects the payoffs of the different members of society and how these groups are represented by the political organization of the country.

A clear example of the connection between the distributional effects of foreign investment and the propensities to expropriate under different political regimes is offered by the wave of FDI in railroads that took place throughout the world, and particularly in Latin America, in the late 19th and early 20th centuries.² The local political arenas were the scenes of heated exchanges of

¹Jensen (2006) argues that this logic might also apply to the case of FDI.

²See among others, Summerhill (2006), Cortés Conde (1979) and Coatsworth (1979), for

opinions between, on one side, those who considered such activities as necessary inputs for economic progress that would benefit all social groups and, on the other extreme, those who viewed them as an element of an undesirable collusion between foreign investors and domestic elites against the interests of the rest of the population. Moreover, foreign investment in transport and food conservation technologies has been identified as a cause of the rise of Latin American inequality during the 19th century (Donghi, 1993; Coatsworth, 2005).

In Argentina, in the first part of the 20th century, for example, an observable feature was that support for railroad companies came from conservative segments, with interests linked to export activities, with opposition from groups closer to import-competing sectors, including urban industrial workers. In fact, critical views of the role of railroad companies not only pointed to monopolistic behavior with effects discussed throughout various activities, or to their political influence, but also stressed specifically the disincentives that it imposed for sectors exposed to foreign competition.³ Those debates ultimately led to measures of nationalization by the broadly supported democratic government of Juan Peron in 1948. Indeed, nationalizations and reversals of FDI occurred in Latin America in connection with the emergence of regimes with broad popular support, replacing previous governments strongly influenced by agricultural elites.⁴

economic histories of these processes. Between 1870 and 1930, the length of railway tracks in service in Latin America went from practically zero to approximately 150000 kilometers; see Sanz Fernandez (1998).

³In words of Scalabrini Ortiz, a leading nationalist Argentinean intellectual: “In any case, the important thing about railroad tariffs is not so much to moderate the excessive profits of the companies, but to prevent them from utilizing those tariffs as an instrument of discrimination, harmful to the economy of the country.... British railroads did not suffocate agriculture, because obtaining foodstuffs and raw materials is one of England’s anxious wishes, but they did annihilate the industries and manufactures that could compete with English products...” (Scalabrini Ortiz, 1940, p. 54).

⁴This is observed in Colombia (1963), Mexico (1970) or Costa Rica (1972) where railways run either by North-American or British companies have been nationalized in 1963, 1970 and 1972 respectively. In other regions however, expropriation has been undertaken by non-democratic governments like in the case of the Kingdom of Morocco in 1963 or Tunisia in 1965, where French and Spanish companies were nationalized.

Our analysis builds on the traditional observation that governments typically express objectives biased towards the interests of certain social groups (see, for example, Acemoglu, Johnson, and Robinson (2005)). In this line, we derive different government strategies vis-a vis foreign investment taking into account the consequences of alternative policies on the incomes of the owners of different factors of production, land and labor in this case. Our analysis suggests that expropriation may be related to specific structural characteristics of the economies and not to general behavioral traits of oligarchic or democratic regimes.

We model the conflicting distributional impacts of investments such as railroads on the incomes of social groups in the context of a two-sector small open economy that gives rise to Stolper-Samuelson effects.⁵ Both goods are internationally tradable, and are produced with land and labor. Landowners constitute the economic elite, holding the political power in oligarchic societies. Workers are the majority of the population and therefore exert their influence under democracy. Though producers are price takers in the world markets of both goods, the net price faced by suppliers of the exportable good is decreasing in transport costs, since the international price is received FOB, at the port. We assume that the ad-valorem transport cost of shipping the exportable good can be reduced through investments in infrastructure which, for historical reasons, we associate with building railroads (the analysis would clearly apply also to other investments in infrastructure with effects on the profitability of the exportable sector). We focus on situations where the domestic economy is unable to undertake such investments and therefore railway construction requires the intervention of foreign investors. With their high fixed costs and values of sunk capital, railways required large initial outlays. Therefore, the decision to construct and to operate a railroad meant that investors entertained the expectations of large and long-lived flows of revenues.⁶

We also assume that the exportable good is land intensive and the im-

⁵An alternative channel through which FDI may generate inequalities and therefore different attitudes toward expropriation is the skill upgrading associated with foreign affiliate activities. See, for example, Blonigen and Slaughter (2001).

⁶See Summerhill (2006).

portable good is labor intensive. Thus, as shown by Stolper and Samuelson (1941), a reduction in the cost of transporting the exportable good benefits owners of land and harms workers. This result is consistent with Latin American historiography which claims that investments that raised profits in export sectors are at the origin of Latin American inequality. According to Coatsworth (2005), the effect of concentration of land ownership in Latin America on the concentration of wealth and income was limited until the installation of railroads and the use of newly developed refrigeration techniques enhanced the opportunities for profitable land exploitation and raised land values.

In our model, the redistributive effect of the railway (triggered by the Stolper-Samuelson effects) differentiates the interests of landlords and workers. This allows us to derive the treatment of property rights under different institutional arrangements, without assuming that a simple relation exists between the type of political regime and its incentives to expropriate. We consider different political organizations: oligarchies represent the interests of landowners and democracies those of workers. The objectives of the corresponding authorities are described simply as the maximization of the market real incomes of the preferred groups. The economy has an investment opportunity consisting of a fixed- scale project, capable of supplying current and future transport services with no operational expenditures. The world interest rate determines the opportunity cost of funds for the prospective investors. Without the railroad, the transportation of the agricultural, exportable good implies a cost equivalent to the loss of a certain amount of the product. Thus, domestic sellers of the good receive a price equal to the international price less the transport cost. If the project is completed, net revenues for the agricultural producers would be given by the international price less the unit fees charged by the railroad. Given factor mobility, an increase in the net price of the exportable good induces reallocations which unambiguously raise land rents and reduce wages. The fee that the railroad obtains for its freight services determines the magnitude of the Stolper-Samuelson effect on factor incomes and, naturally, also the revenues of the investor/operator.

A first issue regards the incentives for expropriation perceived by a democracy and an oligarchy when the contractual price of the transport service has already been fixed. In order to study this question we characterize the decisions of the agents (foreign investors and the government) with the transport price as a parameter. Thus, we can find the configurations (realized investment without expropriation, investment with expropriation and no investment) that emerge for different values of the transport fee. This leads to an analytically simple comparison of the incentives to expropriate under each regime. In the argument, an oligarchy would find it expropriation convenient when railway tariffs are high (thus generating a strong conflict of interest between the local landlord elite and the railroad enterprise), while the opposite holds for a democracy (those incentives would be symmetrically different if the ex-portable goods transported by the railroad were labor intensive). The model suggests that the range of transport prices that induces expropriation is larger for democratic than for oligarchic governments. However, this does not imply that democracies are necessarily more prone to expropriate than oligarchies. In this context, the answer would depend on the type of investment, on structural features like the factor intensities of activities that make use of the services and the prices charged for those services. This result is consistent with Bohn and Deacon (2000) who find that the relationship between investment and expropriation risk depends on the type of resource involved in the foreign investment.

The model also shows that expropriation might be induced by foreign investors. If oligarchies are in power, high transport prices provide incentives for expropriation, while increasing the expected revenues associated with the investment. This induces a trade-off from the point of view of the investors. We then study if, supposing that foreign investors have full bargaining power to determine the contractual price of the service, they may choose a price high enough that it would induce expropriation by an oligarchy. We find that conditional on structural features of the economy (like the elasticity of land rents to product prices) it would be possible to reach an equilibrium where unsafe investment is a consequence of a tariff negotiation between the investor and

the government, even in situations where the foreign investor is able to set the tariff unilaterally. The attraction of high present revenues may make unsafe investment preferred by the foreign investor to a state with lower current prices which would make a future landlord government unwilling to expropriate (see related evidence in Haber, Razo, and Maurer (2003)). This result casts doubts on the commonsensical prescription according to which expropriation-free environments are always needed for foreign investment to occur.

2 The Model

2.1 The Economic Structure

We consider an infinite horizon economy where a continuum of individuals on the $[0, 1]$ interval is divided between a proportion $L > \frac{1}{2}$ of workers and a fraction $1 - L$ of landowners. In each period, every worker is endowed with one unit of labor, so that the total supply of labor in the economy is L . Similarly, each landowner is endowed with one unit of land, corresponding to total stock $T = 1 - L$.

The economy produces two tradable goods using labor and land, with different factor intensities. We denote the land intensive good by X and the labor intensive good by S . We assume that the economy is relatively abundant in land. This implies that the economy is a net exporter of X .

Producers solve:

$$\max_{L_X, T_X} z A_X T_X^{1-\gamma_X} L_X^{\gamma_X} - w L_X - r T_X$$

and

$$\max_{L_S, T_S} p_S A_S T_S^{1-\gamma_S} L_S^{\gamma_S} - w L_S - r T_S$$

where w and r are wages and rents, which are equalized between sectors due to perfect factor mobility. A_X and A_S represent total factor productivities in each sector. The output elasticity with respect to labor is denoted γ_X in

sector X and γ_S in sector S ; z and p_S are the net prices faced by the producers of good X and S , respectively. Price p_S is determined in the international market; the net price z results from the world price of good X , p_X , together with the transport costs faced by producers, which depend on the existence of the railroad and the tariff that it charges.

The railroad lowers the transport cost of shipping good X , but has no direct effect on good S .⁷ The unit cost per unit of X of the existing alternative method of transportation is α . We assume that the transport capacity (measured in terms of the maximum amount of good X that can be transported at zero cost) is proportional to the magnitude of sunk investments in the service, denoted by K (good X serving as numeraire); the constant of proportionality, κ , which indicates the capital stock required to transport a flow equal to a unit of goods, would depend on the physical features of the economy, in addition to technological and relative price parameters which are left implicit. Clearly, a larger κ means that the project is more expensive. The railroad charges a price φ per unit of good transported. Therefore, if p_X is the world price of good X , and assuming that the demand for transportation does not exceed capacity, the net price received by the producers of the good X would be:

$$z = \begin{cases} p_X(1 - \varphi) & \text{if } \textit{railway} \\ p_X(1 - \alpha) & \text{if } \textit{no investment} \end{cases}$$

2.2 The Effect of the Railway

Clearly, landowners would be interested in the railway if and only if the shipping cost is lower than using the alternative transport method ($\varphi < \alpha$), so that the investment leads to an increase in z . Let $\hat{z} > 0$ be the proportional change in the net price change for a given international price due to the existence of the railroad. Equilibrium, zero-profit, conditions in industries S and X imply that⁸:

⁷In fact, the railroad would, if anything, reduce the domestic price of S , which would reinforce the effects on production and wages/rents.

⁸To facilitate the exposition, we treat the changes as if they were of infinitesimal magnitudes, and proceed to use linear approximations.

$$\begin{aligned}\widehat{z} &= \gamma_X \widehat{w} + (1 - \gamma_X) \widehat{r}; \\ 0 &= \gamma_S \widehat{w} + (1 - \gamma_S) \widehat{r}.\end{aligned}$$

Rearranging terms we obtain:

$$\widehat{w}/\widehat{z} \equiv (1 - \gamma_S)/(\gamma_X - \gamma_S) \equiv \widehat{\gamma}_1 \quad (1)$$

$$\widehat{r}/\widehat{z} \equiv \gamma_S/(\gamma_S - \gamma_X) = \widehat{\gamma}_2 \quad (2)$$

It is clear that, if as assumed $\gamma_S > \gamma_X$, then $\widehat{\gamma}_1 < 0$ and $\widehat{\gamma}_2 > 1$. Therefore, an increase in z induces an unambiguous (in terms of both goods) fall in real wages, and an equally unambiguous rise in the real value of land rents. This is the well-known Stolper-Samuelson result.

We use equations (1) and (2) to determine the payoffs of workers and landlords after the railway is in place. First, we note that:

$$\widehat{z} = \frac{z(ARW) - z(BRW)}{z(BRW)} = \frac{\alpha - \varphi}{1 - \alpha}.$$

Let $w(BRW)$ and $w(ARW)$ be the wage rates before and after the railway is set-up, where $w(ARW) = w(BRW) + \Delta w$. Define $r(BRW)$ and $r(ARW)$ in a similar way. The variations in payoffs levels are:

$$\begin{aligned}\Delta w &= \widehat{\gamma}_1 \frac{\alpha - \varphi}{1 - \alpha} w(BRW) \\ \Delta r &= \widehat{\gamma}_2 \frac{\alpha - \varphi}{1 - \alpha} r(BRW),\end{aligned}$$

which imply

$$w(ARW) = \left[1 - |\hat{\gamma}_1| \frac{\alpha - \varphi}{1 - \alpha} \right] w(BRW) \quad (3)$$

$$r(ARW) = \left[1 + \hat{\gamma}_2 \frac{\alpha - \varphi}{1 - \alpha} \right] r(BRW). \quad (4)$$

Equations (3) and (4) indicate the effects of the railroad on factor prices. Here, $w(ARW) < w(BRW)$ and $r(ARW) > r(BRW)$; the opposite would be the case if the sector mainly served by the railroad was relatively labor intensive. Investments in infrastructure can clearly induce conflicts of interests between different factors, depending on the economic structure and the nature of the capital which is to be put in place.

3 Investment and Expropriation

We assume that the economy lacks the capital and technical resources required to undertake the necessary investments to build the railway, and that some sort of foreign knowledge is required to operate the project initially. This rules out the possibility of financing the investments with international loans, and identifies the project with an FDI enterprise. Building and starting the operation of the railway requires the involvement of a foreign investor who provides both the capital and technical knowledge. This fits well the case of British railway investment in countries like Mexico and Argentina, and that of US railway investments in Brazil.

By assumption, the railroad has no explicit operational costs. The investment is made instantaneously; when it has taken place, the railway company sets a price of transport services, which must satisfy the participation constraints of the government (since this must authorize the investment) and the foreign investor. Once the railroad is in place, and after it has operated for one period at the price established initially, the government decides whether to expropriate or not. We consider two political regimes, which determine different possible objectives for the authorities. In the oligarchy, the government

represents the interests of the landowners and, therefore, behaves in a way that maximizes their payoff. In a democracy, the government represents the median voter, a worker by assumption, and therefore, seeks to maximize the payoff of workers..

We treat the government as one player and the foreign investor as another player in a dynamic game. The government has the faculty to negotiate with the foreign investor the installation of the railway and later decide whether to expropriate it or not. We focus on Markov Perfect Equilibria where each optimal strategy derives from payoff-relevant states, characterized by the expropriation costs.⁹

If the government decides to expropriate, the economy incurs a loss denoted μ and assumed to be equally distributed among all the residents.¹⁰ The cost of expropriation depends on the state of nature (S_t^s). This captures the idea that large-scale political decisions of the sort require particular conditions regarding, for example, the coherence of attitudes and the relative strengths of the parties involved.¹¹ We model this by considering two states: if $S_t^s = B$, then $\mu = \infty$ and expropriation is not possible; if, on the other hand, $S_t^s = G$, then $\mu < \infty$ and the government might be willing to pay the cost of expropriation. The probability that the social state is G (B) is denoted by ψ ($1 - \psi$).

The sequence of events within each period is as follows:

1. The price of the freight service is determined at a given, exogenous, level.

⁹We consider that Markov games are the natural way to model the decisions to expropriate and investment in the shadow of expropriation. We have also studied the main questions of this paper using a two-period model which is available upon request.

¹⁰We assume the country suffers as a whole the consequences of expropriation since it might be difficult to impose targeted reprisals against some individuals. This avoids potential problems with free-riding behavior as discussed by Acemoglu and Robinson (2006) in the case of the cost of revolution.

¹¹There are alternative reasons to adopt this type of representation as, for example, the "obsolescing bargain" hypothesis. As suggested by Kindeleberger (1969) and emphasized by Vernon (1971), the faculty to impose domestic conditions on existing foreign investment increases over time. In the limit, the host government can renege on initial agreements (as tariffs) and seize the control of the investment. In our setting, such situation occurs, not gradually, but after some finite time has passed.

2. In the initial period, the foreign investor decides whether to invest K units of resources in the project. If the decision is not to invest the investor gets the returns given by the world interest rate, consumption takes place and the period ends.
3. The state S_t^s is revealed.
4. The local government, whether democratic or oligarchic, decides whether to expropriate or not. Expropriation is not reversible.
5. Production, consumption, trade take place.
6. Steps 3 to 5 are repeated with infinite horizon.

The implication of this timing structure is that the investment decision will take into account the possibility of expropriation in order to calculate the continuation values associated with each strategy.

3.1 Expropriation

We first consider the incentives for expropriation perceived by an oligarchy and a democracy when the contractual price of the transport service has already been fixed. We assume that any renegotiation of the contract entails a fixed cost for the government, so that in fact its choice variable is whether to expropriate or not.

In a second step we analyze the incentives to invest and we determine the relevant range of prices that generate the different types of equilibria of the dynamic game: investment with no expected expropriation, expropriable investment and no investment. Here, for simplicity, we treat the price of the service as an exogenous parameter and model the behavior of the agents as a function of that parameter.

3.1.1 Expropriation under Oligarchy

Let $r(E)$ be the land rent after expropriation. Clearly, if the oligarchic government decides to expropriate, the market incomes of its constituents are maximized by setting the price of the service at zero: $\varphi = 0$. Using equation (4), we then obtain:

$$r(E) = (1 + \widehat{\gamma}_2 \frac{\alpha}{1 - \alpha})r(BRW).$$

We can now compute the continuation values (discounted expected net present values) for the elite in both cases: expropriation (E) and non-expropriation (NE).

$$W^E(NE) = \frac{r(ARW)}{1 - \beta} \quad (5)$$

$$W^E(E) = \frac{\psi}{1 - (1 - \psi)\beta} \left[\frac{r(E)}{1 - \beta} + \frac{r(ARW)(1 - \psi)}{\psi} - \mu \right] \quad (6)$$

where β is the discount factor.

We implicitly make some assumptions that need clarification. First, φ remains, for the time being, exogenously given. Second, the railroad does not deteriorate over time and therefore its cost-reducing effect is permanent. We also assume that the railway functioning is independent on who is running it. This implies that, once in place, the railway may be run by foreign investors, democratic or autocratic governments without any additional cost. Finally, we rule out the possibility of new foreign investments after expropriation.

Under oligarchy, expropriation takes place if $W^E(E) > W^E(NE)$. Using equations (5) and (6), this condition implies

$$\frac{r(E)}{1 - \beta} - \mu \geq \frac{r(ARW)}{1 - \beta}$$

This is an intuitive condition. The oligarchic government will choose expropriation if the state of the world allows it if and only if the difference between the present value of the (infinite) flow of rents at zero transport cost exceeds

the value of rents at the given transport price by more than the current costs that expropriation imposes on landlords.

After rearranging, the condition becomes:

$$\frac{\varphi r(BRW)\hat{\gamma}_2}{(1-\beta)(1-\alpha)} \geq \mu.$$

This is the expropriation constraint that can be easily expressed in terms of φ as follows:

$$\varphi > \frac{\mu(1-\beta)(1-\alpha)}{r(BRW)\hat{\gamma}_2} \equiv \varphi_{1A} \quad (7)$$

In the case of $\varphi > \varphi_{1A}$, expropriation gains for the elite are large enough so that the oligarchic government would rather incur the cost μ and take over the railway.

3.1.2 Expropriation under Democracy

The democratic government will act in order to maximize the welfare of workers. When no expropriation takes place, the continuation value for workers is given by:

$$W^w(NE) = \frac{w(ARW)}{1-\beta}$$

Democratic expropriation may potentially take different forms in order to benefit workers. We consider the case in which expropriation implies eliminating the service that the investment provides to export activities, which would make wages increase to the pre-investment level. That is, the Stolper-Samuelson effects of the railroad would be entirely reversed by expropriation. We also assume that there is no market for expropriated capital.¹² This assumption makes the incentive for expropriation rely exclusively on the factor-price effects and rules out other reasons for expropriation, and other uses of the resources

¹²We discuss below how redistributing some of the expropriated capital would reinforce our results.

It is straightforward to show that the expected utility of the government (that is, for the representative worker) after expropriation is:

$$V^w(G) = \frac{w(BRW)}{1 - \beta} - \mu \quad (8)$$

On the other hand, the expected value for the workers associated with non-expropriation is:

$$V^w(B) = w(ARW) + \beta W^w(E) \quad (9)$$

where $W^w(E) = \psi V^w(G) + (1 - \psi)V^w(B)$ is the continuation value associated with the expropriation strategy. After using equations (8) and (9), $W^w(E)$ becomes:

$$W^w(E) = \frac{\psi}{1 - (1 - \psi)\beta} \left[\frac{w(BRW)}{1 - \beta} + \frac{(1 - \psi)w(ARW)}{\psi} - \mu \right]$$

The democratic government will expropriate whenever $W^w(E) > W^w(NE)$, that is, when

$$\frac{w(BRW)}{1 - \beta} - \mu > \frac{w(ARW)}{1 - \beta}$$

This condition has a similar straightforward interpretation as in the case of the oligarchic government. The corresponding condition for φ is:

$$\varphi < \alpha - \frac{(1 - \beta)(1 - \alpha)\mu}{|\hat{\gamma}_1| w(BRW)} \equiv \varphi_{1D} \quad (10)$$

Observe that the higher the cost of alternative shipping methods the higher φ_{1D} and, therefore, the likelier that a democratic government will expropriate, since the increase in the relative price of the labor-intensive good would be accordingly large.

The incentive to expropriate is influenced by technological parameters. Equation (1) shows that φ_{1D} varies negatively with γ_X . A higher γ_X is an indication of a smaller difference in factor intensity in sectors S and X ; there-

fore, an economy where sectors have similar factor intensity would generate lower incentives for democratic governments to expropriate.

3.1.3 Democracy versus Oligarchy

In this section we compare the incentives to expropriate under Democracy and Oligarchy. The first step consists in identifying conditions for expropriation to occur under both regimes. Notice first that a feasible railway requires $\varphi < \alpha$. We assume that this holds. The question now is to study the relative magnitude of the expropriation bounds, φ_{1A} and φ_{1D} . In principle, both cases are possible: $\varphi_{1A} \geq \varphi_{1D}$ or $\varphi_{1A} < \varphi_{1D}$. To characterize such cases, observe that both thresholds depend on α in an opposite way: while φ_{1A} decreases in α , φ_{1D} increases in α . This implies that φ_{1D} is higher than φ_{1A} for sufficiently high levels of α . More specifically, this is true for

$$\frac{\alpha}{1-\alpha} > \mu(1-\beta) \left[\frac{1}{|\hat{\gamma}_1|w(BRW)} + \frac{1}{\hat{\gamma}_2 r(BRW)} \right]. \quad (11)$$

When inequality (11) holds, it follows that:

1. if $\varphi < \varphi_{1A}$, only democracies expropriate;
2. if $\varphi \in [\varphi_{1A}, \varphi_{1D}]$, both democracies and autocracies expropriate;
3. if $\varphi > \varphi_{1D}$, only oligarchies expropriate.

When inequality (11) does not hold, it follows that:

4. if $\varphi < \varphi_{1D}$, only democracies expropriate;
5. if $\varphi \in [\varphi_{1D}, \varphi_{1A}]$, neither democracies nor autocracies expropriate;
6. if $\varphi > \varphi_{1A}$, only oligarchies expropriate.

The above cases capture important features of the link between expropriation and political regimes. Only democracies expropriate when φ is sufficiently low (cases 1 and 4). This is due to the fact that a lower φ implies a

larger Stolper-Samuelson effect and therefore the railway is very profitable for landowners and very negative for workers. When the transportation price is sufficiently high, only oligarchies expropriate (cases 3 and 6). From the point of view of the workers, the magnitude of the Stolper-Samuelson effect does not compensate the expropriation cost. For the oligarchy, however, the incentive to expropriate is strong as they could raise the land returns considerably by lowering the transportation price. Naturally, low values of α reduce the potential size of the Stolper-Samuelson effects. If α is sufficiently low, there are cases under which expropriation never occurs.

We find that an oligarchy finds it convenient to expropriate when railway tariffs are high (thus generating a strong conflict of interest between the local landlord elite and the railroad enterprise), while the opposite holds for a democracy.¹³ However, note that these incentives would be symmetrically different if the exportable good transported by the railroad was labor intensive.

Even though the previous analysis shows that expropriation may occur under both political regimes, under the assumptions made, we find that:

Proposition 1 *Democracies tend to expropriate for a larger set of transportation prices than Oligarchies.*

Proof $\alpha - \varphi_{1A} < \varphi_{1D}$ implies $\alpha - \frac{\mu(1-\alpha)(1-\beta)}{\hat{\gamma}_2 r(BRW)} < \alpha - \frac{\mu(1-\alpha)(1-\beta)}{|\hat{\gamma}_1| w(BRW)}$ which requires $\hat{\gamma}_2 r(BRW)T > |\hat{\gamma}_1| w(BRW)L$ to be satisfied. Observe that this implies $\frac{T_S}{T} < \frac{L_S}{L}$, which is always satisfied by assumption. ■

¹³There might be other motives under democracy to expropriate than just reverse the negative effects of the railway. Consider the case in which expropriated capital can somehow be sold. If the proceeds can be redistributed among workers, this would generate an additional gain; the per capita magnitude of this potential source of revenues would depend on how specific the railway capital is and on how large is the population of workers.

Alternatively, a democratic government could gain control over the railroads, reset the tariff φ and redistribute railway revenues among workers. This strategy would enable workers not only to control the Stolper-Samuelson effect, but also to obtain the returns on the investment. Regarding the price-setting choice of the government, it would weigh the effects on factor returns with the revenues from the transport monopoly. Intuitively, the price would be set above the profit maximizing monopoly price (if that price is strictly lower than α), and below the level that makes the use of the railway prohibitive for producers of good A . In any case, including a potential margin of benefits through redistributed revenues would amplify incentives to appropriate the project for a democracy.

It is also worth investigating how changes in μ affect the incentives to expropriate under oligarchy and democracy. This would give an indication on how the incentives scale with the penalties for expropriation.

Computing $\frac{\partial \varphi_{1A}}{\partial \mu}$ and $\frac{\partial \varphi_{1D}}{\partial \mu}$, we obtain

$$\begin{aligned}\frac{\partial \varphi_{1A}}{\partial \mu} &= \frac{(1 - \beta)(1 - \alpha)}{r(BRW)\hat{\gamma}_2} \\ \frac{\partial \varphi_{1D}}{\partial \mu} &= -\frac{(1 - \beta)(1 - \alpha)}{w(BRW)|\hat{\gamma}_1|}\end{aligned}$$

Clearly, the expropriation cost reduces the incentives to expropriate in both regimes. Observe that $\frac{T_S}{T} < \frac{L_S}{L}$ implies that $|\frac{\partial \varphi_{1D}}{\partial \mu}| > \frac{\partial \varphi_{1A}}{\partial \mu}$ and therefore that democracies are, although keener to expropriate, more enforceable than oligarchies.

3.2 The Investment Decision

The foreign investor has to decide whether to invest or not. We consider the railway project as a lump-sum investment of size K . This entitles the investor to get revenues from transporting good X by charging a unit price φ . As the railway increases production in sector X , railway revenues depend on the volume of output after the railway is in place ($X^{ARW}(\varphi)$). We show in the appendix that

$$X^{ARW}(\varphi) = (1 + \epsilon \frac{\alpha - \varphi}{1 - \alpha})X^{BRW}(\varphi) \quad (12)$$

Where $\epsilon = \frac{\hat{y}_X}{z}$ is the output elasticity of the agricultural good with respect to the net price z and $X^{BRW}(\varphi)$ is the level of production of X before the railway has been built.

The opportunity cost of investing in the railway is given by the world interest rate i^* .

To calculate the continuation value for the investor we need to consider two cases: when φ is such that the government will expropriate as soon as the

state of the world allows it (i.e. $S_t^s = G$), and when expropriation will never take place ($S_t^s = B$).

When expropriation is certain in one of the states of the world, the continuation value for the investor is:

$$W^{FI}(E) = \psi V^{FI}(G) + (1 - \psi)V^{FI}(B)$$

Where, given that expropriation drives to zero the revenues, the value of the project for the investor in that state is: $V^{FI}(G) = 0$. When expropriation does not take place (i.e. while $S_t^s = B$), the foreign investor gets an income per period $\varphi X^{ARW}(\varphi)$ and therefore the value of the project is:

$$W^{FI}(E) = \frac{(1 - \psi)\varphi X^{ARW}(\varphi)}{1 - (1 - \psi)\beta}$$

The railway is a better investment than the opportunity cost if:

$$\varphi X^{ARW}(\varphi) \left(\frac{1 - \psi}{1 - (1 - \psi)\beta} \right) \geq \frac{i^* K}{1 - \beta} \quad (13)$$

This is the investment constraint. The condition can be reformulated to highlight the role of the parameter κ , which measures the volume of investment required per unit of transport capacity: $\kappa = \frac{K}{X^{ARW}}$. Clearly, a lower κ implies a cheaper railway infrastructure per unit of services supplied. Rearranging equation (13), we obtain:

$$\kappa \leq \frac{\varphi}{i^* \Omega}$$

where $\Omega = \frac{1 - (1 - \psi)\beta}{(1 - \psi)(1 - \beta)}$. The expected return on investment exceeds the opportunity cost if the invested capital per unit of services is lower than the expected present value of prices charged, suitably discounted (taking into account the possibility of expropriation). This defines a bound for the price of services in order for the project to be undertaken in the case there is expropriation risk:

$$\varphi_2 = i^* \Omega \kappa \quad (14)$$

Clearly, a lower value of κ reduces the minimum price acceptable to investors.

When expropriation will never take place, investment is undertaken if

$$\frac{\varphi X^{ARW}}{1 - \beta} \geq \frac{i^* K}{1 - \beta}$$

or

$$\kappa \geq \frac{\varphi}{i^*}$$

which establishes the bound for profitable investment under no expropriation :

$$\varphi_3 = i^* \kappa$$

Notice that $\Omega > 1$; thus $\varphi_3 < \varphi_2$, which states the obvious but reassuring result that safe investment is likelier than expropriable investment.

We have identified the existence of values of φ , both for safe and expropriable investments, which make the project more attractive for the investor than the alternative placement of the resources in international capital markets. The question is now if the investor would sometimes choose to undertake the project and and, if able to determine the price unilaterally, would set it at a level that would make the project subject to future expropriation

We analyze the case of Oligarchy.¹⁴ The first thing is to establish a trade-off between maximizing earnings under no expropriation and incurring an expropriation risk. This is done by showing that single- period revenues of the railroad are maximized at a price higher than the one (φ_{1A}) that would induce the government to expropriate if it had the chance to choose: this means that we need to investigate whether there exists φ such that $\varphi X^{ARW}(\varphi > \varphi_{1A}) > \varphi_{1A} X^{ARW}(\varphi_{1A})$. Solving this implies:

¹⁴The analysis for Democracy is similar and it is available under request.

Proposition 2 *There exist levels of the transport tariff*

$$\varphi > 1 - \alpha(1 + \epsilon) - \frac{\mu(1 - \alpha)(1 - \beta)}{r(BRW)\hat{\gamma}_2} \equiv \varphi^* \quad (15)$$

such that, while the investor controls the project, the revenues generated when the investment is subject to expropriation are larger than those that would accrue at a price that makes the project immune to expropriation risk.

Proof $\varphi X(\varphi > \varphi_{1A}) - \varphi_{1A} X(\varphi_{1A}) > 0$ implies

$$\varphi \left[1 + \epsilon \frac{\alpha}{1 - \alpha} \right] - \frac{\varphi^2}{1 - \alpha} - \frac{\mu(1 - \alpha)(1 - \beta)}{r(BRW)\hat{\gamma}_2} \left[1 + \epsilon \left(\frac{\alpha}{1 - \alpha} - \frac{\mu(1 - \beta)}{r(BRW)\hat{\gamma}_2} \right) \right] > 0$$

This has two solutions:

1. $\frac{\mu(1 - \beta)(1 - \alpha)}{r(BRW)\hat{\gamma}_2}$
2. $1 - \alpha(1 + \epsilon) - \frac{\mu}{r(BRW)\hat{\gamma}_2} [(1 - \alpha)(1 - \beta)]$

It is immediate that only 2 satisfies $\varphi X(\varphi > \varphi_{1A}) > \varphi_{1A} X(\varphi_{1A})$. ■

This result suggests that expropriation may potentially be induced by the foreign investor if this has the power of choosing the tariff. We explore further this possibility in section 4.

3.3 Equilibrium Characterization

We have identified the investment and expropriation constraints. These are determined by wages and rents levels, which are themselves functions of the tariff associated with the railway. We can therefore find solutions for a given φ and state the corresponding expropriation behavior of democracies and oligarchies.

We need to show the existence of tariffs allowing for railway investment. As the break even thresholds under no expropriation risk (φ_3) and without that risk (φ_2) are such that $\varphi_3 < \varphi_2$, the potential existence of both safe

and expropriable investments requires the existence of values of φ such as $\varphi \in [\varphi_2, \alpha]$. This is equivalent to show that $\varphi_2 < \alpha$. The following lemma states the condition for this possibility.

Lemma 1 *The possibility of railway investment requires the following condition to hold*

Condition 1

$$\kappa \leq \frac{\alpha}{i^* \Omega}$$

Proof It immediately follows from inspecting $\varphi_2 < \alpha$ using equation (14). ■

This result involves an interesting implication. We can interpret κ^{-1} as a measure of railway efficiency. Therefore, investment requires a minimum level of efficiency. How binding is such requirement depends on investment opportunities abroad, the cost of alternative transport methods, political stability, captured by the probability of social states in which expropriation is possible and the discount factor.

Proposition 3 *When the Condition 1 holds, there exists $\varphi \in (\varphi_3, \alpha)$ such that, given the intervals:*

$$\begin{aligned} Z_1 &= \{\varphi \in X : \varphi \leq \varphi_{1D} \wedge \varphi \leq \varphi_{1A}\} \\ Z_2 &= \{\varphi \in X : \varphi > \varphi_{1D} \wedge \varphi \geq \varphi_{1A}\} \\ Z_3 &= \{\varphi \in X : \varphi \leq \varphi_{1D} \wedge \varphi \geq \varphi_{1A}\} \\ Z_4 &= \{\varphi \in X : \varphi \geq \varphi_{1D} \wedge \varphi \leq \varphi_{1A}\} \end{aligned}$$

Then:

- $\varphi \in Z_1$ implies that expropriation only occurs under democracy;
- $\varphi \in Z_2$ implies that expropriation only occurs under oligarchy ;
- $\varphi \in Z_3$ implies that both types of government expropriate;

- $\varphi \in Z_4$ implies that neither a democratic government nor an autocratic government expropriate.

Proof See Appendix C where we define the conditions for non-emptiness of Z_1 to Z_4 . ■

This result summarizes the previous analysis and demonstrates the existence of cases Z_1 to Z_4 . It is interesting to bear in mind that the model does not predict that democracies necessarily offer a less secure environment for investment than oligarchy, as shown by the existence of region Z_2 , when tariffs are high enough.

So far we have treated the tariff as exogenous. We turn now to investigate whether tariffs yielding to expropriation can be imposed by the foreign investor in a negotiation with the government.

4 Expropriation risk induced by the foreign investor

We consider now the case in which freight prices are determined through a negotiation between the government and the investor.

A variety of outcomes can emerge depending on the respective bargaining powers, the value of expropriation costs, the political regime and the economic structure. The possibility of both expropriable and safe investments amplifies the number of candidate equilibria. Instead of fully characterizing all these cases, we focus on situations where expropriation is an outcome in the case where the bargaining power lies fully with the investor.¹⁵

Given the configuration of the economy, a democratic government would be a tougher negotiator than the one representing oligarchic interests because

¹⁵An exhaustive analysis of possible equilibria in the negotiation game is available upon request.

of the negative Stolper-Samuelson effect on wages.¹⁶ The landlord group, in contrast, would welcome railway investments per se as means to raise their rents. We focus then on the case of an oligarchy.

The key question is whether expropriation is an equilibrium outcome in situations where the oligarchic government negotiates with the investor. Consider the case of Nash bargaining. Any incentive compatible price resulting from negotiation must satisfy the conditions given in Proposition 3. This implies, for example, that an incentive compatible tariff yielding an equilibrium with expropriation has to be greater than φ_2 (so that the investor is willing to invest) and also higher than φ_{1A} (so that the government chooses to expropriate when the opportunity arises).

We need to establish first when the government is willing ex ante to accept a deal with the investor yielding expropriation in the future. If the railroad is to be built, the landlord group must obtain a greater payoff than the one resulting in the absence of the railway, that is:

$$\frac{\psi}{1 - (1 - \psi)\beta} \left[\frac{r(X)}{1 - \beta} + \frac{r(ARW)(1 - \psi)}{\psi} - \mu \right] \geq \frac{r(BRW)}{1 - \beta}$$

which is satisfied for

$$\varphi < \alpha \left(\frac{1 - (1 - \psi)\beta}{(1 - \psi)(1 - \beta)} \right) - (1 - \alpha) \left(\frac{\psi}{1 - \psi} \frac{\mu}{\hat{\gamma}_2 r(BRW)} \right) \equiv \varphi'_{1A}. \quad (16)$$

The upper bound φ'_{1A} depends positively on α , because a higher transport cost before the railway increases the payoff for the landlords of having the railroad; the negative dependence on the expropriation cost μ derives from the fact that, with higher expropriation costs, the government requires a larger payoff in order to find the railroad project acceptable. An equilibrium involving expropriation requires $\varphi_{1A} < \varphi'_{1A}$ (that is: the maximum tariff not generating

¹⁶A democratic government may still be interested in the railway if expropriation gains are expected to be sufficiently high. However, this would require benefits accruing from running the railroad (through re-distributed incomes) and not only through a reversal of the Stolper-Samuelson effect.

expropriation incentives must be lower than the maximum price for which the government would accept the railroad under a transport price that will induce expropriation). Otherwise, any outcome of the negotiation allowing the railway will imply no future expropriation. The condition for $\varphi_{1A} < \varphi'_{1A}$ is:

$$\mu < \frac{\alpha r(BRW)\hat{\gamma}_2}{(1-\alpha)(1-\beta)} \equiv \mu_1 \quad (\text{Expropriation Condition})$$

A low expropriation cost relative to the transport costs saved by the railroad raises the incentives of the government to take over the railroad when the opportunity emerges, and it increases the value of having the railroad built given future expropriation. Observe as well that μ_1 is increasing in $\hat{\gamma}_2$. This means that a higher price elasticity of land rents implies higher benefits from expropriation, which is reflected in both a lower φ_{1A} and a higher φ'_{1A} .

A simple representation of the bargaining scenario results from looking at the extreme cases where one of the participants can impose its preferred price subject to an incentive compatibility constraint for the other party. We are interested in cases where the foreign investor can induce her preferred tariff.¹⁷ To make calculations simpler, we assume that the revenues from the railroad are increasing with the tariff in the range between 0 and α ; that is: the elasticity of the traffic with respect to the price is less than unity in that range. This simply requires ϵ be greater than $\frac{1-\alpha}{\alpha}$, that is, a sufficiently high output elasticity with respect to the net price of the exportable good. If that condition is satisfied, as we assume, the investor will choose φ_{1A} in the case of safe investment and $\min\{\alpha - \varsigma, \varphi'_{1A}\}$ for ς infinitesimally low in the case of expropriable investment.

The investor prefers imposing a high tariff which makes the project liable for future expropriation when

¹⁷Alternatively, consider this brief sketch of the case where the oligarchic government can impose the price that will make the foreign investor just willing to build the railroad. Since the landlords's payoff decreases in the price, the government will choose between the two minimum prices that will induce investment, without expropriation in one case, and with expected expropriation in the other. We know from our discussion above that these tariffs are φ_3 for the safe investment, and φ_{1A} , for expropriable investment. The government will choose according to the comparison between the values of $W^E(NX, \varphi_3)$ and $W^{NE}(X, \varphi_{1A})$.

$$W^{FI}(NX, \varphi_{1A}) < W^{FI}(X, \min\{\alpha - \varsigma, \varphi'_{1A}\}), \quad (17)$$

that is

$$\frac{\varphi_{1A} X^{ARW}(\varphi_{1A})}{1 - \beta} < \frac{(1 - \psi) \min\{\alpha - \varsigma, \varphi'_{1A}\} X^{ARW}(\min\{\alpha - \varsigma, \varphi'_{1A}\})}{1 - (1 - \psi)\beta} \quad (18)$$

It can be shown that sufficiently low expropriation costs would make the foreign investor choose a tariff associated with expropriation. We develop in the appendix the inequality in equation 18 for both $\varphi'_{1A} \geq \alpha$ and $\varphi'_{1A} < \alpha$. In both cases, equation 18 is clearly satisfied for $\mu = 0$. Observe that both sides of (18) are continuously differentiable with respect to μ . As the left hand side is increasing in φ_{1A} , it is increasing in μ too. This implies that expropriation is chosen by investors for sufficiently low values of μ (i.e. for $\mu < \bar{\mu} \in (0, \infty]$). Obviously, the condition is likelier to be satisfied for low levels of ψ which means that this strategy is likelier in relatively stable social states where expropriation is unlikely.

Let us summarize the analysis by the following proposition:

Proposition 4 (Expropriation with prices chosen by the investor)

An equilibrium with expropriable investment is a consequence of the foreign investor's choice for

- $\mu < \min\{\mu_1, \bar{\mu}\}$

For low expropriation costs, the investor prefers obtaining high revenues up to the moment when expropriation takes place instead of lowering the tariff enough to conserve the permanent right to exploit the railroad; a similar result would hold for an impatient investor. Higher values of μ eliminate the expropriation equilibrium and, at the same time, they increase the ability of the investor to extract the rents from the project if it has the bargaining power on its side.

5 Concluding remarks

In this paper, we have investigated the incentives to expropriate foreign capital under democracy and oligarchy. We have derived an institutional arrangement for foreign investment from its macroeconomic effects and the economic structure of the receiving country. Whether democracies are more or less prone to expropriation of FDI than oligarchies depends crucially on the type of investment considered, the sector, on structural features like the factor intensities of activities that make use of the services provided by the investments in question, and on tariffs charged for those services.

Our model rationalizes the fact that mass democracies in Latin America during the XXth century were prone to nationalize FDI projects directed to the provision of services to the production of tradable goods controlled by agricultural elites. In the context studied, foreign investments, through Stolper-Samuelson effects, benefited landlords and hurt labour intensive activities, thus tending to lower wages. Naturally, under oligarchic rule, those investments were desirable for the government, and were undertaken by foreign investors. Once those investment contracts were inherited by governments that put high weights on the interests of workers, incentives to expropriate emerged. This, however, is not an intrinsic result of democracies, but results in particular configurations of economic interests associated with the comparative advantages of the countries. With different economic structures, democracies could have different incentives with respect to FDI projects that provide services to the production of exportable goods.

Finally, another result with potential practical relevance is that, conditional on structural features of the economy, it would be possible to reach equilibrium where expropriable investment is a consequence of a tariff negotiation between the investor and the government, even in situations where the foreign investor is capable of setting the tariff unilaterally. The attraction of high revenues in no-expropriation states may make expropriable investment preferred by the foreign investor to a scenario with lower prices, which would make a future landlord government unwilling to expropriate. An implication of this

result is that, in certain circumstances, respecting the property rights is not necessarily a precondition for foreign investment but instead, expropriation is endogenously determined by the interaction between domestic governments and foreign investment.

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Appendices

A Determination of $X^{ARW}(\varphi)$

The existence of the railroad, and the negotiated fee, imply a change \hat{z} in the "net price" of good X . The implications for factor prices were derived above: given the assumption that good X is relatively land-intensive, ($\gamma_S > \gamma_X$, with γ_i the labor share in sector i) the standard Stolper-Samuelson result applies: if $\hat{z} > 0$, $\hat{w} - \hat{z} > 0, \hat{t} < 0$. The output movements are determined by the factor-demand equations (where a hat over a variable indicates the proportional change of the variable):

$$\begin{aligned}\hat{L} &= 0 = \lambda_{LX}\hat{L}_X + \lambda_{LS}\hat{L}_S \\ \hat{T} &= 0 = \lambda_{TX}\hat{T}_X + \lambda_{TS}\hat{T}_S\end{aligned}$$

where $\lambda_{Ai} = A_i/A$ is the share of sector i in the total use of factor A . If \hat{A}_i is the proportional change of the use of factor A in sector i , and production functions have a Cobb-Douglas form, the changes in the demand for factors are given by:

$$\hat{A}_i = \hat{y}_i - (\hat{h}_A - \hat{p}_i)$$

where \hat{y}_i is the proportional change in the output of good i , \hat{p}_i the proportional change in the price of i , and \hat{h}_A the change in the reward of factor A .

Then:

$$\begin{aligned}0 &= \lambda_{LX}\hat{y}_X + \lambda_{LS}\hat{y}_S - \lambda_{LX}(\hat{w} - \hat{z}) - \lambda_{LS}\hat{w} \\ 0 &= \lambda_{TX}\hat{y}_X + \lambda_{TS}\hat{y}_S - \lambda_{TX}(\hat{t} - \hat{z}) - \lambda_{TS}\hat{t}\end{aligned}$$

It can be noted that, given the results on \hat{w}, \hat{t} , if $\hat{z} > 0$:

$$\begin{aligned}\lambda_{LX}(\hat{w} - \hat{z}) + \lambda_{LS}\hat{w} &= \phi_w < 0 \\ \lambda_{TX}(\hat{t} - \hat{z}) + \lambda_{TS}\hat{t} &= \phi_t > 0\end{aligned}$$

The determinant of the system of factor demands is: $\Delta = \lambda_{LX}\lambda_{TS} - \lambda_{TX}\lambda_{LS}$

Now: $\lambda_{Ai} = \frac{A_i}{A} = \frac{h_{AA_i}}{h_{AA}} = \frac{h_{AA_i} p_i y_i}{p_i y_i h_{AA}}$ so that:

$$\Delta = \frac{wL}{zy_X} \frac{tT}{psy_S} (\gamma_X(1 - \gamma_S) - (1 - \gamma_X)\gamma_S)$$

Clearly:

$$\text{sgn}\Delta = \text{sgn}(\gamma_X - \gamma_S) < 0 \text{ given the assumptions}$$

Then: solving:

$$\begin{aligned} \hat{y}_X &= \frac{1}{\Delta} (\phi_w \lambda_{TS} - \phi_t \lambda_{LS}) > 0 \\ \hat{y}_S &= \frac{1}{\Delta} (\phi_t \lambda_{LX} - \phi_w \lambda_{TX}) < 0 \end{aligned}$$

These equations establish the changes in output as a function of z , the "producer" price of good X .

Those changes can be (through tedious but straightforward calculations) expressed in terms of "primitives": the parameters γ_X, γ_S , and the initial shares of the sectors in the value of output (which, with more computations, can be derived from factor endowments): $\mu_i = \frac{p_i y_i}{\sum_{j=X,S} p_j y_j}$, with $i = X, S$, and p_i producer's prices.

Then:

$$\lambda_{LX} = \frac{wL_X}{wL} = \frac{\gamma_X \mu_X}{\gamma_X \mu_X + \gamma_S \mu_S}$$

and a similar expression for the share of X in the use of land.

Also:

$$\begin{aligned} \phi_w &= \lambda_{LX} \frac{1 - \gamma_X}{\gamma_X - \gamma_S} + \lambda_{LS} \frac{1 - \gamma_S}{\gamma_X - \gamma_S} \\ &= \frac{1}{\gamma_X \mu_X + \gamma_S \mu_S} \frac{1}{\gamma_X - \gamma_S} (\gamma_X \mu_X (1 - \gamma_X) + \gamma_S \mu_S (1 - \gamma_S)) \end{aligned}$$

$$\begin{aligned} \phi_t &= \lambda_{TX} \frac{\gamma_X}{\gamma_S - \gamma_X} + \lambda_{TS} \frac{\gamma_S}{\gamma_S - \gamma_X} \\ &= \frac{1}{(1 - \gamma_X) \mu_X + (1 - \gamma_S) \mu_S} \frac{1}{\gamma_S - \gamma_X} (\gamma_X \mu_X (1 - \gamma_X) + \gamma_S \mu_S (1 - \gamma_S)) \end{aligned}$$

The determinant of the system that determines the output changes \hat{y}_i is:

$$\Delta = (\gamma_X \mu_X + \gamma_S \mu_S)^{-1} ((1 - \gamma_X) \mu_X + (1 - \gamma_S) \mu_S)^{-1} (\gamma_X - \gamma_S)$$

Which implies:

$$\hat{y}_X / \hat{z} = \frac{1}{(\gamma_X - \gamma_S)^2} (\gamma_X \mu_X (1 - \gamma_X) + \gamma_S \mu_S (1 - \gamma_S)) = \epsilon \quad (19)$$

This corresponds to the standard Rybcynski result that the output of good X increases unambiguously with the producer price of the good (and an analogous expression would show that production of S would fall as z increases).

Equation (19) allows us to derive the following expression of the production of X once the railway has been established:

$$X(ARW) = (1 + \epsilon \frac{(\alpha - \varphi)}{1 - \alpha}) X(BRW) \quad (20)$$

where the expressions BRW, ARW indicate, respectively, "before the railway" and "after the railway".

B Proof of proposition 3

We have to prove as well the existence of a range of values for φ such as expropriation will take place. This is equivalent to show the existence of values of φ such as $\varphi_{1D} > 0$ in the case of a Democracy and $\varphi_{1A} < \alpha$ in the case of an oligarchy. From equation 10 we see that this is always the case for

$$\alpha > \frac{(1 - \beta)\mu}{|\hat{\gamma}_1| w(BRW) - (1 - \beta)\mu} \quad (21)$$

when the political regime is a Democracy. Similarly, we obtain from equation 7 that the possibility of expropriation requires

$$\alpha > \frac{(1 - \beta)\mu}{r(BRW)\hat{\gamma}_2 + (1 - \beta)\mu} \quad (22)$$

Observe that the bounds (21) and (22) are both lower than unity. More importantly, notice that both establish the following conditions:

Condition 2 *The government chooses expropriation, if feasible, when α satisfies*

$$\alpha > \frac{(1 - \beta)\mu}{2|\hat{\gamma}_1|w(BRW) + (1 - \beta)\mu}$$

if the political regime is a Democracy

and

Condition 3 *The government chooses expropriation, if feasible, when α satisfies*

$$\alpha > \frac{(1 - \beta)\mu}{r(BRW)\hat{\gamma}_2 + (1 - \beta)\mu}$$

if the political regime is an oligarchy.

We can now establish the existence of intervals $Z_1 - Z_5$.

1. Z_1 corresponds to values of φ such as $\varphi < \text{Min}(\alpha, \varphi_{1A}, \varphi_{1D})$. This requires the satisfaction of conditions 1 and 2. Condition 1 establishes the existence of φ such that the investor wishes to undertake the project. Condition 2 establishes the existence of φ such as expropriation takes place in a Democracy. Proposition 1 provides the conditions for $\varphi_{1A} < \varphi_{1D}$ which implies the existence of values of φ such as expropriation takes place *only* under Democracy.
2. Z_2 corresponds to values of φ such as $\varphi \in (\text{Max}[\varphi_{1A}, \varphi_{1D}], \alpha)$. This requires the satisfaction of conditions 1 and 3. Proposition 1 provides the conditions for $\varphi_{1A} > \varphi_{1D}$
3. Z_3 corresponds to values of φ such as $\varphi \in (\varphi_{1A}, \text{Min}[\alpha, \varphi_{1D}])$. This requires the satisfaction of conditions 1, 2 and 3 .
4. Z_4 corresponds to values of φ such as $\varphi \in (\varphi_{1D}, \text{Min}[\alpha, \varphi_{1A}])$. This simply requires condition 1.

C Proposition 4

There are two cases to be considered:

C.1 $\phi'_{1A} < \alpha$

Equation 18 becomes:

$$\frac{\varphi_{1A} X^{ARW}(\varphi_{1A})}{1 - \beta} < \frac{(1 - \psi)\alpha X^{ARW}(\alpha)}{1 - (1 - \psi)\beta}.$$

That is using (12) and (7),

$$\frac{\mu(1 - \alpha)}{r(BRW)\hat{\gamma}_2} \left[1 + \frac{\epsilon\alpha}{1 - \alpha} - \frac{\mu(1 - \beta)\epsilon}{r(BRW)\hat{\gamma}_2} \right] < \frac{(1 - \psi)\alpha}{1 - (1 - \psi)\beta} + \frac{(1 - \psi)\eta}{(1 - \alpha)(1 - (1 - \psi)\beta)}.$$

This is clearly satisfied for $\mu = 0$. For $\mu < \frac{1}{2(1-\beta)\epsilon} + \frac{\alpha}{2(1-\beta)(1-\alpha)}$, the left hand side is increasing in μ which means that there is a value of $\mu = \bar{\mu}$ beyond which inducing expropriation is no longer preferred by the foreign investor. This threshold is:

$$\bar{\mu}_1 = \frac{\Upsilon_1(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta) + [\Upsilon_1(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta)^2 - 4\Phi_1(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta)\Gamma_1(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta)]^{\frac{1}{2}}}{2\Gamma_1(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta)}$$

where,

$$\begin{aligned} \Upsilon_1 &= \frac{1 - \alpha(1 - \epsilon)}{r(BRW)\hat{\gamma}_2} \\ \Gamma_1 &= \frac{(1 - \alpha)(1 - \beta)\epsilon}{(r(BRW)\hat{\gamma}_2)^2} \\ \Phi_1 &= \frac{1 - \psi}{1 - (1 - \psi)\beta} \left(\alpha + \frac{\eta}{1 - \alpha} \right) \end{aligned}$$

C.2 $\phi'_{1A} \geq \alpha$

Equation 18 becomes:

$$\frac{\varphi_{1A} X^{ARW}(\varphi_{1A})}{1 - \beta} < \frac{(1 - \psi)\varphi'_{1A} X^{ARW}(\varphi'_{1A})}{1 - (1 - \psi)\beta}.$$

That is using (16),

$$\frac{\varphi_{1A}}{1-\beta} \left(1 + \epsilon \frac{\alpha - \varphi_{1A}}{1-\alpha} \right) < \frac{(1-\psi)}{1-(1-\psi)\beta} \varphi'_{1A} \left(1 + \epsilon \frac{\alpha - \varphi'_{1A}}{1-\alpha} \right) \quad (23)$$

This condition is satisfied for $\mu = 0$. Also, the right hand side is increasing in φ' , which is itself decreasing in μ . We can also show that the left hand side is increasing in μ as long as $\mu < \frac{1}{2(1-\alpha)(1-\beta)}$. Given this, it is clear that (23) is satisfied for sufficiently low values of μ . The threshold is implicitly given by:

$$\bar{\mu}_2 = \frac{\Upsilon_2(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta) + [\Upsilon_2(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta)^2 - 4\Phi_2(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta)\Gamma_2(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta)]^{\frac{1}{2}}}{2\Gamma_2(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta)}$$

Where:

$$\begin{aligned} \Upsilon_2(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta) &= \frac{1 - \alpha(1 - \epsilon)}{r(BRW)\hat{\gamma}_2} - \frac{\alpha^2 \left(\frac{1-(1-\psi)\beta}{(1-\psi)(1-\beta)} \right) \left(\frac{\psi}{1-\psi} \frac{1}{\hat{\gamma}_2 r(BRW)} \right)}{(1-\beta)} + \\ &\quad \frac{(1-\alpha)(1-\psi) + \alpha\epsilon(1-\psi) - (1-\psi)\left(\alpha \left(\frac{1-(1-\psi)\beta}{(1-\psi)(1-\beta)} \right)\right)}{\psi r(BRW)(1 - (1-\psi)\beta)} \\ \Gamma_2(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta) &= \frac{1-\alpha}{r(BRW)\hat{\gamma}_2} \left[\frac{1-\beta}{r(BRW)\hat{\gamma}_2} + \frac{1}{(1-(1-\psi)\beta)r(BRW)} \right] \\ \Phi_2(\epsilon, \hat{\gamma}_2, \alpha, \psi, \beta) &= \frac{\alpha}{1-\alpha} \left[1 + \frac{\alpha}{1-\beta} \left(\epsilon - \frac{1-(1-\psi)\beta}{(1-\psi)(1-\beta)} \right) \right] \end{aligned}$$