The Corruption of Transition

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Abstract

A political economic framework is used to describe an economy following transition to private ownership. The transition, characterized by massive privatization, is accompanied by a constitutional change, which is influenced by potential shareholders who may be described as either non-corrupt shareholders or corrupt shareholders.

The paper argues that institutions that mitigate illicit activity, and not only protect investors’ rights, are crucial to successful transition. It identifies industries in which corrupt shareholders are more likely to invest (e.g., very profitable industries such as natural resource monopolies), and shows that in corrupted transitions, corrupt shareholders may invest also in less profitable industries and non-corrupt shareholders separate themselves from such corrupted industries. The paper then derives some policy implications.

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1. Introduction

In the latter part of the 20th century we witnessed transition from centralized regimes to market regimes (Bulgaria, Poland and Russia, to name a few). During the transition, economic resources were privatized and market and legal institutions created. The transition, in many cases, was associated with corruption manifested with expropriation of revenues and financial assets from their legal owners, and with the ability to tolerate illicit activities in shadier industries such as gambling, trade in guns and human organs, and prostitution (Naim, 2005). In 1994, for example, a new issue of Komineft stock, one of Russia's largest oil companies, was offered without giving adequate notice to its outside shareholders. This resulted in the dilution of outside shareholders' ownership in the company by a third (see Blasi et al., 1997, p. 93). The production of counterfeit drugs by the pharmaceutical industry in China during the late 1990s is another example, whereby local police had little incentives or resources to crack down on nimble counterfeits – assuming they were not connected to them in the first place.

Corruption, however, affects some industries more than others. Corrupt activities are concentrated in lucrative industries such as natural resource industries (Durnev and Guriev 2007; among others). It is also more common in less transparent and shadier industries (Naim 2005). In Moldova, for example, trade in human organs and guns flourishes and is controlled by local families, which abide by no law but their own. This paper presents a model of transition which strives to characterize (some) of the underlining forces that cause corruption to infiltrate lucrative, as well as shadier, industries. To this end, we view transition as a process which is characterized by three facets: First, establishment of rule-of-law; Second, the economy is privatized
and ownership changes from public to private hands; Third, the economy moves to profit maximizing behavior.

To derive a framework that illustrates the consequences of a corrupt transition, assume, similar to existing literature, that regime changes enable the elite to affect laws governing economic outcomes to their advantage, in expectation of future economic benefits (see Hellman, 1998; Roland, 2000; Acemoglu, 2003; Stiglitz and Hoff 2005; among others). The elite are divided to two groups: corrupt, who take advantage of a poorly defined and enforced rule-of-law, and non-corrupt. We draw from the literature on interest groups and Menu-Auction (e.g., Bernheim and Whinston, 1986; Grossman and Helpman, 1994 and 1995; Dixit et al., 1997) to illustrate that political constraints may corrupt the transition to market regime. This distortion can lead to under-investment (see Brunetti and Weder, 1998; Keefer and Knack, 1995; Kisunko and Weder, 1997; Marro, 1995 and 1997; Lambsdorff, 1999; among others). The intuition developed in the paper can be used to better understand why privatization and restructuring in Poland was delayed by various interest groups. A similar story, whereby political struggle mitigated the benefit of privatization, is true also for Hungary (Dervis and Condon, 1994).

Next, by assuming heterogeneity with respect to average industries profitability (i.e., heterogeneity between industries, but not within industries), as well as with respect to industries propensity to become corrupted, the analysis is extended to show that distorting the transition also corrupts certain industries; lucrative industries are captured by corrupt shareholders, i.e., inherently high-profit industries such as natural resource monopolies (supported empirically by Campos, 2000 among others), and criminal business conduct is introduced. Furthermore, in corrupt

\footnote{Campos and Giovannoni (2005) show that the degree of asset striping is driven by the interplay...}
economies, corrupt shareholders invest in less profitable industries, while non-corrupt shareholders separate themselves from these industries simply because they are corrupted.

This paper, therefore, extends work on connected firms (Roberts, 1990; Kroszner and Stratmann, 1998; Ang and Boyer, 2000; Morck et al., 2000; Fisman, 2001; Johnson and Mitton, 2003; Faccio, 2006; among others), and argues that although corrupt shareholders may be less productive than the average shareholder (Faccio 2006), they are located in the more lucrative industries. Moreover, and different from the literature that investigates the role bribes to the government play in income transfer (Grossman and Helpman, 1994 and 1995; Dixit et al., 1997; Bulte et al., 2007; among others), this paper focuses on how corrupting transition is used by corrupt shareholders to expropriate others, and shows how this process leads to corruption of some industries, but not others.

The paper therefore links privatization and corruption; when institutions governing market regimes are not in place, massive privatization may corrupt the economy further. In Russia, for example, massive privatization accelerated the self-dealing process by selling control of its largest enterprises cheaply to frauds, which transferred their skimming talents to the enterprises they acquired and used their wealth to further corrupt the government and block reforms that threatened to constrain their actions (Black et al., 2000). Therefore, one of the paper's implications is gradual privatization in economies with poorly defined and enforced rule-of-law, whereby smaller and less profitable industries are privatized first. Such strategy may alleviate demand for poorly defined market institutions and corruption of industries.

Finally, a link between interest rates and the market institutions is also

between the firm’s potential profitability and its ability to influence law enforcement.
identified – higher interest rates lead to weaker institutions. To this end, Stiglitz and Hoff (2005) showed that a higher interest rate is negatively correlated with the demand for legal reforms.

The economic structure is depicted in Section 2, whereas the legal and political institutions are presented in Section 3. The timing of the game is given in Section 4. In Section 5, the equilibrium investment level is investigated, and the equilibrium level of the legal system is determined via political economic equilibrium. Discussion and concluding remarks are given in Section 6. Proofs are relegated to the Appendices.

2. The Economic Structure

Assume an economy producing \( J+1 \) commodities, where commodity 0 is the numéraire. In other words, there are \( 1\ldots J \) industries in the economy that produce commodities \( y = (y_1, y_2, \ldots, y_J) \). To simplify the exposition, a representative firm is assumed to capture the average industry's characteristics, and is denoted with subscript \( j \) – similar to the industry it represents. A richer setting can be used, but it will come at the price of additional complexity.

Commodity 0 is manufactured from labor alone with constant returns to scale and an input-output coefficient of 1 (e.g., food). Since we assume that the aggregate supply of labor is large enough to ensure a positive supply of this commodity and since the price of commodity 0 is normalized to 1, the wage rate in the competitive equilibrium equals 1.

Although we do not assume heterogeneity within an industry, we do assume heterogeneity between industries. Specifically, under the market regime, and with the wage rate fixed at 1, the aggregate reward to the shareholders from producing
commodity \( j \) depends on the price, \( p = (p_1, \ldots, p_J) \), the investment, \( X_j \), and the industry’s physical economic characteristics (e.g., physical barriers to entry in the mining sector). These characteristics are assumed to be captured by the index \( \varphi_j \), where \( \varphi_j \in [0,1] \). Thus, \( \pi_j(p, X_j, \varphi_j) \) is the net profit of privatized firm \( j \), where \( X_j = \sum x_j \), and \( x_j \) is the capital transferred to firm \( j \) by shareholder \( i \) for \( i \in I \), and where \( I \) denotes the set of potential shareholders, i.e., the owner of capital. Furthermore, assume \( \frac{\partial \pi_j}{\partial x_j} \geq 0 \) and \( \frac{\partial^2 \pi_j}{\partial x_j^2} \leq 0 \) (marginal productivity of investment is decreasing), \( \frac{\partial \pi_i}{\partial \varphi_j} \geq 0 \), and \( \frac{\partial^2 \pi_j}{\partial \varphi_j^2} \geq 0 \). The shareholders in the economy are owners of the firms following privatization, when ownership is identified with residual rights of control of physical assets (e.g., Grossman and Hart, 1986; and Hart, 1991).

This economy is populated by individuals with identical preferences, where the size of the population is normalized to 1. Each individual maximizes utility given by

\[
\begin{align*}
    u &= q_0 + \sum_{j \in J} u_j(q_j),
\end{align*}
\]

where \( q_0 \) is the consumption of commodity 0 and \( q_j \) is the consumption of commodity \( j \), produced by firm \( j \equiv \{1, 2, \ldots, J\} \). The sub-utility function \( u_j(\cdot) \) is differentiable, increasing, and strictly concave. Commodity 0 serves as the numéraire with a price of 1.

Given these preferences, an individual spending an amount \( E \), will consume

\[
    q_j = d_j(p_j),
\]

of commodity \( j \). The demand function \( d_j(p_j) \) is the inverse of \( \frac{\partial u_j(q_j)}{\partial q_j} \). A

\[\text{\underline{2}} \text{ A slightly different approach, not taken in this paper, is that the residual rights of control are} \]
consumer consumes \( q_0 = E - \sum_{j=1} p_j \cdot d_j(p_j) \) of the numéraire commodity. The indirect utility, then, takes the form of

\[
W = E + \text{cs}(p),
\]

where \( \text{cs}(p) = \sum_{j=1} u_j [d_j(p_j)] - \sum_{j=1} p_j \cdot d_j(p_j) \) is the consumer surplus derived from these commodities. Note that these assumptions imply that \( q_j = d_j(p_j) \), which equals in equilibrium to the quantity supplied, \( y_j \), and therefore \( \pi_j(p, X_j, \phi_j) = \pi_j(p_j, X_j, \phi_j) \).

### 3. Institutions

To quantify the institutional set-up, a coefficient that represents the overall performance of the legal system and its ability to support a competitive environment under a market regime is introduced, namely the rule-of-law coefficient (RLC). This coefficient denoted by \( \theta \in [0,1] \) assigns the economy with a number between 0 and 1 depending on its institutional state; the stronger an economy’s institutions are, the higher is the assigned value. In the game, the RLC is endogenous and is determined by the government and the elite.

The ability of a given legal system to create viable checks and balances affects different industries differently; because different industries have different propensity to become corrupted (e.g., the gambling industry versus the software applications industry), and because rules affect different industries differently. For instance, the laws on land property rights passed by President Putin toward the end of the 20th century affected the housing market differently than they affected the pharmaceutical industry. It is, therefore, natural to assume heterogeneity among firms with respect to

attributed to employee decisions (Williamson, 1985; and Coase, 1988).
the RLC. To this end, let $c_j = c(j, \theta)$ denote industry's propensity to become corrupt, where $c_1 \leq c_2 \leq \ldots \leq c_J$. Then, an industry-specific RLC $\theta_j = f(c_j, \theta)$ is formally defined, where $\theta_j \in [0,1]$ and where $\frac{df(c_j, \theta)}{d\theta} \geq 0$ and $\frac{df(c_j, \theta)}{dc_j} \leq 0$, and therefore $\theta_1 \geq \theta_2 \geq \ldots \geq \theta_J$.

The paper also assumes that shareholders vary in their behavioral norms (e.g. use of corrupt methods, as opposed to legal methods, of acquiring firms). Specifically, assume two types of shareholders:

1. A non-corrupt shareholder (NC), who consumes and benefits from the goods in the economy.
2. A corrupt shareholder (C), who also consumes and benefits from the goods in the economy and is corrupt; in other words, a corrupt shareholder has the ability to steal from others either because he has the required technology or because of cultural norms (see Naim 2005).

Corrupt shareholders may exploit other shareholders by increasing their share of the residual claim on the physical assets. The corrupt shareholder's ability to dilute other shareholders’ residual claims over the physical assets is a function of the industry-specific RLC, $\theta_j$, and it does not affect the firm’s profits directly (although it does affect the amount invested in the firm).

In addition, corrupt shareholders may simply steal directly from the firm (e.g.,

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3 Djankov et al. 2005, 2006a, and 2006b, show that shareholders' behavioral norms vary across countries.
4 A different approach, which is not taken in this paper, claims that shareholders vary in their productive activities, such as innovations, and unproductive activities, such as rent seeking or organized crime (e.g., Baumol, 1990). Murphy, Shleifer and Vishny (1993) discussed the negative
taking a proportion of the products produced, reselling them and benefiting from the proceeds independent of any residual claim over the firm’s profits – illicit activity). Contrary to the corrupt shareholder’s ability to redistribute its residual claim, his ability to steal from the firm reduces the firm’s profits. Formally, the firm’s profits decrease by a proportion \( D(\theta_j, \alpha_{Cj}(\theta_j)) \), where \( \alpha_{Cj}(\theta_j) \) is the corrupt shareholder’s residual claim and is a function of the industry-specific RLC. Furthermore, assume that \( \frac{\partial D}{\partial \theta_j} \geq 0 \) (the corrupt shareholder's ability to corrupt the industry is non-decreasing in its residual claim over the industry's physical assets), that \( \frac{\partial D}{\partial \alpha_{Cj}} \leq 0 \) (better legal institutions reduce the ability to introduce rent-seeking activities), and that \( D(0, \alpha_{Cj}) = 1 \) for \( \alpha_{Cj} > 0 \), \( D(1, .) = 0 \), and \( D(, 0) = 0 \). The absolute values of \( D(.) \) at \( \theta_j = 0 \), \( \theta_j = 1 \) and \( \alpha_{Cj} = 0 \), are not important for the analysis, however their relative values with respect to the interior solution is.

The corrupt shareholder’s income increases by \( \alpha_{Cj}(\cdot) \cdot D(\theta_j, \alpha_{Cj}(\cdot)) \) times the firm’s profits, whereas a proportion equal to \( (1-\alpha_{Cj}(\cdot)) \cdot D(\theta_j, \alpha_{Cj}(\cdot)) \) of firm \( j \)'s profits are lost. Theft is costly, but not to corrupt shareholders. In other words, an iceberg assumption, where part of the revenue stolen is consumed by the very act of stealing, is used to model the rent-seeking behavior. Henceforth, we refer to \( D(\theta_j, \alpha_{Cj}(\cdot)) \) as the embezzlement function. The characteristics of the embezzlement function are reminiscent of the damage function defined in the literature on pesticides (e.g., Lichtenberg et al. 1979), with corrupt shareholders replacing the pests.

We assume corrupt shareholders possess two capacities, namely the corruption technology: (i) the ability to redistribute the firm’s residual claim over its physical effect of rent seeking on growth.
assets, and (ii) the ability to steal from the firm and corrupt the industry. While the former assumption affects income distribution, the latter affects total income as well.

The model, therefore, draws both from the literature on institutions and growth (e.g., North, 1981 and 1990; Alesina and Rodrik, 1994; Acemoglu and Robinson, 2004; and Glaeser et al., 2004) and from the literature on investor rights (e.g., LaPorta et al., 1998, 1999, and 2000; and Glaeser et al., 2001) in order to explain the transition to capitalism.\(^5\) Note that the discussion is static, and therefore does not include the evolution of constitutional changes.\(^6\)

The political constraints are now modeled, where we assume non-corrupt (and corrupt) elites solved the collective action problem (Olson, 1971) and have organized themselves into an interest group, i.e., a lobby. Let \(\mathcal{N} \equiv \{NC, C\}\) denote the set of lobbies in the economy and \(s_l\) denote the amount lobby \(l\) contributed to the government. Lobby \(l\) makes its political contribution contingent on the RLC chosen by the government, i.e., \(s_l(\theta)\). Due to the desire to govern and maximize the number of votes during the elections, the incumbent government maximizes the economic surplus, \(W\). Governments, however, also care about contributions (e.g., rhetoric and advertising during elections, as well as personal perks), and thus the incumbent government wants maximize total contributions, \(\sum_{l \in \mathcal{N}} s_l\). Combining these two objectives, and following Ledyard (1989), Snyder (1990), Baron (1994), Feddersen and Pesendorfer (1996), Grossman and Helpman (1996a), and Grossman and Helpman (1996b), among others, results in the following government benefit

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\(^5\) Hellman and Schankerman (2000) showed that within a country, economic reforms improve governance in countries with interest groups that lack the ability or will to influence government policies.

\(^6\) Hellman et al. (2000) investigated the dynamics of the capture economy (see also Hellman, 1998). To this end, Lau et al. (2000) developed a simple model to analyze the “dual-track” approach to market liberalization as a mechanism for implementing efficient Pareto-improving economic reform, that is, reform achieving efficiency without creating losers. Stiglitz and Hoff (2005), on the other hand,
function,
\[ G = aW + \sum_{i \in S} s_i, \]  
(2)
where \( a \) is the marginal benefit from the economic surplus.

Each lobby tailors the contribution schedule \( s_i(\theta) \) to maximize the total income of its members (income less contributions). It then collects the necessary donations in such a way as to allow all to share in the gains from the political contribution. Therefore, the joint income of the members of lobby \( l \) is \( V_i = \Omega_i - s_i \), where \( \Omega_i \) is their gross-of-contributions joint income, i.e.,
\[ \Omega_i = l_i + w_i \]  
(3)
and where \( l_i \) is the total labor supply (and also the labor income) of members of lobby \( l \). The monetary value of lobby \( l \)'s profit from capital is denoted \( w_j \).\(^7\)

Let \( t_i(\theta) \) denote the tax collected by the government from interest group \( l \) as its share of the transaction costs of the RLC where \( \frac{\partial t_i(\theta)}{\partial \theta} > 0 \). The net initial endowment, \( e_i - t_i(\theta) \), of lobby \( l \) is distributed between investment in the firms, \( x_i \), and alternative options in the capital market, \( e_i - t_i(\theta) - x_i \). The non-corrupt shareholders’ total income gross of contributions is
\[ w_{NC} = \sum_{j=1}^{J} \alpha_{NCj} (\theta_j) \cdot \pi_j (p_j, X_j, \varphi_j) \cdot \left[ 1 - D(\theta_j, \alpha_{Cj}) \right] + (e_{NC} - t_{NC}(\theta) - x_{NC}) \cdot (1 + r) \]  
(4)
and the corrupt shareholders’ relative share in the firm’s profits is \( \alpha_{Cj} (\theta_j) \); in other words, \( \alpha_{NCj} (\theta_j) = 1 - \alpha_{Cj} (\theta_j) \). It is also assumed that \( \frac{\partial \alpha_{NCj}}{\partial \theta_j} \geq 0 \). The alternative.

investigated the demand for rule of law in post-communist economies following privatization.

\(^7\) The paper’s results still hold if we extend the lobby’s objective function to include consumption, i.e.,
\[ \Omega_i = W_i = l_i + w_i + \phi_i \cdot c_s (p) \], where \( \phi_i \) is the lobby’s fraction in the voting population and \( W_i \) is their gross-of-contribution joint welfare.
profit from one unit of capital is \((1+r)\). In addition, let \(x_j = \sum_{j=1}^{J} x_{ij}\) (and recall that \(l \in \{NC, C\}\), and \(X_j = x_{NCj} + x_{ej}\)). The corrupt shareholders’ total income, on the other hand, is

\[
w_c = \sum_{j=1}^{J} \alpha_{ij}(\theta_j) \cdot \pi_j(p_j, X_j, \varphi_j) + (e_c - t_c(\theta) - x_c) \cdot (1+r).
\]  

(5)

The behavior of the different representative shareholders, i.e., non-corrupt shareholders or corrupt shareholders, is derived explicitly in Appendix A.

Note that the difference between non-corrupt shareholders and corrupt shareholders boils down to two key parameters: Their ability to redistribute the residual claim over physical assets and their ability to steal income directly.

4. The Two-Stage Game

The transition is modeled as a two-stage game—first, a reform takes place, and then, markets interact (Fig. 1). The reform includes the establishment and enforcement of investors’ rights, as well as the ability to enforce law and order and prevent theft and illegal activity.

The parameters of the reform are determined in a menu auction game between the elite (i.e., individuals that have the political power to influence government’s decisions via monetary contributions, and are assumed to be the shareholders in the paper) and the government.\(^8\) Recall that the elite may include corrupt individuals. It may, for example, be composed of oligarchs who are a unique constituency that is both willing and able to lobby for development of market institutions (Guriev and

\(^8\) Following Acemoglu (2006) and Acemoglu and Robinson (2006), among others, we model the elite as groups that have de jure power; in other words, they have the power to affect the rules that will govern the transition. In practice, the question of who “the elite” are is a key question, one which we remain agnostic about in this paper; though the model illustrates that the business conduct of the elites has an important effect on the efficiency of equilibria.
Rachinsky, 2005; Acemoglu 2003; among others). These variations in benefits produce differing incentives for the elite in pursuing the desired level of reform. The government takes into consideration the elite’s contributions since, although it cares about consumers’ well-being, it is financed, at least partly, by the elite's money. The outcome of the reform is summed up by a coefficient, namely the RLC.

The government initially owns the firms, whereas after the transition all firms are privately owned. Once the RLC is determined, the government distributes the firms’ shares in a fair and equitable manner (e.g., vouchers are distributed to the population, as they were distributed by the Russian government in late 1992). The corrupt shareholders can redistribute the residual claims over physical assets, where the ability to redistribute the residual claim is a function of the industry-specific RLC, \( \theta_j \). This, for example, captures tactics that (illegally) altered the initial distribution of shares in Krasnoyarsk, Serbia, where laws were subject to loose interpretation. In this case, a large stake in Russia’s second-biggest hydro-electric power plant somehow changed hands for roughly 2% of the market price.\(^9\) Finally, and given the ex post distribution of shares, investment is made and profits are realized.

5. Equilibrium

The impact of the existing political constraints on the evolving legal system, and therefore on the economy are now explored. Using the framework developed above, we start by assuming property rights are well defined and enforced, but the embezzlement function may be different from zero (Section 5.1). Next, we investigate the importance of defining and enforcing property rights, assuming illicit trade is not

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possible, i.e., $D(.) \equiv 0$ (Section 5.2). Finally, we model and analyze the case in which both rent-seeking activities are possible (Section 5.3). Focusing on each rent-seeking activity separately, and then adding the two together, allows us to develop intuition and to better understand the predictions made in the paper.

### 5.1. Illicit Trade

In this Section we assume illicit trade is possible, but redistributing firms' shares is not, i.e., $\alpha_{NCj}$ and $\alpha_{Cj}$ are fixed and not a function of $\theta_j$, and derive the equilibrium by solving the game backward; first deriving the optimal investment scheme, $X_j$, and then deriving the legal institutions, i.e., the RLC.

**Proposition 1.** If $\frac{d^2 \pi_j}{dX_j^2} < 0$ then $\frac{d\alpha_{NCj}}{d\theta_j} > 0$ and $\frac{d\alpha_{Cj}}{d\theta_j} = 0$. Furthermore, $\frac{dX_j}{d\theta_j} > 0$.

**Proof.** The proof is relegated to Appendix B.

Proposition one states that given $\frac{d^2 \pi_j}{dX_j^2} < 0$, the amount non-corrupt shareholders invest in firm $j$ increases, whereas corrupt shareholders’ investment remains unchanged with $\theta_j$ (follows from Lemmas 1A and 3A in Appendix A). The reason is that the greater $\theta_j$ is, the smaller is the value of the embezzlement function, and therefore the lower is the volume of illicit trade.

Next, we show that non-corrupt shareholders prefer to separate themselves from the corrupt shareholders, and invest in less lucrative industries simply because corrupt shareholders do not invest in these industries. In other words, a Separation Theorem is derived. To see this, let the line CC in Fig. 2 depict the combinations of $\theta_j$ and $\varphi_j$, such that corrupt shareholders are indifferent to the question of investing
or not investing in firm \( j \) (note that the line is drawn independent of the x-coordinate, i.e., independent of the RLC). Corrupt shareholders invest in firms located in Region A of Fig. 2, i.e. they invest in the more lucrative industries. When \( \theta_j \) is a small, a non-corrupt shareholder may invest in firms with lower \( \varphi_j \)'s simply because corrupt shareholders do not invest in these firms. To derive this conjecture, let \( \varphi_j \) denote the critical value of \( \varphi_j \) such that \( R_{C_j} (\varphi_j) = (1 + r) \), where

\[
R_{NC_j} (\varphi_j) = \alpha_{NC_j} \cdot \frac{d\pi_j(\cdot, \varphi_j)}{dX_j} \cdot \left( 1 - D(\theta_j, \alpha_{C_j}) \right), \quad \text{and} \quad R_{C_j} (\varphi_j) = \alpha_{C_j} \cdot \frac{d\pi_j(\cdot, \varphi_j)}{dX_j} \quad \text{(Eqs. (1A) and (3A) in Appendix A, respectively).}
\]

\[
0 \lim_{\epsilon \to 0} R_{NC_j} (\varphi_j - \epsilon) \geq R_{C_j} (\varphi_j) = (1 + r). \quad \text{If, on the other hand,} \quad \alpha_{NC_j} \leq \alpha_{C_j}, \quad \text{then} \quad 0 \lim_{\epsilon \to 0} R_{NC_j} (\varphi_j - \epsilon) < R_{C_j} (\varphi_j) = (1 + r).
\]

**Proposition 2.** If \( \alpha_{NC_j} > \alpha_{C_j} \), then \( \lim_{\epsilon \to 0} R_{NC_j} (\varphi_j - \epsilon) \geq R_{C_j} (\varphi_j) = (1 + r) \). If, on the other hand, \( \alpha_{NC_j} \leq \alpha_{C_j} \), then \( \lim_{\epsilon \to 0} R_{NC_j} (\varphi_j - \epsilon) < R_{C_j} (\varphi_j) = (1 + r) \).
**Proof.** The proof is relegated to Appendix B.

In Fig. 3a, non-corrupt shareholders invest in firms located in Regions B and C, whereas corrupt shareholders invest in firms located in Regions A and B (which is equivalent to Region A in Fig. 2). The conditions, under which non-corrupt shareholders invest in less profitable firms, are met if the majority of the shares are owned by non-corrupt shareholders, i.e., \( \alpha_{NCj} > \alpha_{Cj} \) (Fig. 3a, Region C). If, on the other hand, most of the shares are owned by corrupt shareholders, i.e., \( \alpha_{NCj} \leq \alpha_{Cj} \), then non-corrupt shareholders do not invest in less profitable firms, and the AA and CC lines coincide (Fig. 3b). Non-corrupt shareholders prefer to separate themselves from the corrupt shareholders as long as the return per unit of capital invested is sufficiently high.

**Fig. 3a: Illicit trade and the investment of non-corrupt shareholders**

where \( \alpha_{NCj} > \alpha_{Cj} \)
Fig. 3b: Illicit trade and the investment of non-corrupt shareholders

where $\alpha_{NC} \leq \alpha_{Cj}$

We now turn to the first stage of the game and determine the equilibrium RLC. Following Grossman and Helpman’s (1994) Proposition 1, the political-economic equilibrium is characterized, where the RLC equates the marginal benefit from the RLC to the marginal cost plus the alternative cost of capital, i.e., $(1+r)$.

**Proposition 3.** If an internal solution exists, then in equilibrium the RLC is determined by the following relationship:

$$(1+r) \cdot S(\theta)$$

$$= (1+r) \cdot (1+a) \cdot \sum_{i=[NC,C]} \frac{\partial l_i}{\partial \theta}$$

$$= (1+a) \sum_{j=1}^J \left[ \frac{\partial D(\theta_j, \alpha_{Cj})}{\partial \theta} \right] \cdot \alpha_{NCj} \cdot \pi_j (\cdot) + a \sum_{j=1}^J q_j \left[ \frac{\partial p_j}{\partial \theta} \right]$$

$$= B(\theta)$$

**Proof.** The proof is relegated to Appendix B.

The marginal benefit from the RLC, $B(\theta)$, can be broken down into two parts;
1. The Production effect, i.e., 
\[(1 + a) \left| \frac{\partial (\theta, \alpha_c)}{\partial \theta} \right| \alpha_{NC} \cdot \pi_j (\cdot) \], and

2. The Consumption effect, i.e., 
\[a \left[ q_j \cdot \left| \frac{\partial \theta}{\partial \theta} \right| \right].

The first part, i.e., the Production effect, captures the increase in output as \( \theta \) increases (an increase in \( \theta \) decreases the embezzlement function). The more shares that are allocated to the non-corrupt shareholders (i.e., the larger is \( \alpha_{NC} \)), the higher the profits (i.e., the larger is \( \pi_j (\cdot) \)), and the more sensitive is the embezzlement function to changes in the RLC (i.e., the larger is \( \left| \frac{\partial (\theta, \alpha_c)}{\partial \theta} \right| \)), the larger the Production effect will be. The second part, i.e., the Consumption effect, captures the increase in consumer surplus as \( \theta \) increases (an increase in \( \theta \) increases the supply of product \( j \), and therefore reduces the equilibrium price). The Consumption effect is greater, the larger is the quantity consumed.

Assume \( S(\theta) \) is an increasing function and \( B(\theta) \) is a decreasing function of \( \theta \). Assume also that \( S(0) < B(0) \) and \( S(1) > B(1) \). These assumptions imply a unique internal equilibrium at \( \theta^* \in (0, 1) \) (see Fig. 4).

![Graph showing S(\theta) and B(\theta) with \theta^* as the equilibrium point]
Fig. 4: An interior equilibrium

According to this scenario, depicted in Fig. 4, the economy does not reach full capitalism, i.e., $\theta = 1$, in part because of the monetary cost associated with stronger institutions, i.e., higher $\theta$'s. Hence, and similar to the predictions of Polishchuk and Savvateev (2004), fully secured property rights will not emerge during transition. To this end, Hellman (1998) argued that short-run winners will try to prevent the reform from continuing.

The absence of a rule of law, i.e., a low RLC, in countries like Russia has led to an increase in predatory activities that are likely to have adverse effects on productive activity such as investment. The question then is why is the law enforced in some countries and less (or barely) enforced in other countries? Existing literature (e.g., Johnson, Kaufmann, and Shleifer, 1998; and Roland and Verdier, 1999) explain this difference by modeling coordination problems (law enforcement is a public good). See also Roland (2000), chapter 8, and reference therein. In those papers, there is a “good” equilibrium and a “bad” equilibrium and economies may choose one or the other. By focusing on a unique equilibrium, we abstract from the coordination problem and focus instead on the economic and political cost of reform; a cost that is affected by the distribution of power among the elite prior to the reform. To this end, output may decrease after reform. In terms of Fig. 4, if for low values of $\theta$, the marginal benefit from the RLC, $B(\theta)$, is small compared with the marginal cost of the constitution index, $S(\theta)$, then output declines after transition. Proposition 3 suggests that the outcome of the reform is a balance between the benefits from a reform and the monetary costs. Furthermore, if the political economic benefits from a RLC are sufficiently small, output will decline. An alternative explanation to this decline in output is given by Braguinsky and Myerson (2007), who focused on capital
market.

**Corollary 2. If interest rates, \( r \), are very high, then institutions might be in total anarchy during the privatization process.**

Corollary 2, which follows directly from Proposition 4, sheds new light on the role the price of capital plays in creating new institutions. More specifically, it shows that the price of capital affects an economy in transition, both at the investment level and at the institutions level (See also Stiglitz and Hoff, 2005).

**5.2. Defining and enforcing property rights**

Next, and unlike Section 5.1, we assume that the RLC does affect property rights enforcement, i.e. \( \alpha_{NCj}(\theta_j) \) and \( \alpha_{Cj}(\theta_j) \) vary with \( \theta_j \), but that illicit trade is not possible, i.e. \( D(\theta_j, \alpha_{Cj}) \equiv 0 \).

Again, starting from the second stage of the game, and unlike Proposition 1 derived in Section 5.1, the amount invested by corrupt shareholders increases as the RLC decreases.

**Proposition 4. If** \( \frac{d^2x_{j}}{dx_{j}^2} < 0 \), **then** \( \frac{dx_{NCj}}{d\theta_j} > 0 \) **and** \( \frac{dx_{Cj}}{d\theta_j} < 0 \), **where** \( \frac{dx_{j}}{d\theta_j} = 0 \).

**Proof.** The proof is similar to the one used to derive Proposition 1, and therefore is omitted.

In other words, and given \( \frac{d^2x_{j}}{dx_{j}^2} < 0 \), the amount non-corrupt shareholders invest in firm \( j \) increases, whereas the amount corrupt shareholders invest in firm \( j \) decreases, with \( \theta \). The reason is that shareholders are similar except for their ability to exploit
other shareholders, where the larger $\theta_j$, the larger the residual claim that goes to non-corrupt shareholders. Note that, since $1 = \alpha_{Cj}(\theta_j) + \alpha_{NCj}(\theta_j)$ and the embezzlement function is fixed at zero, the total investment is independent of $\theta_j$.

Although the non-corrupt shareholder’s return to investment increases with $\theta_j$, whereas the corrupt shareholder's return to investment decreases with $\theta_j$, the Separating Theorem does not hold. The reason is that the embezzlement function is fixed at zero, and therefore the return to investment decreases monotonically with $\phi_j$ for both non-corrupt shareholders and corrupt shareholders (see Fig. 5). The non-corrupt shareholders invest in firms located in Region B of Fig. 5, whereas the corrupt shareholders invest in firms located in Regions A and B of Fig. 5.

Note also that the AA curve, unlike in Section 5.1, is upward sloping. The corrupt shareholder’s return to investment decreases with $\theta_j$, whereas the return to investment of the non-corrupt shareholders increases with $\theta_j$. 

Fig 5: Return to investment, where $\alpha_{NCj}(1) = \alpha_{Cj}(1)$
Returning to the first stage of the game, in which the RLC is determined, it can be shown that the quality of legal institutions will be lower than in Section 5.1. The reason is that the marginal benefit from institutions is lower. The economy ends up at Point B, which is down and to the left of Point A (see Fig. 6). The difference in the marginal benefit from legal institutions is

\[ B_1(\theta) - B_2(\theta) = (1 + a) \sum_{j=1}^{n} \left[ \frac{\partial D(\theta_j, \alpha_{j\gamma})}{\partial \theta} \cdot \alpha_{\gamma j} \right] \cdot \pi_j(.) > 0, \]

where 1 denotes Scenario 1 (holding the distribution of shares constant) and 2 denotes Scenario 2 (fixing the embezzlement function at zero). Under Scenario 2, the marginal benefit equals only the consumption effect, i.e.,

\[ a \left[ q_j \left| \frac{\partial q_j}{\partial \theta} \right| \right]. \]

**Fig. 6: The RLC and property rights institutions**

### 5.3. Property rights institutions and illicit trade

Now we are ready to incorporate both rent-seeking activities, and shed further light on the RLC. To this end, we denote the absolute value of the elasticity of substitution
between illicit institutions and property rights institutions as \( \xi = \left| \frac{d\ln D(\theta_j, a_{\theta_j})}{d\ln(a_{\theta_j}(\theta_j))} \right| \).

**Assumption 1.** \( \xi = \left| \frac{d\ln D(\theta_j, a_{\theta_j})}{d\ln(a_{\theta_j}(\theta_j))} \right| > 1 \)

In other words, the damage control function (e.g., theft) is more sensitive to changes in the RLC, than are property rights institutions.

**Proposition 5.** Given Assumption 1, net profits of firm \( j \) increase with \( \theta_j \) and are maximized at \( \theta_j = 1 \). Furthermore, marginal benefit from investment increases with \( \theta_j \), i.e., 
\[
\frac{\partial^2 W}{\partial \theta_j \partial X_j} > 0.
\]

**Proof.** The proof is relegated to Appendix B.

In other words, given the assumptions made in the paper and if \( \xi > 1 \), investment is more profitable the higher the RLC.

**Proposition 6.** Given Assumption 1, \( \frac{dx_{\theta_j}}{d\theta_j} > 0 \) and \( \frac{dx_{\theta_j}}{d\theta_j} < 0 \), where \( \frac{dx_j}{d\theta_j} > 0 \).

**Proof.** Follows from Propositions 1 and 4. Q.E.D.

To this end, foreign and Russian investors who participated in the 2001 CEFIR survey were asked to set reform priorities, evaluate the depth of problems in a number of investment related areas, and identify major reasons for capital flight from Russia. It is interesting to note that the survey concluded that the highest priority should be given to fighting corruption, and that the lack of independence of the judiciary system and the authorities’ failure to implement court decisions were seen by the respondents...
as an extremely serious barrier to investment.

Reintroducing the embezzlement function brings back the Separating Theorem, whereby the AA curve now slopes upward because ex post investor rights are a function of the RLC and are not fixed. As in Section 5.1, the corrupt shareholders invests in firms located in Regions A and B of Fig. 7, whereas the non-corrupt shareholders invests in firms located in Regions B and C of Fig. 7 (assuming $\alpha_{NCj} > \alpha_{Cj}$).

![Fig. 7: Shareholders investment scheme](image)

The interactions between property rights institutions and illicit trade do, however, affect the RLC. Specifically, it introduces an ownership effect. The marginal benefit from the RLC, under this third scenario, can be broken down into three parts:

1. The Ownership effect, i.e., $-(1+a)\frac{\partial \alpha_{NCj}}{\partial \theta} \cdot D(\theta, \alpha_{Cj}) \cdot \pi_j(\cdot)$,

2. The Production effect, i.e., $(1+a)\left[\frac{\partial D(\theta, \alpha_{Cj})}{\partial \theta} \right] \alpha_{NCj}(\cdot) \cdot \pi_j(\cdot)$, and
3. The Consumption effect, i.e., \( a \left[ q_j \left| \frac{\partial \pi_j}{\partial \theta} \right. \right] \).

The interactions between property rights institutions and illicit trade introduces a new effect, i.e., the Ownership effect, which captures the change in output due to the change in ownership. An increase in \( \theta \) leads to an increase in the non-corrupt shareholders' share in firm \( j \), and therefore to an increase in the loss in output due to the embezzlement function. The marginal benefit from the RLC is

\[
(1+a) \sum_{j=1}^{J} \left[ -\frac{\partial \alpha_{SCj}}{\partial \theta} \cdot D(\theta_j, \alpha_{Cj}) + \frac{\partial D(\theta_j, \alpha_{Cj})}{\partial \theta} \cdot \alpha_{SCj} \left( . \right) \right] \cdot \pi_j \left( . \right) + \sum_{j=1}^{J} q_j \left[ \frac{\partial p_j}{\partial X_j} \cdot \frac{\partial X_j}{\partial \theta} \right],
\]

where the Ownership effect is negative. The equilibrium is therefore obtained down and to the left of Point A in Fig. 4. The ability of corrupt shareholders to redistribute shares mitigates the direct cost imposed by the embezzlement function on the firms' output. If everyone is corrupt, then there is no one to steal from.

This conclusion, that interest groups may create incentives large enough to prevent the economy from fully implementing reforms, can provide us with a rationale for the differences in economic performance and reforms between Yeltsin’s presidency, during which Russia grew in 1997 and 1998 by 0.009 and (-0.049), respectively, and Putin’s Presidency, during which Russia grew in 1999 and 2000 by 0.054 and 0.09, respectively (Berglof et al., 2003, Table 3.3). The paper can offer a political-economic rationale for the difference in the performance of the two presidents, if indeed the various domestic interest groups that supported Yeltsin (but not Putin) benefited from “lawlessness”. Putin started his political career from scratch, with almost no binding commitment to existing lobby groups, whereas Yeltsin depended heavily on the support of various domestic interest groups during his rule and 1996 reelection. The Putin government passed about 80 percent of its legislative agenda through the Duma: twenty-nine reform laws in such contentious
areas as land property and law enforcement. The government back in 1996-1997 had prepared most of these laws but they had no chance of being passed by the previous Duma, given the fierce conflict between the two branches of government (See Berglof et al, 2003, and reference therein). Overall, the combination of additional resources, the absence of commitments to interest groups and lack of parliamentary opposition, allowed Putin to pursue his own personal agenda.

6. The Empirical Assessment

The empirical predictions of the paper, especially the relation between profitability and corruption, are investigated next. Although the analysis is descriptive in nature and does not imply any causality, it does find correlation between variables and therefore supports the theoretical findings.

For the empirical assessment, we required observations that single out corrupt shareholders and allow us to classify them by country and by sector (using the 1987 version of the 1-digit SIC code). A good starting point was data collected and used by Faccio (2006) on connected firms, i.e., firms connected to a politician (the firm's large shareholders or top officers are a member of parliament, a minister or the head of state, or closely related to a top official). Since ex ante, the relation between connected firms and corruption is not clear, we computed the correlation coefficient between the two. The corruption indices were those developed by Kaufmann et al. (1999a and 1999b) [henceforth, denoted Kaufmann] and the International Country Risk Guide's assessment of corruption in governments [henceforth, denoted ICRG]. The Kaufmann coefficient is based on a statistical compilation of perception regarding the quality of governance in different countries.

The measure of connected firms is a good proxy for corrupt shareholders,

10 Boycko, Shleifer and Vishney (1995) also noted the strong opposition to reforms since 1992.
since the correlation coefficient linking the number of connected firms and the
different corruption indices is positive and different from zero at a significance level
of 1% (see Table 1). A similar conclusion was derived by Faccio (2006).

<table>
<thead>
<tr>
<th></th>
<th>Legal Quality</th>
<th>Kaufmann</th>
<th>ICRG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firms connected to a minister or MP, or in close relationship</td>
<td>-0.55</td>
<td>0.56</td>
<td>0.55</td>
</tr>
</tbody>
</table>

**Table 1: Connected firms and corruption**

Moreover, a weak definition and enforcement of property rights implies that the
quality of the legal environment is low. Hence, quality of legal environment should be
negatively correlated with the number of connected firms. Using the quality of legal
environment coefficient developed by Faccio (2006) [henceforth, denoted Legal Quality],¹¹ it can be shown that Legal Quality is negatively correlated with the
number of connected firms and is different from 0 at a significance level of 1% (Table
1). Although the corruption indices supposedly measure different aspects of
corruption, the two are highly correlated (the correlation coefficient between the
Kaufmann and ICRG coefficients is 0.9 and is significant at a 1% level). Hence, in
what follows, we focus on the Kaufmann coefficient of corruption using Faccio's
definition of connected firms.

As noted in Faccio, the number of identifiable connected firms within any
individual country is not necessarily large (a strict application of the criteria yields a

¹¹ The quality of legal environment is the average between efficiency of the judicial system and rule of
law. Efficiency of the judicial system is an assessment of the efficiency and integrity of the legal
environment as it affects businesses, particularly foreign firms and is produced by the country-risk
sub-sample of connected firms that constitutes less than 3% of the total sample, i.e. 541 firms); connections are more widespread among larger firms (connected firms represent 7.72% of the world's stock market capitalization); and in some countries, political connections are quite common (in Russia, for example, connected firms represent 86.75% of the market capitalization). Moreover, the log of GDP per capita is negatively correlated with corruption (i.e., -0.87) and positively correlated with the quality of the legal environment (i.e., 0.88), both at a 1% significance level (Table 2):

<table>
<thead>
<tr>
<th></th>
<th>Legal Quality</th>
<th>Kaufmann</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log GDP Per capita</td>
<td>0.88</td>
<td>-0.87</td>
</tr>
</tbody>
</table>

**Table 2: Correlation between log GDP per capita, corruption, and quality of legal environment**

Going back to Proposition 6 (or Proposition 1), we argued that the marginal benefit from investment increases with the RLC. Hence, if indeed investment is positively correlated with GDP per capita and negatively correlated with corruption, then log GDP per capita should be positively correlated with Legal Quality and negatively correlation with the Kaufmann coefficient, as depicted in Table 2.

Next, using Mergent\textsuperscript{12} and Hoover's\textsuperscript{13} online websites, the firms' main line of business (1-digit SIC code, 1987 version), revenue and net income where added. Connected firms' income and revenue were positively correlated with corruption (Table 3), as predicted by our model, if indeed profits are correlated with investment.

\textsuperscript{12}http://www.mergentonline.com/

\textsuperscript{13}rating agency Business International Corporation. Rule of law is an assessment of the law-and-order tradition in the country and is produced by the country-risk rating agency International Country Risk.
Table 3: Correlation between income, revenue, and corruption

Before elaborating on the interactions between industry characteristics and corruption, we evaluated the business constraints that "gifts", bribes, and theft impose on a firm in corrupt economies (i.e., economies in which firms claim that corruption, theft, and lack of a supportive legal environment constrain their business). Using Investment Climate Survey data (2005), the correlation coefficient between Kaufmann and corruption and theft is computed and equals 0.3. This coefficient is larger than the correlation between Kaufmann and the Legal System (which is related to the definition and enforcement of property rights), and equals 0.25. Although we should be careful when interpreting these observations, they do suggest that if we view the Kaufmann coefficient as a proxy for the RLC, then it is more sensitive to "gifts", bribes and theft in corrupt economies, than to property rights institutions (restating Assumption 1).

Next, and returning to our data set on connected firms, we examined the distribution of firms across sectors (1-digit SIC code). Over 50% of all connected firms are in the finance, insurance and real-estate sector and the manufacturing sector; 27% and 28%, respectively. However, looking at average profits across sectors, the finance, insurance and real-estate sector's profits are significantly higher than those of

<table>
<thead>
<tr>
<th></th>
<th>Legal Quality</th>
<th>Kaufmann</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>-0.3</td>
<td>0.28</td>
</tr>
<tr>
<td>Revenue</td>
<td>-0.28</td>
<td>0.31</td>
</tr>
</tbody>
</table>
the manufacturing sector.

Whereas many of the connected firms in the finance, insurance and real-estate sector are located in less corrupt countries, many of the connected firms in manufacturing are located in the more corrupt countries. The average level of corruption in the sample, i.e., the average Kaufmann coefficient, is 3.13 and the median is 3.40. The country's average level of corruption for connected firms in the finance, insurance and real-estate sector is 2.86 and the median is 2.31. The country's average level of corruption for connected firms in the manufacturing sector is 3.35 and the median is 3.47. In corrupt economies, corrupt shareholders are more likely to capture manufacturing firms (the AA curve slopes upward).

7. Discussion and Concluding Remarks

The paper assumes a two-stage transition. First, property rights institutions and illicit trade institutions are created. Then, the economic regime is transformed to a market regime, firms are privatized, illegal activity reallocates firms' residual claim, and productive (as well as unproductive) activity is performed.

The ability of the corrupt elite to influence the ruling party may lead to a low RLC, which causes under-investment, corruption, and capturing of lucrative industries by corrupt shareholders. Then, by introducing heterogeneity among industries, we extend the literature and show that the corrupt elite also corrupts the more lucrative industries and in corrupt economies, non-corrupt shareholders separate themselves from the corrupt shareholders. These predictions are consistent with the empirical findings of Campos (2000), who observes that corrupt shareholders own the large corporations, as well as the ones offered in this paper.

Although further empirical analysis is warranted before policy implications
are derived, the paper does support gradual privatization under certain conditions. It suggests that privatization should be contingent on the evolution of the legal system, since if the legal system does not yet include the required legal institutions, privatizing the economy's lucrative industries corrupts those industries. To this end, it is interesting to note that in the 1980s and 1990s, China privatized its local and regional firms, and only much later did it start privatizing its lucrative state-owned enterprises. The paper also suggests that culture and moral norms of elite may matter: when the elite have a strong sense of social responsibility, it may lead to a “Clean transition”, in contrast to when elite members have no sense of “Noble oblige” and moral limitation. In the latter, gradualism may include civic education.

This paper shows that the elite corrupts the legal institutions, captures key industries, and causes capital to migrate away from the production sector. Although it is our opinion that the intuition derived in the paper carries over to a variety of transitions (e.g. from communism to capitalism and from colonialism to independence), we wish to further investigate this by explicitly modeling political institutions and/or privatization methods.

7. Appendices

Appendix A

1A. Non-Corrupt Shareholders

1A.1. Non-Corrupt Shareholders’ and investment

The RLC is determined at the first stage and before non-corrupt shareholders decide
how much to invest in the firm (which is determined at the second stage). Hence, when non-corrupt shareholders decide how much to invest in the firm, i.e., when they maximize $\Omega_{NC}$ (Eq. 3) with respect to $x_{NCj}$ for all $j$, they take $\theta$ as given; therefore, in equilibrium

$$R_{NCj} = \alpha_{NCj}(\theta_j) \cdot \frac{d\pi}{dx_j} \cdot \left(1 - D(\theta_j, \alpha_{Cj})\right) = 1 + r \text{ or } x_{NCj} = 0$$  \hspace{1cm} (1A)

Note that we assumed, for simplicity, that firms act in a competitive environment. Then, since the privatized firm maximizes its profit, the supply function for $q_j$ can be derived from the profit function using Hotelling’s lemma, i.e.

$$\frac{\partial \pi}{\partial q_j} = y_j(p_j, X_j, \varphi_j) \text{ for } \forall j \in J,$$

where $\frac{\partial y_j}{\partial x_j} \geq 0$ and $\frac{\partial y_j}{\partial \varphi_j} \geq 0$, and

where $\frac{d\pi}{dx_j} = y_j(p_j, \varphi_j, \frac{\partial y_j}{\partial x_j} + \frac{\partial y_j}{\partial \alpha_j})$.

As seen from Eq. (1A) the marginal increment in profits, $\alpha_{NCj}(\theta_j) \cdot \frac{d\pi}{dx_j} \cdot \left(1 - D(\theta_j, \alpha_{Cj})\right)$ due to a marginal increase in the amount they invest in firm $j$, $x_{NCj}$, equals the return from investing in the outside option, $(1 + r)$. It also indicates that a decrease in the residual claim over the physical assets of non-corrupt shareholders, $\alpha_{NCj}(\theta_j)$, will decrease the investment made by non-corrupt shareholders.

**Lemma 1A.**

$$\frac{\partial R_{NCj}}{\partial \theta_j} > 0.$$

**Proof.** To derive Lemma 1A, let us take the derivative of Eq. (1A) with respect to $\theta_j$, while applying our assumption that $\frac{\partial \alpha_{NCj}}{\partial \theta_j} \geq 0$ and $\frac{\partial \alpha_{NCj}}{\partial x_j} \leq 0$, and while holding $x_j$ constant.
non-corrupt shareholders’ return from investment, $R_{NC}$, increases with $\theta_j$. This is because corrupt shareholders’ ability to steal and redistribute income decreases as $\theta_j$ increases, and therefore the unproductive activity in the economy is lower.

1A.2. Non-Corrupt Shareholders and the RLC

The government solves a common-agent problem when determining the RLC in equilibrium. Therefore, while applying the envelope theorem, i.e., $\frac{\partial W_{NC}}{\partial NC} = 0$, and since the contribution plan is **locally truthful** (i.e., the marginal contribution equals the marginal benefit from the RLC),

$$\sum_{j=1}^{J} \left[ \frac{\partial \alpha_{NCj}}{\partial \theta_j} \left( 1 - D(\theta_j, \alpha_{Oj}) \right) - \frac{\partial D(\theta_j, \alpha_{Oj})}{\partial \theta} \cdot \alpha_{NCj}(\theta_j) \right] \cdot \pi_j - \frac{\partial t_{NCj}}{\partial \theta} (1 + r) = \frac{\partial s_{NCj}}{\partial \theta}. \quad (2A)$$

The contributions are “locally truthful”, as defined by Bernheim and Whinston (1986) and Dixit, Grossman and Helpman (1996). Grossman and Helpman (1994 and 1995) also reached this conclusion for cases in which groups compete for trade protection in both small and large economies. Dixit (1995) addresses **locally truthful** contributions when there is a dichotomy between taxes and subsidies on production and consumption in an open economy. Brainard and Verdier (1994) investigate how persistent protection emerges from an interaction between industry adjustment, lobbying, and political response. They investigate the behavior of an industry owner following an exogenous shock, and show that the contributions at equilibrium are locally truthful.

The marginal benefit from the level of the RLC, LHS, is equated to the marginal cost of acquiring a higher RLC, RHS. Non-corrupt shareholders’ marginal
benefit from an increase in $\theta_j$ is larger the larger is $\frac{\partial}{\partial \theta_j} \left[ (1 - D(\theta_j, \alpha_{\theta_j})) \cdot \alpha_{\theta_j} \right]$. The marginal cost of acquiring a higher index is smaller the smaller is $\frac{\partial}{\partial \theta_j} (1 + r)$. Furthermore, if taxes are not contingent on the firm-specific RLC, then the contribution function slopes upwards, i.e., $\frac{\partial \alpha_{\theta_j}}{\partial \theta_j} > 0$ (since $\frac{\partial \alpha_{\theta_j}}{\partial \theta_j} > 0$ and $\frac{\partial D(\theta_j, \alpha_{\theta_j})}{\partial \theta_j} < 0$).

**Lemma 2A.**

$\frac{\partial \alpha_{\theta_j}}{\partial \theta_j}$ is larger the larger is $\frac{\partial}{\partial \theta_j} \left[ (1 - D(\theta_j, \alpha_{\theta_j})) \cdot \alpha_{\theta_j} \right] > 0$ and the smaller is $\frac{\partial \alpha_{\theta_j}}{\partial \theta_j}$. Furthermore, if $\frac{\partial \alpha_{\theta_j}}{\partial \theta_j} \equiv 0$ then $\frac{\partial \alpha_{\theta_j}}{\partial \theta_j} > 0$.

The larger is the non-corrupt shareholders marginal profit, the larger is its marginal contribution (the equilibrium is locally truthful). Then, since $\frac{\partial}{\partial \theta_j} \left[ (1 - D(\theta_j, \alpha_{\theta_j})) \cdot \alpha_{\theta_j} \right] > 0$, marginal profits increase with the RLC. Furthermore, if the level of institutions does not affect the monetary cost collected from non-corrupt shareholders, then the marginal benefit from higher RLC is positive for all $\theta$ and $\frac{\partial \alpha_{\theta_j}}{\partial \theta_j} > 0$.

**2A. Corrupt Shareholders**

**2A.1. Corrupt Shareholders’ and investment**

The first-order condition with respect to $x_{\theta_j}$ for $j \in J$ is, in equilibrium,

$$R_{\theta_j} \equiv \alpha_{\theta_j}(\theta_j) \frac{d\pi_j}{dX_j} = (1 + r) \text{ or } x_{\theta_j} = 0. \tag{3A}$$

Given that corrupt shareholders invests in firm $j$, the return to the marginal unit invested equals $R_{\theta_j}$. Recall that the embezzlement function does not affect corrupt
shareholders.

Hence, as obtained for non-corrupt shareholders in Eq. (1A), corrupt shareholders equate their alternative cost of capital, RHS, to their marginal benefit from the firm, LHS. Unlike non-corrupt shareholders, however, the embezzlement function does not affect corrupt shareholder’s marginal return to investment (by assumption).

**Lemma 3A.**

\[
\frac{\partial R}{\partial \theta_j} < 0.
\]

**Proof.** To derive Lemma 3A, let us take the derivative of Eq. (3A) with respect to \( \theta_j \), while applying our assumption that \( \frac{\partial C_j}{\partial \theta_j} \leq 0 \) and while holding \( x_{\theta_j} \) constant.

### 2A.2. Corrupt Shareholders and the RLC

As mentioned above in Section 3.4.1, the contribution schedule in equilibrium is *locally truthful*, i.e.,

\[
\sum_{j=1}^{J} \frac{\partial \alpha_{Cj}}{\partial \theta} \cdot \pi_j (\cdot) - \frac{\partial t_c}{\partial \theta} (1 + r) = \frac{\partial s_c}{\partial \theta}.
\]  

(4A)

Thus, in equilibrium, the marginal contribution schedule of corrupt shareholders, RHS, is equal to the net marginal benefit attributed to the RLC, LHS. It is postulated that the larger the RLC, the lower is corrupt shareholders’ share of the residual claim, i.e., \( \frac{\partial s_{\theta}}{\partial \theta} \leq 0 \), therefore the LHS is negative; in other words, the contribution schedule is downward sloping, \( \frac{\partial s_{\theta}}{\partial \theta} < 0 \).

**Lemma 4A.**

\( \frac{\partial s_{\theta}}{\partial \theta} < 0 \), and \( \left| \frac{\partial s_{\theta}}{\partial \theta} \right| \) is smaller the smaller is \( \frac{\partial s_{\theta}}{\partial \theta} > 0 \).
Appendix B

Proof of Proposition 1:

To derive Proposition 1, we utilize the implicit function theorem and Eqs. (1A) and (3A) in Appendix A. In other words, and since \( \frac{d^2 \pi_j}{dx_j} < 0 \),

\[
\frac{dx_{NCj}}{d\theta_j} = -\frac{d\pi_j}{dx_j} \frac{\frac{d\theta_j}{d\theta_j}}{\frac{d\pi_j}{dx_j}} \left[ 1 - D(\theta_j, \alpha_{Cj}) \right] > 0 \quad \text{and}
\[
\frac{dx_{Cj}}{d\theta_j} = -\frac{d\pi_j}{dx_j} \frac{\frac{d\theta_j}{d\theta_j}}{\frac{d\pi_j}{dx_j}} \left[ 1 - D(\theta_j, \alpha_{Cj}) \right] = 0,
\]

and therefore \( \frac{dx_j}{d\theta_j} > 0 \).

Q.E.D.

Proof of Proposition 2:

The non-corrupt shareholders return to investment is lower when \( \alpha_{Cj} > 0 \), since \( D(., 1) > 0 \) if \( \alpha_{Cj} > 0 \) and \( \theta_j < 1 \) and \( D(., 0) = 0 \) otherwise; in other words, for \( \alpha_{Cj} > 0 \) and \( \theta_j < 1 \) we have

\[
\frac{d\pi_j}{dX_j} \left( 1 - D(\theta_j, \alpha_{Cj}) > 0 \right) < \frac{d\pi_j}{dX_j}.
\]

If \( 0 < \phi_j < \bar{\phi}_j < 1 \) then corrupt shareholders do not invest in firm \( j \) and \( D(., 0) = 0 \).

Therefore, if \( \alpha_{NCj} > \alpha_{Cj} \) then \( \lim_{\epsilon \to 0} R_{NCj}(\bar{\phi}_j - \epsilon) > R_{Cj}(\bar{\phi}_j) = (1 + r) \). If, on the other hand, \( \alpha_{NCj} \leq \alpha_{Cj} \) then \( \lim_{\epsilon \to 0} R_{NCj}(\bar{\phi}_j - \epsilon) \leq R_{Cj}(\bar{\phi}_j) = (1 + r) \).

Q.E.D.

Proof of Proposition 3:

The price of commodity \( j \), \( p_j \), can be rewritten as \( p_j(X_j(\theta_j), \varphi_j) \). The reasoning for
this is that the equilibrium price clears the market, i.e., \( q_j(p) = y_j(p, X_j, \phi_j) \), and the income of the shareholders and their investment level are a function of the firm-specific RLC, i.e. \( \theta_j \). In other words, in equilibrium, the price is determined by the demand and supply of the goods, and thus the price, \textit{in equilibrium}, is a function of \( X_j(\theta_j) \) and \( \phi_j \). Hence, domestic welfare is a function of \( \theta \):

\[
W(\theta) = l + \sum_{l \in \{NC,C\}} w_i(\theta) + cs(\theta).
\]

The political-economic equilibrium can then be characterized in line with Grossman and Helpman’s (1994) \textit{Proposition 1} (see also Bernheim and Whinston, 1986, Lemma 2).

\textbf{Lemma 1B.}

\( \{s_i^0\}_{i \in \{NC,C\}}, \theta \) is a subgame-perfect Nash equilibrium of the political-economic game if and only if

1. \( s_i^0 \) are feasible for \( l \in \{NC,C\} \);

2. \( \theta^* \) maximizes \( aW(\theta) + \sum_{l \in \{NC,C\}} s_i(\theta) \) on \( \theta \);

3. \( \theta^* \) maximizes \( V_i(\theta) + aW(\theta) + \sum_{l \in \{NC,C\}} s_i(\theta) \) on \( \theta \) for every \( l \in \{NC,C\} \).

4. For every \( l \in \{NC,C\} \) there exists a \( \theta' \in \theta \) that maximizes \( aW(\theta) + \sum_{l \in \{NC,C\}} s_i(\theta) \) on \( \theta \) such that \( s_i(\theta') = 0 \).

From Lemma 1A it can be shown, using Parts 2 and 3 Lemma 1B, that the equilibrium is locally truthful, and thus, in equilibrium,

\[
\frac{\partial \Omega_i}{\partial \theta} = \frac{\partial s_i}{\partial \theta}.
\]
The marginal economic surplus from the RLC, using the envelope theorem is,

\[ \frac{\partial W(\theta)}{\partial \theta} = -\sum_{j=1}^{J} \left( \frac{\partial D(\theta_j, \alpha_{Cj})}{\partial \theta} \cdot \alpha_{NCj} \cdot \pi_j(.) \right) - (1+r) \sum_{i=\{N,C\}} \frac{\partial t_i}{\partial \theta} + \sum_{j=1}^{J} \left[ q_j \frac{\partial \phi_j}{\partial X_j} \frac{\partial X_j}{\partial \theta} \right]. \]

Using Eqs. (2A) and (4A) and applying Part 2 of Lemma 1B implies that

\[ a \frac{\partial W}{\partial \theta} + \sum_{i=\{N,C\}} \frac{\partial \Omega}{\partial \theta} = 0, \]

where

\[ \sum_{i=\{N,C\}} \frac{\partial \Omega}{\partial \theta} = -\sum_{j=1}^{J} \left[ \frac{\partial D(\theta_j, \alpha_{Cj})}{\partial \theta} \cdot \alpha_{NCj} \cdot \pi_j(.) \right] - (1+r) \sum_{i=\{N,C\}} \frac{\partial t_i}{\partial \theta}. \]

Proposition 3 follows.

Q.E.D.

**Proof of Proposition 5:**

Net profits equal

\[ \pi_j(p_j, X_j, \phi_j) - \alpha_{NCj}(\theta_j) \cdot \pi_j(p_j, X_j, \phi_j) \cdot D(\theta_j, \alpha_{Cj}). \]

Direct calculation establish that if \( \frac{d}{d \theta_j} \ln D(\theta_j, \alpha_{Cj}) > \frac{d}{d \theta_j} \ln \{\alpha_{NCj}(\theta_j)\} \) then net profits increase with \( \theta_j \):

\[ \frac{\partial}{\partial \theta_j} [\pi_j(p_j, X_j, \phi_j) - \alpha_{NCj}(\theta_j) \cdot \pi_j(p_j, X_j, \phi_j) \cdot D(\theta_j, \alpha_{Cj})] > 0 \iff \left| \frac{d}{d \theta_j} \ln D(\theta_j, \alpha_{Cj}) \right| > \left| \frac{d}{d \theta_j} \ln \{\alpha_{NCj}(\theta_j)\} \right|. \]

Then, while using Eqs. (4), (5), and noting that \( W \) equals

\[ \sum_{i=\{N,C\}} l + \sum_{i=\{N,C\}} w_i + cs\left(p(X)\right) \text{ for } X \equiv \{X_1, \ldots, X_j\}, \]

it can be shown that

\[ \frac{\partial^2 W}{\partial \theta_j \partial X_j} = \frac{\partial^2}{\partial \theta_j \partial X_j} [\pi_j(p_j, X_j, \phi_j) - \alpha_{NCj}(\theta_j) \cdot \pi_j(p_j, X_j, \phi_j) \cdot D(\theta_j, \alpha_{Cj})] > 0. \]
Q.E.D.
References


Acemoglu, Daron, Simón Johnson, and James Robinson, “Institutions as the Fundamental Cause of Long-Run Growth,” April 2004.


