

# 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 non-corrupt entrepreneurs and corrupt entrepreneurs.

The paper sheds light on the way in which corrupt entrepreneurs corrupt the transition. In particular, the paper argues that institutions that mitigate illicit trade, and not only protect investors rights, are crucial to successful transition. It identifies firms and industries that corrupt entrepreneurs are more likely to invest in, e.g., very profitable industries such as natural resource monopolies and corrupt industries such as loan sharking. Furthermore, non-corrupt entrepreneurs may invest in less profitable firms simply because corrupt entrepreneurs do not invest in such firms.

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# 1 Introduction

In the latter part of the 20th century, we have witnessed transitions from centralized governments to capitalism. These transitions were characterized by massive resource allocation from public to private hands, which included massive privatization of the economy. This process was accompanied by a changing infrastructure and legal system, which affect the economy's ability to enforce the laws it institutionalizes, and therefore affects the success of the transition.<sup>1</sup> The change in the political economic institutions and legal system (e.g., the degree to which institutions provide a legal framework that is enforceable and prevents one group from expropriating the other) play an important role in transition to capitalism.

This is the focus of the paper. More specifically, it uses micro-foundations to characterize the political economic environment of an economy in transition, assuming interest groups differ with respect to their behavioral norms.<sup>2</sup> The paper, then, investigates how interest groups affect the transition of the institutions and the legal framework to support market regimes, where the new institutions and legal framework affect the level of investment and therefore the firms' output.

This paper, therefore, draws from both the literature on institutions and growth (e.g., North, 1981, 1990, Alesina and Rodrik 1994, Acemoglu and Robinson 2004, and Glaeser et al. 2004 ) and the literature on investor rights (e.g., LaPorta et al. 1998, 1999, and 2000, and Glaeser et al. 2001) to explain the transition to capitalism. It assumes that the state is an instrument for transferring resources from one group to another, and that the distribution of political power between groups with different behavioral norms affects ex-post distribution of resources. The paper, then, investigates the importance of "property rights institutions" and "licit institutions" on investment (and therefore total output) and ownership.<sup>3</sup>

In order to elucidate the bilateral connection between privatization and the constitutional conditions, an index is assumed, namely the *constitutional index*. An index value of zero indicates that the economy is in total anarchy (e.g., there is no limit on the ability of one group to expropriate the other), whereas an index value of 1 indicates that the economy is in complete order under a market regime (e.g., property

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<sup>1</sup>For more on the importance of a minimal endowment – institutional, economic, cultural, and political – necessary to ensure that the standard reform policies lead directly to a benign evolutionary process, see Murrell (1996) and Rapaczynski (1996). The importance of the legal system's initial conditions was also pointed out, with respect to Kremlin Capitalism (Blasi et. al. 1997), as being a key factor in the success of the privatization process in Russia during the transition period.

<sup>2</sup>Social capital, which is influenced by behavioral norms, affects institutions, growth, and investment (e.g., Knack and Keefer, 1997, Putnam, 2000, Woolcock and Narayan, 2000, and Easterly et al., 2005).

<sup>3</sup>Several authors have recently tried to un-bundle institutions. One example is Acemoglu and Johnson (2003), who investigated the importance of "property rights institutions" and "contracting institutions" in the long-run growth, investment, and financial development of the European colonization. Another is Persson and Tabellini (2003), who investigated the policy and economic consequences of different forms of government and electoral rules.

rights are well defined). Heterogeneity among firms with respect to profitability<sup>4</sup> and the constitutional index is assumed. The ability of a given legal system to create viable checks and balances affect different firms (industries) differently.

The government initially owns the firms, whereas after the transition all firms are privately owned. Initially the government decides the value of the constitutional index, i.e., the status of the judicial and legal system and therefore the ability to enforce investor rights. Interest groups independently attempt to influence the constitutional index chosen by the government. Some agents, who use illegal methods of operation, benefit from a lower constitutional index (e.g., residual rights of control over physical assets are not well defined and/or looting is possible), while others, who acquire shares legally, profit when it is higher. These variations in benefits produce differing incentives for the interest groups in pursuing the desired level of the constitutional index.

The government then distributes the firms' shares, where it is assumed that ex-post residual rights of control over physical assets, and the volume of illicit trade, are affected by the chosen constitutional index.<sup>5</sup> Thus, the constitutional index affects the amount invested in the firm and therefore affects the total output. Note that the discussion is of comparative statics nature, and therefore does not include evolution of constitutional changes.<sup>6</sup> The paper compares the outcome of privatization under different constitutional indices, and how it impacts ownership and investment.

The paper sheds new light on corrupt entrepreneurs' ability, and therefore incentives, to corrupt transition to a market regime. It illustrates the importance of mitigating illicit trade. It is shown that one should first mitigate illicit trade (e.g., looting), and only then should they try to protect investors'

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<sup>4</sup>Campos and Giovannoni (2005) show that the degree of asset stripping is driven by the interplay between the firm's potential profitability and its ability to influence law enforcement.

<sup>5</sup>Black et al. (2000) offer a partial explanation why Russia's economy did not revive after privatization. Those authors argued that mass privatization is likely to lead to massive self-dealing by managers and controlling shareholders unless (implausibly in the initial transition from central planning to markets) a country has a good infrastructure for controlling self-dealing (i.e., a high constitutional index). Russia accelerated the self-dealing process by selling control of its largest enterprises cheaply to crooks, who transferred their skimming talents to the enterprises they acquired, and used their wealth to further corrupt the government and block reforms that might constrain their actions.

<sup>6</sup>For more on the evolution of economies in transition see, for example, Godoy and Stiglitz (2006). Those authors investigated whether speed of privatization, legal institutions or initial conditions are more important in explaining the growth of the transition countries in the years since the end of the Cold War. Sonin (2002), on the other hand, analyzed the dynamics of institutional subversion focusing on one particular institution, public protection of property rights.

Hellman et al. (2000) investigated the dynamics of the capture economy on the basis of new firm-level data from 1999 Business Environment and Enterprise Performance Survey (BEEPS). They contrast state capture (firms shaping and affecting formulation of the rules of the game through private payments to public officials and politicians) with influence (doing the same without resource to payment) and with administrative corruption ("petty" forms of bribery in connection with the implementation of laws, rules, and regulations). They then argued that reforms should be shifted toward channeling firms' strategies in the direction of more legitimate forms of influence. Note that Hellman et al. focused on the demand by new firms to influence the state, given that large incumbent firms with formal ties to the state tend to inherit influence as a legacy of the past and tend to enjoy more secure property and contractual rights. The current paper, on the other hand, investigates the demand for constitutional changes before privatization, where all firms are initially owned by state and then privatized (there are no new entrants in the paper). In the paper, the demand for state capture arises due to the existence of corrupt entrepreneurs that want to dilute other shareholders shares.

rights. The paper also links interest rate to the constitutional index and shows that a higher interest rate is associated with a lower constitutional index.<sup>7</sup>

The paper identifies firms and industries that corrupt entrepreneurs are more likely to invest in, e.g., very profitable industries such as natural resource monopolies (supported empirically by Campos, 2000) and corrupt industries such as drug trafficking and loan sharking. The paper shows that non-corrupt entrepreneurs may invest in less profitable firms simply because corrupt entrepreneurs do not invest in such firms.

The intuitive nature of the aforementioned results stems from the political-economic structure, and especially from the assumption that an interest group exists that is connected to the government and benefits from a ruleless system (low constitutional index).<sup>8</sup> This group uses its own power to redistribute profits, and this ability decreases the higher the constitutional index is. More specifically, the constitutional index affects the distribution of residual claims over physical assets and illicit trade. While the former affects income distribution, the latter affects, in addition to income distribution, total income. The prediction made on ownership and investment stem from the heterogeneity assumption on profitability and the constitutional index.

The next section, Section 2, surveys the literature. The firm is modeled in Section 3.1; the consumers in Section 3.2; and the government in Section 3.3. The institutions and the constitutional index are presented in Section 3.4, whereas lobbies' are introduced in Sections 3.4. The timing of the game is given in Section 4. In Section 5, the equilibrium investment level is investigated (5.1), and the equilibrium level of the constitutional index is determined via political economic equilibrium (5.2). Discussion and concluding remarks are given in Section 6.

## 2 Literature

Gerard Roland (2000) has eloquently argued that central planning could have perfectly coexisted with flexible prices for consumers, and that political constraints and therefore political institutions are to blame for the inefficiency of these regimes (see the model by Shleifer and Vishny, 1992).<sup>9</sup> The paper adopts this view and tries to explain the sources of these political constraints drawing on the literature

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<sup>7</sup>Stiglitz et al. (2005) showed that higher interest rate is negatively correlated with demand for legal reforms.

<sup>8</sup>Corruption (which is possible with a low constitutional index) is one of the "six deadly sins" of Eastern Asia and is one of the six major causes hindering Eastern Asian progress ("Six Deadly Sins," The Economist, May 5th, 1998).

<sup>9</sup>In Poland, privatization and restructuring was delayed by various interest groups. The Polish mass privatization plan was blocked in Parliament for at least three years and after numerous revisions, amendments, and modifications was adopted in April 1993. When the plan finally reached implementation, it lost momentum. A similar story, whereby political struggle mitigated the benefit from privatization, is true also for Hungary (Dervis and Condon, 1994).

on interest groups and Menu-Auction, e.g., Bernheim and Whinston (1986), Grossman and Helpman (1994, 1995) and Dixit et al. (1997).

One of the most striking stylized facts about the transition in Central and Eastern Europe is the major output fall that took place at the beginning of the transition. No country in Central or Eastern Europe has been able to avoid such a fall in output. Furthermore, over time, the output fall differed greatly between countries, where for some the output fall was more permanent than for others (see Table 7.1 in Roland, 2000). Current literature has explained the output fall in terms of disruption and bargaining inefficiency, e.g., Blanchard and Kremer (1997), and search frictions and specific investment, e.g., Roland and Verdier (1999). The paper complements those authors by showing that the output may fall even without investment specificity and independent of the outside opportunities. To this end, this paper is related to Hellman (1998) who investigated the role short-run winners play in stalling the economy in a partial reform equilibrium that generates concentrated rents for them, while imposing high costs on the rest of the society.

The shareholders 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).<sup>10</sup> The owners are entrepreneurs who vary in their behavioral norms (e.g. use of corrupt methods, as opposed to legal methods, of acquiring firms). A different approach, which is not taken in this paper, says that entrepreneurs vary in their productive activities, such as innovations, and unproductive activities, such as rent seeking or organized crime (e.g., Baumol, 1990).<sup>11</sup>

La Porta et al. (2000) used the intuition developed by Jensen and Meckling (1976), who recognized the role that the legal system and the law play in social organizations, and argued that firm owners can be classified as either “insiders” or “outsiders.” La Porta et al. then showed that “insiders” can expropriate “outsiders” unless the rights of the “outsiders” are protected, (henceforth denoted investor protection). This paper extends that intuition and argues that legal institutions should protect law-abiding entrepreneurs. Moreover, and following La Porta et al. (2003), the paper assumes that better protection, by means of a higher constitutional index, is achieved by adding better checks and balances to the legal institution.<sup>12</sup>

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<sup>10</sup>A slightly different approach, not taken in the paper, is that the residual rights of control are attributed to employee decisions (Williamson, 1985, and Coase, 1988).

<sup>11</sup>Murphy, Shleifer, and Vishny (1993) discussed the negative effect of rent seeking on growth.

<sup>12</sup>The intuition developed in the paper suggests a “political” explanation for the differences in legal families, a difference that stems both from the distribution of political power among groups and from the heterogeneity of behavioral norms among groups. Legal scholars who investigated the relationship between commercial legal systems and political history include David and Brierley (1985) and La Porta et al. (1999).

Privatization in the Western world has been dealt with in cases of public utility firms (e.g., Vickers and Yarrow, 1988). When interest groups prevail, the regulation scheme is affected by the competition between the different groups (e.g., Stigler, 1971, Peltzman, 1976, and Becker, 1983). This work relates to the latter case, where the novelty is in the introduction of a dynamic story in which interest groups not only try to influence government decisions, but also try to influence the laws that govern economic transactions and, as a result, the payoffs from such transactions. To this end, the paper also complements Stiglitz and Hoff (2005), who investigate the demand for the rule of law in post-communist economies *after* privatization under the assumption that theft is possible, that those who have "stolen" assets cannot be fully protected under a change in the legal regime toward rule of law, and that the number of agents with control rights over assets is large.

### 3 The model

A two-stage game is assumed, whereby government chooses the institutions of the economy in the first stage, and in the second stage firms are privatized and ownership distribution is determined. In particular, in the first stage, interest groups influence the government's choice of institutions of the economy by offering the government contributions that are contingent on the government's choice of institutions. In the second stage, the government distributes shares (firms' profits). The entrepreneurs, then, choose the amount they want to invest in the firm. The timing of the game is depicted in Fig. 1.

#### 3.1 Firms

Commodity 0 is manufactured from labor alone with constant return to scale and an input-output coefficient of 1. 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. There are  $1 \dots J$  firms in the economy that produce commodities  $q \equiv (q_1, q_2, \dots, q_J)$ .

During the second stage, the ownership of the firms passes into private hands. With the wage rate fixed at 1, the aggregate reward to the shareholders from producing commodity  $j$  depends on the price,  $p = (p_1 \dots p_J)$ , the investment,  $X_j$ , and the industry's economic characteristics (e.g., physical barriers to entry). 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 the privatized firm  $j$ , whilst  $X_j = x_{NCj} + x_{Cj}$ .  $x_{ij}$  is the capital

transferred to firm  $j$  by entrepreneur  $i = \{NC, C\}$ , where NC and C denote the non-corrupt and corrupt entrepreneurs, respectively. Furthermore, assume  $\frac{\partial \pi_j}{\partial X_j} \geq 0$ ,  $\frac{\partial^2 \pi_j}{\partial X_j^2} \leq 0$ ,  $\frac{\partial \pi_j}{\partial p_j} \geq 0$ , and  $\frac{\partial \pi_j}{\partial \varphi_j} \geq 0$ .

For the sake of simplicity, it will be assumed that the 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.  $\frac{\partial \pi_j}{\partial p_j} = y_j(p, X_j, \varphi_j)$  for  $\forall j \in J$ , where  $\frac{\partial y_j}{\partial X_j} \geq 0$  and  $\frac{\partial y_j}{\partial \varphi_j} \geq 0$ .

### 3.2 Consumers

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

$$u = q_0 + \sum_{j \in J} u_j(q_j) \quad (1)$$

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

Given these preferences, an individual spending an amount  $E$ , consumes  $q_j = d_j(p_j)$  of commodity  $j$ . The demand function  $d_j(p_j)$  is the inverse of  $\frac{\partial u_j(q_j)}{\partial q_j}$ . A consumer consumes  $q_0 = E - \sum_{j \in J} p_j \cdot d_j(p_j)$  of the numeraire commodity. The indirect utility, then, takes the form of

$$W = E + cs(p) \quad (2)$$

where  $cs(p) \equiv \sum_{j \in J} u_j[d_j(p_j)] - \sum_{j \in J} p_j \cdot d_j(p_j)$  is the consumer surplus derived from these goods. Note that quasi-linear preferences imply that  $q_j = d_j(p_j)$ , and therefore  $\pi_j(p, X_j, \varphi_j) = \pi_j(p_j, X_j, \varphi_j)$ .

### 3.3 Government

The government chooses the constitution index in a *common-agent* equilibrium so as to maximize its benefit. Then, given the constitution index, it privatizes the firms in the economy.

Due to public opinion<sup>13</sup> and the desire to govern, the incumbent government has an incentive to maximize the economic surplus,  $W$ . On the other hand, the need for contributions (e.g. rhetoric and advertisement during elections) produces incentives for the incumbent government to maximize total contributions,  $\sum_{i=\{NC,C\}} s_i$ . Combining these incentives results in the following government benefit function,

$$G = aW + \sum_{i=\{NC,C\}} s_i, \quad (3)$$

where  $a$  is the marginal benefit from the economic surplus.

### 3.4 Institutions and the Constitutional index

#### 3.4.1 Constitutional index

To simplify the analysis, we capture the institutions of the economy using a one-dimensional variable, coined the “constitutional index.” This index assigns an economy with a number between 0 and 1 depending on its institutional state; in other words,  $\theta \in [0, 1]$ , where the “better” an economy’s institutions are, the higher is the assigned value. By “better” we mean institutions, and therefore a legal and judicial system, that better support a market regime and help investors protect their residual claim over the physical assets.<sup>14</sup>

In the game, the constitutional index is determined by the government and the entrepreneurs; in other words, it is endogenous in the model. This index takes into account the ability of interest groups and the state to expropriate others, the ability of the legal system to create viable checks and balances, and the political constraints.

#### 3.4.2 Firm-specific constitutional index

Let us assume heterogeneity among firms with respect to the constitutional index. Put differently, the ability of a given legal system to create viable checks and balances affect different firms (industries)

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<sup>13</sup>Ledyard (1989), Snyder (1990), Baron (1994), Feddersen and Pesendorfer (1996), Grossman and Helpman (1996a), and Grossman and Helpman (1996b) explored the interaction between the election process and pressure groups. An empirical analysis of the influence of voter preference, party affiliation, and senator ideology on the voting behavior of senators can be found in Levitt (1996).

<sup>14</sup>The pharmaceutical industry in China is an example of poor law enforcement. In China, pharmaceutical manufacturers battle counterfeiters. In 2002, the *Washington Post* reported the case of a security contractor in Guangzhou called Smiling Wolf Consultative, who had carried out ten raids on counterfeit/fake drug manufacturing sites but never found anyone on the premises to take in. The head of the company, Liu Dianlin, admitted to the *Post* that the task was Sisyphean and that it is impossible to eradicate the counterfeiting problem. Although these raids came after the Chinese government set its own wheels in motion to crack down on counterfeits, local police have little incentive or resources to crack down on nimble counterfeits—if they are not connected to them in the first place.

differently. For instance, land property rights affect real estate firms differently than it affects high-tech firms working on internet applications. Formally, we define a firm-specific constitutional index  $\theta_j = \theta_j(\theta)$  where  $\theta_j \in [0, 1]$ .

The firm's specific measure  $\theta_j$  includes measurements that affect corporate governance. It captures, for example, the bleak and diversified picture on corporate governance of Russian corporations in 1996: "Thirteen percent of companies engaged in bad practices so systematically that their corporate governance was graded as horrible; 46 percent received bad corporate governance grades; and 39 percent, who engaged in only one or two questionable practices among generally good ones, were graded as good. Two percent of the companies attained excellent scores." [Blasi et al. (1997), p.101]

### 3.4.3 Illicit trade: investor protection rights and looting

Corrupt entrepreneurs may tilt the playing field to their advantage by either increasing their share of the residual claim on the physical assets or by stealing from the firm (e.g., taking a proportion of the products sold and reselling them in the black market – illicit trade).

In the paper, the corrupt entrepreneur's ability to dilute other shareholders' residual claims over the physical assets is a function of the firm-specific constitutional index,  $\theta_j$ , and does not affect the firm's profits directly (although it does affect the amount invested in the firm). The corrupt entrepreneur's ability to steal from the firm, on the other hand, reduces the firm's profits. Formally, the firm's profits decrease by a proportion  $D(\theta_j, \alpha_{Cj})$ , where  $\alpha_{Cj}$  is the corrupt entrepreneur's residual claim. In addition, we assume that  $\frac{\partial D}{\partial \alpha_{Cj}} \geq 0$  and  $\frac{\partial D}{\partial \theta_j} \leq 0$ , and that  $D(0, \alpha_{Cj} > 0) = 1$ ,  $D(1, \cdot) = 0$ , and  $D(\cdot, 0) = 0$ .

The corrupt entrepreneur's income increases by  $\alpha_{Cj} \cdot D(\theta_j, \alpha_{Cj})$  times the firm's profits, whereas a proportion equal to  $(1 - \alpha_{Cj}) \cdot D(\theta_j, \alpha_{Cj})$  of firm  $j$ 's profits are lost. Illicit trade is costly, but not to illicit traders. In other words, an iceberg assumption is used to model the rent-seeking behavior. Henceforth, we refer to  $D(\theta_j, \alpha_{Cj})$  as the *damage function*. The characteristics of the damage function are reminiscent to the damage function defined in the literature on pesticides (e.g., Lichtenberg et al. 1979), with corrupt entrepreneurs replacing the pests.

These assumptions model two abilities that characterize corrupt entrepreneurs: (1) the corrupt entrepreneur's ability to redistribute the firm's residual claim over its physical assets, and (ii) the corrupt entrepreneur's ability to steal from the firm (e.g., to take a proportion of the final output and sell it

on the black market). While the former assumption affects income distribution, the latter affects, in addition to income distribution, total income.

### 3.5 Special-interest groups

There are two types of shareholders in the economy:

1. Non-corrupt entrepreneurs (NCEs), who consume and benefit from the goods in the economy.
2. Corrupt entrepreneurs (CEs), who also consume and benefit from the goods in the economy and are corrupt; in other words, CEs have the ability to steal from others either because they have the required technology or because of culture and corrupt norms.<sup>15</sup>

We assume that non-corrupt (corrupt) entrepreneurs solved the collective action problem (Olson, 1971) and organized into an interest group, i.e., into a lobby. Lobby  $i$ , representing an organized group, makes its political contribution contingent on the constitutional index chosen by the government. Let  $s_i(\theta)$  denote the contribution schedule tendered by lobby  $i$ . The lobby tailors this schedule 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. Put differently, the joint income of the members of lobby  $i$  is  $V_i = \Omega_i - s_i$ , where  $\Omega_i$  is their gross-of-contributions joint income, i.e.,

$$\Omega_i(p, \theta) = l_i + w_i \tag{4}$$

where  $l_i$  is the total labor supply (and also the labor income) of members of lobby  $i$ .  $w_i$  is the monetary value of lobby  $i$ 's profit from capital.<sup>16</sup>

The profit from capital,  $w_i$ , is now derived explicitly. The net initial endowment,  $e_i - t_i(\theta)$ , of entrepreneur  $i$ , for  $i \in \{NC, C\}$ , is distributed between investment in the firms,  $x_i$ , and alternative options in the capital market,  $e_i - t_i(\theta) - x_i$ , where  $t_i(\theta)$  is a tax collected by the government from

<sup>15</sup>Economies of transition had entrepreneurs, just not the standard mold. "A typical post-Soviet tycoon did not train at Harvard Business School. He more likely spent his formative years in government, the military, or the KGB. He garnered his work experience not at some toy investment bank or multinational cooperation but as a participant in the shady transactions that became a fact of life whenever rationing and government controls came into form." (Moise Naim, 2005, p. 30.)

<sup>16</sup>The paper's results still hold if we extend the lobby's objective function to include consumption, i.e.,  $\Omega_i \equiv W_i = l_i + w_i + \phi_i \cdot cs(p)$ , where  $\phi_i$  is the lobby's fraction in the voting population and  $W_i$  is their gross-of-contribution joint welfare.

entrepreneur  $i$  as his share of the transaction costs of the constitutional index and  $\frac{\partial t_i(\theta)}{\partial \theta} > 0$ . Thus the NCEs' total income gross of contributions is,

$$w_{NC} \equiv \sum_{j=1}^J \alpha_{NCj}(\theta_j) \cdot \pi_j(p_j, X_j, \varphi_j) \cdot (1 - D(\theta_j, \alpha_{Cj})) + (e_{NC} - t_{NC}(\theta) - x_{NC}) \cdot (1 + r) \quad (5)$$

CEs' 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  $\frac{\partial \alpha_{NCj}}{\partial \theta_j} \geq 0 \geq \frac{\partial \alpha_{Cj}}{\partial \theta_j} \cdot (1 + r)$ , on the other hand, is the alternative profit from one unit of capital. In addition, let  $x_i = \sum_{j=1}^J x_{ij}$  for  $i \in \{NC, C\}$ .

NCEs' income from investing in the firms' profits is

$$\sum_{j=1}^J \alpha_{NCj}(\theta_j) \cdot \pi_j(p_j, X_j, \varphi_j) \cdot (1 - D(\theta_j, \alpha_{Cj})), \quad (6)$$

whereas its income from investing in the outside option is

$$(e_{NC} - t_{NC}(\theta) - x_{NC}) \cdot (1 + r). \quad (7)$$

The CEs' total income, on the other hand, is

$$w_C = \sum_{j=1}^J \alpha_{Cj}(\theta_j) \cdot \pi_j(p_j, X_j, \varphi_j) + (e_C - t_C(\theta) - x_C) \cdot (1 + r). \quad (8)$$

The behavior of the different entrepreneurs is derived explicitly in Appendix A.

## 4 The Timing of the Game

Initially the government decides the value of the constitutional index,  $\theta$ , given the contribution schedule tendered by interest groups,  $s_{NCE}(\theta)$  and  $s_{CE}(\theta)$ . Put differently, interest groups independently attempt to influence the constitutional index chosen by the government.

Next, shares are distributed by the government to the public. The CE, then, can redistribute the residual claim, and the ability to redistribute the residual claim is a function of the firm-specific constitutional index. Put differently, the aforementioned assumptions imply that the initial distribution of shares may

be (illegally) altered when the firm-specific constitutional index is smaller than 1.<sup>17,18</sup> The timing of the game is depicted in Fig. 1.

Finally, and given the ex post distribution of shares, investment is made and profits are realized.

## 5 Equilibrium

We begin by characterizing the equilibrium level of investment.

### 5.1 The equilibrium level of Investment

If, in equilibrium,  $\frac{dD(\cdot)/d\theta}{D(\cdot)}$  is sufficiently large, then net profits, i.e.,

$$\pi_j(p_j, X_j, \varphi_j) - \alpha_{NCj}(\theta_j) \cdot \pi_j(p_j, X_j, \varphi_j) \cdot D(\theta_j, \alpha_{Cj}),$$

and therefore domestic welfare  $W$ , increase with the firm-specific constitutional index.

#### Proposition 1

If  $\left| \frac{d}{d\theta_j} \ln D(\theta_j, \alpha_{Cj}) \right| > \frac{d}{d\theta_j} \ln(\alpha_{NCj}(\theta_j))$  then, all else being equal, net profits of firm  $j$  and domestic welfare increase with  $\theta_j$  and are maximized at  $\theta_j = 1$ .

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

<sup>17</sup>For example, shares may be diluted:

This tactic [diluting strategy] effectively reduced the power of the outside shareholders... In 1994... a new issue of stock took place at Komineft, one of Russia's largest oil companies... Without giving adequate notice to its outside shareholders, the company called a meeting, and the shareholders present approved a very large issuance of new shares. Several key outside shareholders were not notified of this action and were not allowed to buy new shares if they did hear about it. The result was that the outside shareholders' ownership in the company was diluted by a third. [Blasi et al., 1997, p.93]

A different tactic that (illegally) alters the initial distribution of the shares, when laws are subject to loose interpretation, is takeovers:

In Krasnoyarsk, Siberia, where a large stake in Russia's second-biggest hydro-electric power plant somehow changed hands for roughly 2% of the market price... [Hence] in Russia, laws of any kind bind only those who care to be bound by them. [*The sheriff of Stock market Gulch*, The Economist, Feb. 26, 1998]

These examples, among others, help elucidate the connection between ownership of the firm and the firm-specific constitutional index.

<sup>18</sup>To simplify this presentation, it is assumed that the CEs' ability to increase their share of the residual claim is only a function of the firm-specific constitutional index, and that changing the CEs' residual claim does not affect the amount CEs' can invest in alternative assets. Introducing a price for the shares "stolen" from other shareholders does not alter the main results of the model; it does, however, make the presentation more cumbersome.

If the damage function is sufficiently sensitive to a change in  $\theta_j$ , then domestic welfare and net profits are maximized at  $\theta = 1$ . Mitigating illicit trade by means of better institutions is key for a successful transition to market regimes. The reason for this is that illicit trade introduces inefficiency and loss of output (follows from the iceberg assumption).

**Proposition 2**

If  $\frac{d^2\pi_j}{dX_j^2} < 0$  then  $\frac{dx_{NCj}}{d\theta_j} > 0$  and  $\frac{dx_{Cj}}{d\theta_j} < 0$ . Furthermore, if  $\left| \frac{dD(\cdot)}{d\theta_j} \right|$  is sufficiently large then  $\frac{dX_j}{d\theta_j} > 0$ .

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

In other words, and given  $\frac{d^2\pi_j}{dX_j^2} < 0$ , the amount NCEs invest in firm  $j$  increases, whereas CE's investment decreases with  $\theta$  (follows from Lemmas 1A and 3A in Appendix A). The reasons are (i) the larger  $\theta_j$  is, the larger is the residual claim that goes to NCEs, and (ii) the larger  $\theta_j$  is, the smaller is the value of the damage function and therefore the lower is the volume of illicit trade. Moreover, if the marginal decline in looting technology is sufficiently large, i.e.,  $\left| \frac{dD(\cdot)}{d\theta_j} \right|$  is large enough, then aggregate investment  $X_j$  increases with  $\theta$ .<sup>19</sup>

Next, we show that, in equilibrium, NCEs prefer to separate themselves from the CEs. Let the line CC in Fig. 2 depict the combinations of  $\theta_j$  and  $\varphi_j$  such that CEs are indifferent to the question of investing or not investing in firm  $j$ . Then, using Eq. (3A) in Appendix A, it can be shown that CC slopes upward (follows from Lemma 3A in Appendix A and since  $\frac{\partial\pi_j}{\partial\varphi_j} > 0$ ). CEs invest in firms located in region A of Fig. 2, industries that are either very profitable (e.g., industries that exploit natural resources such as oil or diamonds) or less transparent and more corrupt (e.g., loan sharking).

When  $\theta_j$  is small, but not too small, NCEs may invest in firms with lower  $\varphi_j$ s simply because CEs do not invest in these firms.

**Proposition 3**

Let  $\bar{\varphi}_j$  be the critical value of  $\varphi_j$  such that  $R_{Cj}(\varphi_j) = (1 + r)$ , where

$$R_{Cj}(\varphi_j) \equiv \alpha_{Cj}(\theta_j) \cdot \frac{d\pi_j(\cdot, \varphi_j)}{dX_j}$$

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<sup>19</sup>The increase in investment that occurred when property rights institutions improved was documented by Acemoglu and Johnson (2003). Mauro (1995) showed that corruption has a negative impact on investment, whereas Wei (1997) showed that corruption has a negative impact on foreign investment.

Foreign and Russian investors participated in the 2001 CEFIR survey, in which they 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 and the authorities' failure to implement court decisions were seen by the respondents as an extremely serious barrier to investment.

and

$$R_{NCj}(\varphi_j) \equiv \alpha_{NCj}(\theta_j) \cdot \frac{d\pi_j(\cdot, \varphi_j)}{dX_j} \cdot (1 - D(\theta_j, \alpha_{Cj})).$$

Then,  $R_{NCj}(\bar{\varphi}_j - \varepsilon) > R_{NCj}(\bar{\varphi}_j)$  for  $\varepsilon \rightarrow 0_+$ .

Moreover, let  $\Delta\alpha \equiv \alpha_{NCj}(\theta_j) - \alpha_{Cj}(\theta_j)$ .

1. If  $\Delta\alpha \geq 0$  then  $R_{NCj}(\bar{\varphi}_j - \varepsilon) \geq R_{Cj}(\bar{\varphi}_j - \varepsilon)$ .
2. If  $\Delta\alpha < 0$  then  $R_{NCj}(\bar{\varphi}_j - \varepsilon) < R_{Cj}(\bar{\varphi}_j - \varepsilon)$ .

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

The conditions, where NCEs invest in less profitable firms, are depicted in region A Fig. 3. They are met if most of the shares are owned by NCEs, i.e.,  $\Delta\alpha > 0$ . If, on the other hand, most of the shares are owned by CEs, i.e.,  $\Delta\alpha < 0$ , then the pattern of investment differs from that depicted in Fig. 3.

If most of the shares are owned by NCEs, then for sufficiently low constitutional indices (but not too low), NCEs prefer to separate themselves from the CEs (as depicted in Fig. 3). In Fig. 3, NCEs invest in firms located in regions B and C, whereas CEs invest in firms located in regions A and B (which is equivalent to region A in Fig. 2).

We now turn to the constitutional index chosen in equilibrium.

## 5.2 Determination of the Constitutional Index

Following Grossman and Helpman's (1994) *Proposition 1*, we characterize the political-economic equilibrium where the constitutional index equate the marginal benefit from the constitutional index divided by the marginal cost with the alternative cost of capital, i.e.,  $(1 + r)$ .

### Proposition 4

*In equilibrium, the constitutional index is determined by the following relationship<sup>20</sup>,*

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

<sup>20</sup>In Proposition 4 it is assumed that an internal solution exists, whereas a graphic solution is depicted later on (Fig. 4). The discussion will include the corner solution.

where

$$S(\theta) \equiv (1 + a) \sum_{i=\{NC,C\}} \frac{\partial t_i}{\partial \theta}$$

is the cost attributed to the constitutional index, and

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

is the marginal benefit from the constitutional index.

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

The marginal benefit can then be broken down into three parts;

1. Ownership:  $-(1 + a) \frac{\partial \alpha_{NCj}}{\partial \theta} \cdot D(\theta_j, \alpha_{Cj}) \cdot \pi_j(\cdot)$ .
2. Production:  $(1 + a) \left| \frac{\partial D(\theta_j, \alpha_{Cj})}{\partial \theta} \right| \cdot \alpha_{NCj}(\cdot) \cdot \pi_j(\cdot)$ .
3. Consumption:  $a \sum_{j=1}^J \left[ q_j \cdot \left| \frac{\partial p_j}{\partial \theta} \right| \right]$ .

The first part, i.e., Ownership, captures the change in output due to the change in ownership. The second part, i.e., Production, captures the increase in output as  $\theta$  increases. The third part, i.e., Consumption, captures the increase in consumer surplus as  $\theta$  increases (an increase in  $\theta$  increases the supply of product  $j$ ).

### Corollary 1

If  $S(\theta)$  is an increasing function and  $B(\theta)$  is a decreasing function of  $\theta$ , and if  $S(0) < B(0)$  and  $S(1) > B(1)$ , then a unique internal equilibrium exists at  $0 < \theta^* < 1$ .

Given the condition stated in Corollary 1, the intersection of the demand function for  $\theta$ ,  $B(\theta)$ , and the supply function of  $\theta$ ,  $S(\theta)$ , results in a unique internal equilibrium at  $0 < \theta^* < 1$ . According to this scenario, which is depicted in Fig. 4, the economy will not reach full capitalism ( $\theta = 1$ ).

On the other hand, when  $B(\theta) > S(\theta)$  for all  $\theta \in [0, 1]$ , equilibrium is reached at  $\theta = 1$ . The other extreme of  $\theta = 0$  occurs if  $B(0) < S(0)$ . In such a case, the economy will remain in total anarchy.

The absence of a rule of law, i.e., low constitutional index, in countries like Russia has led to an increase in predatory activities that are likely to have adverse effects on productive activity, i.e., investment. The question then is why is the law enforced in some countries and less (or hardly) enforced in other countries? Existing literature (e.g., Johnson, Kaufmann, and Shleifer, 1998, and Roland and Verdier, 1999) explained this difference by modeling coordination problems (law enforcement is a public good).<sup>21</sup> 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 are abstracting from the coordination problem. To this end, the current paper gives us an alternative explanation: It is costly to develop institutions, both economically and politically. Furthermore, the cost of creating political institutions is determined by the distribution of political power between groups with different behavioral norms.

This conclusion can provide us with a rationale for the differences in the 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.<sup>22</sup> 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 has prepared most of these laws but had no chance of being passed by the former Duma given the fierce conflict between the two branches of government.<sup>23</sup> Overall, the combination of additional resources and the absence of commitments to interest groups and of parliamentary opposition have allowed Putin to pursue his own personal agenda.

In summary, this section offers a rationale for governments to refrain from making all of the required changes when moving to a market regime. The existence of interest groups (some with bad norms), together with the (monetary) cost of the constitutional index, creates incentives for governments to refrain from going “all the way.”<sup>24</sup> To this end, if the incentives to keep progress at bay are very high,

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<sup>21</sup>A comprehensive survey of the empirical literature on corruption, government collapse, and unofficial economy is given in Roland (2000), chapter 8.

<sup>22</sup>The data is taken from Berglof et al (2003), Table 3.3.

<sup>23</sup>Boycko, Shleifer, and Vishney (1995) also noted the strong opposition to reforms since 1992.

<sup>24</sup>Hellman (1998) argued that short-run winners, as opposed to reform losers, may prevent the economy from implementing the reforms successfully.

then the economy's output will decline after liberalization. If CEs manage to prevent the government from setting  $\theta$  too high, they might end up decreasing output. The reason for this is that when  $\theta$  is low, industries are less attractive to NCEs as investment opportunities [recall that  $D(0, \alpha_C > 0) = 1$  and therefore  $\alpha_{NCj}(\cdot) \cdot \pi_j(\cdot) \cdot (1 - D(0, \alpha_C > 0)) = 0$ ]. In terms of Fig. 4, if for low values of  $\theta$ , the marginal benefit from the constitutional index,  $B(\theta)$ , is small compared to the marginal cost of the constitution index,  $S(\theta)$ , then output declines after transition.<sup>25</sup>

### 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. In other words, an increase in the price of capital reduces the amount invested by entrepreneurs and creates incentives for the government to set institutions that are less compatible with market regime.<sup>26</sup>

## 6 Discussion and Concluding Remarks

This paper argues that transition to market regimes is a political process in which the parameters of market institutions are defined. Furthermore, the paper shows that corrupt groups influence this process in order to retain control in lucrative markets, resulting in inefficiency due to under-investment.

This paper recognizes heterogeneity among industries. It argues that the lower the constitutional index the larger is the set of industries they target. These predictions are consistent with the empirical findings of Campos (2000), who found that “the main cause of the transition shadow [unofficial economy] is . . . the lack of a rule of law tradition (under socialism, there is no law. . . , there was no tradition – but the Party, and there was no rule, just discretion).” Campos observes that the corrupt entrepreneurs own the large corporations, the profitable capital-intensive industries. Moreover, the paper argues that non-corrupt entrepreneurs will invest in less profitable firms, simply because corrupt entrepreneurs do not invest in these firms.

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<sup>25</sup>These predictions are consistent with the empirical findings of Mauro (1995), when we reinterpret constitutional indices as measure of integrity and efficiency of bureaucracy, whereby “for example, if Bangladesh were to improve its integrity and efficiency of its bureaucracy to the level of that in Uruguay, its investment rates would rise by almost five percent points and its yearly GDP growth rate would rise by over half a percentage point.”

<sup>26</sup>See also Stiglitz and Hoff (2005).

The paper describes an economy in transition, whereby the political-economic structure of the economy determines the share distribution mechanism of the firms by affecting the constitutional index. It should be interesting to collect data on constitutional state and privatization processes in different cases in order to corroborate (if possible) the results presented in this paper.

In the model presented, the constitutional index is determined in a two-stage game. A dynamic model might shed some light on the inter-temporal relations between the constitutional state and the economic structure.

## 7 Appendix A

### 7.1 Non-Corrupt Entrepreneurs

#### 7.1.1 NCEs' and investment

The constitutional index is determined at the first stage and before NCEs decide how much to invest in the firm (which is determined at the second stage). Hence, when NCEs 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

$$\underbrace{\alpha_{NCj}(\theta_j) \cdot \underbrace{\left[ y_j(p_j, \cdot) \cdot \frac{\partial p_j}{\partial X_j} + \frac{\partial \pi_j}{\partial X_j} \right]}_{\equiv \frac{d\pi_j}{dX_j}} \cdot (1 - D(\theta_j, \alpha_{Cj}))}_{\equiv R_{NCj}} = 1 + r \text{ or } x_{NCj} = 0. \quad (1A)$$

As seen from Eq. (1A) the marginal increment in profits,  $\alpha_{NCj}(\theta_j) \cdot \left[ y_j(p_j, \cdot) \cdot \frac{\partial p_j}{\partial X_j} + \frac{\partial \pi_j}{\partial X_j} \right] \cdot (1 - D(\theta_j, \alpha_{Cj}))$  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 NCEs,  $\alpha_{NCj}(\theta_j)$ , will decrease the investment made by NCEs.

**Lemma 1A.**

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

**Proof.** To derive Lemma 1, 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  $\frac{\partial D}{\partial \theta_j} \leq 0$ , and while holding  $x_j$  constant. ■

NCEs' return from investment,  $R_{NCj}$ , increases with  $\theta_j$ . This is because CEs' ability to steal and redistribute income decreases as  $\theta_j$  increases, and therefore the unproductive activity in the economy is lower.

### 7.1.2 NCEs and the constitutional index

The government solves a common-agent problem when determining the constitutional index in equilibrium. Therefore, while applying the envelope theorem, i.e.,  $\frac{\partial W_{NC}}{\partial x_{NCj}} = 0$ , and since the contribution plan is *locally truthful*,<sup>27</sup>

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

The marginal benefit from the level of the constitutional index, LHS, is equated to the marginal cost of acquiring a higher constitutional index, RHS. NCEs' marginal benefit from an increase in  $\theta_j$  is larger the larger is  $\frac{\partial}{\partial \theta_j} [(1 - D(\theta_j, \alpha_{Cj})) \cdot \alpha_{NCj}(\cdot)]$ . The marginal cost of acquiring a higher index is smaller the smaller is  $\frac{\partial t_{NC}}{\partial \theta} (1 + r)$ . Furthermore, if taxes are not contingent on the firm-specific constitutional index, then the contribution function slopes upwards, i.e.,  $\frac{\partial s_{NC}}{\partial \theta} > 0$  (since  $\frac{\partial \alpha_{NCj}}{\partial \theta_j} > 0$  and  $\frac{\partial D(\theta_j, \alpha_{Cj})}{\partial \theta} < 0$ ).

**Lemma 2A.**

$\frac{\partial s_{NC}}{\partial \theta}$  is larger the larger is  $\frac{\partial}{\partial \theta_j} [(1 - D(\theta_j, \alpha_{Cj})) \cdot \alpha_{NCj}(\cdot)] > 0$  and the smaller is  $\frac{\partial t_{NC}}{\partial \theta}$ . Furthermore, if  $\frac{\partial t_{NC}}{\partial \theta} \equiv 0$  then  $\frac{\partial s_{NC}}{\partial \theta} > 0$ .

## 7.2 Corrupt Entrepreneurs

### 7.2.1 CEs' and investment

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

$$\underbrace{\alpha_{Cj}(\theta_j) \cdot \left[ y_j(p_j, \cdot) \cdot \frac{\partial p_j}{\partial X_j} + \frac{\partial \pi_j}{\partial X_j} \right]}_{R_{Cj}} = (1 + r) \text{ or } x_{Cj} = 0. \quad (3A)$$

<sup>27</sup>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.

Hence, as obtained for NCEs in Eq. (1A), CEs equate their alternative cost of capital, RHS, to their marginal benefit from the firm, LHS. Unlike NCEs, however, the damage function does not affect CE's marginal return to investment (by assumption).

**Lemma 3A.**

$$\frac{\partial R_{Cj}}{\partial \theta_j} < 0.$$

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

### 7.2.2 CEs and the constitutional index

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

$$\sum_{j=1}^J \frac{\partial \alpha_{Cj}}{\partial \theta} \cdot \pi_j(\cdot) - \frac{\partial t_C}{\partial \theta} (1+r) = \frac{\partial s_C}{\partial \theta}. \quad (4A)$$

Thus, in equilibrium, the marginal contribution schedule of CEs, RHS, is equal to the net marginal benefit attributed to the constitutional index, LHS.

It is postulated that the larger the constitutional index, the lower is CEs' share of the residual claim, i.e.,  $\frac{\partial \alpha_{Cj}}{\partial \theta_j} \leq 0$ , therefore the LHS is negative; in other words, the contribution schedule is downward sloping,  $\frac{\partial s_C}{\partial \theta} < 0$ .

**Lemma 4A.**

$$\frac{\partial s_C}{\partial \theta} < 0, \text{ and } \left| \frac{\partial s_C}{\partial \theta} \right| \text{ is smaller the smaller is } \frac{\partial t_C}{\partial \theta} > 0.$$

## 8 Appendix B

**Proof of Proposition 1:**

If  $\left| \frac{d}{d\theta_j} \ln D(\theta_j, \alpha_{Cj}) \right| > \frac{d}{d\theta_j} \ln(\alpha_{NCj}(\theta_j))$  then net profits increase with  $\theta_j$ ; in other words,

$$\begin{aligned} \frac{\partial}{\partial \theta_j} [\pi_j(p_j, X_j, \varphi_j) - \alpha_{NCj}(\theta_j) \cdot \pi_j(p_j, X_j, \varphi_j) \cdot D(\theta_j, \alpha_{Cj})] &> 0 \Leftrightarrow \\ \left| \frac{d}{d\theta_j} \ln D(\theta_j, \alpha_{Cj}) \right| &> \frac{d}{d\theta_j} \ln(\alpha_{NCj}(\theta_j)). \end{aligned}$$

Then, while using Eqs. (5), (8), and noting that  $W$  equals  $\sum_{i \in \{NC, C\}} l + \sum_{i \in \{NC, C\}} w_i(\theta) + cs(p(X))$  for  $X \equiv (X_1, \dots, X_J)$ , it can be shown that

$$\frac{\partial^2}{\partial \theta_j \partial X_j} [\pi_j(p_j, X_j, \varphi_j) - \alpha_{NCj}(\theta_j) \cdot \pi_j(p_j, X_j, \varphi_j) \cdot D(\theta_j, \alpha_{Cj})] > 0 \Rightarrow \frac{\partial^2 W}{\partial \theta_j \partial X_j} > 0.$$

Q.E.D.

### Proof of Proposition 2:

To derive Proposition 2, we utilize the implicit function theorem and Eqs. (1A) and (3A) in Appendix A. In other words, and since  $\frac{d^2 \pi_j}{dX_j^2} < 0$  (and therefore  $\frac{\partial R_{NCj}}{\partial x_{NCj}} < 0$  and  $\frac{\partial R_{Cj}}{\partial x_{Cj}} < 0$ ),

$$\begin{aligned} \frac{dx_{NCj}}{d\theta_j} &= -\frac{\frac{d\pi_j}{dX_j} \frac{d}{d\theta_j} [\alpha_{NCj}(\theta_j) \cdot (1 - D(\theta_j, \alpha_{Cj}))]}{\frac{\partial R_{NCj}}{\partial x_{NCj}}} > 0 \text{ and} \\ \frac{dx_{Cj}}{d\theta_j} &= -\frac{\frac{d\pi_j}{dX_j} \frac{d\alpha_{Cj}}{d\theta}}{\frac{\partial R_{Cj}}{\partial x_{Cj}}} < 0. \end{aligned}$$

Furthermore,  $\frac{dX_j}{d\theta_j} = \frac{dx_{NCj}}{d\theta_j} + \frac{dx_{Cj}}{d\theta_j}$ .

Q.E.D.

**Proof of Proposition 3:** The NCEs return to investment is lower when  $\alpha_{Cj} > 0$  (since  $D(\cdot) > 0$ ); in other words,

$$\alpha_{NCj}(\theta_j) \cdot \frac{d\pi_j}{dX_j} \cdot (1 - D(\theta_j, \alpha_{Cj} > 0)) < \alpha_{NCj}(\theta_j) \cdot \frac{d\pi_j}{dX_j}.$$

If  $0 < \varphi_j < \bar{\varphi}_j < 1$ , then CE $s$  do not invest in firm  $j$  and  $D(\cdot, 0) = 0$  (follows from the assumption  $\frac{\partial R_{Cj}}{\partial \varphi_j} > 0$ ). Therefore,  $R_{NCj}(\bar{\varphi}_j - \varepsilon) > R_{NCj}(\bar{\varphi}_j)$  for  $\varepsilon \rightarrow 0_+$ .

To derive the second part of Proposition 3, compute the difference between Eq. (1A) and Eq. (3A) in Appendix A and rearrange terms.

Q.E.D.

### Proof of Proposition 4:

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.,  $q_j(p) = y_j(p, X_j, \varphi_j)$ , and the income of the shareholders and their investment level are a function of the firm-specific constitutional index, 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, in equilibrium, is a function of  $X_j(\theta_j)$  and  $\varphi_j$ . Hence, domestic welfare is a function of  $\theta$ :

$$W(\theta) = l + \sum_{i=\{NC,C\}} w_i(\theta) + cs(\theta)$$

The political-economic equilibrium can, then, be characterized following Grossman and Helpman's (1994) *Proposition 1*.

**Lemma 1B.**

$(\{s_i^0\}_{i=\{NC,C\}}, \theta)$  is a subgame-perfect Nash equilibrium of the political-economic game if and only if:<sup>28</sup>

1.  $s_i^*$  are feasible for  $i \in \{NC, C\}$ ;
2.  $\theta^*$  maximizes  $aW(\theta) + \sum_{i=\{NC,C\}} s_i(\theta)$  on  $\theta$ ;
3.  $\theta^*$  maximizes  $V_i(\theta) + aW(\theta) + \sum_{i=\{NC,C\}} s_i(\theta)$  on  $\theta$  for every  $i \in \{NC, C\}$ .
4. For every  $i \in \{NC, C\}$  there exists a  $\theta^i \in \theta$  that maximizes  $aW(\theta) + \sum_{i=\{NC,C\}} s_i(\theta)$  on  $\theta$  such that  $s_i^*(\theta^i) = 0$ .

From Lemma 1A it can be shown, using Part 2 and 3, 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 constitutional index, using the envelope theorem and the relation  $\alpha_{NCj}(\theta) + \alpha_{Cj}(\theta) = 1 \Rightarrow \frac{\partial \alpha_{NCj}}{\partial \theta} + \frac{\partial \alpha_{Cj}}{\partial \theta} = 0$ , is,

$$\begin{aligned} \frac{\partial W(\theta)}{\partial \theta} &= - \sum_{j=1}^J \left( \frac{\partial \alpha_{NCj}}{\partial \theta} \cdot D(\theta_j, \alpha_{Cj}) + \frac{\partial D(\theta_j, \alpha_{Cj})}{\partial \theta} \cdot \alpha_{NCj}(\cdot) \right) \cdot \pi_j(\cdot) - (1+r) \sum_{i=\{NC,C\}} \frac{\partial t_i}{\partial \theta} \\ &\quad + \sum_{j=1}^J \left[ q_j \cdot \left| \frac{\partial p_j}{\partial X_j} \frac{\partial X_j}{\partial \theta} \right| \right]. \end{aligned}$$

<sup>28</sup>See Grossman and Helpman (1994) *Proposition 1* and also Bernheim and Whinston (1986) *Lemma 2*.

Using Eqs. (2A) and (4A) and applying Lemma 1A Part 2 implies that  $a \frac{\partial W}{\partial \theta} + \sum_{i=\{NC,C\}} \frac{\partial \Omega_i}{\partial \theta} = 0$ , where

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

Proposition 4 follows.

Q.E.D.

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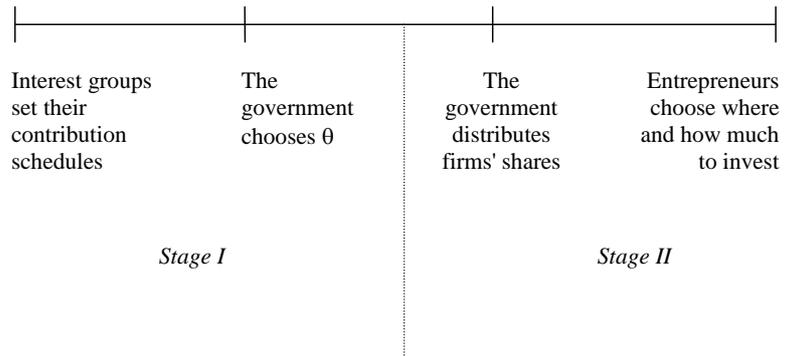


Figure 1: The timing of the game

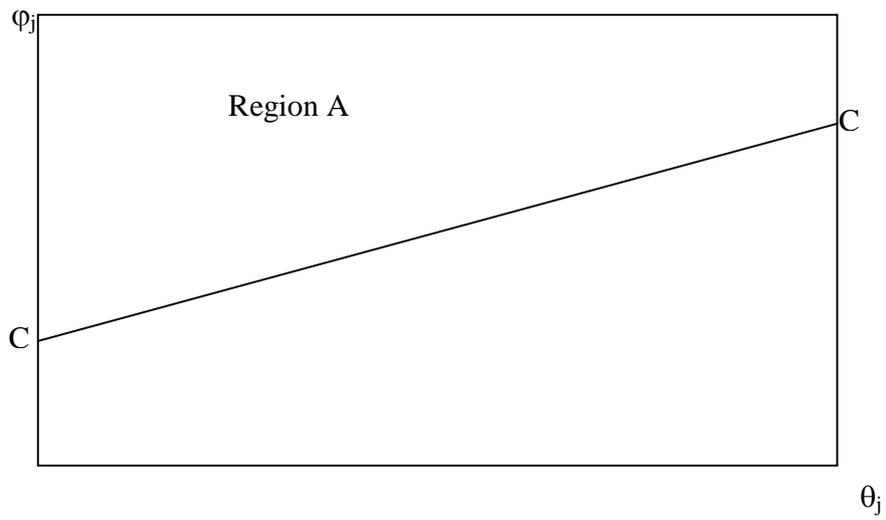


Figure 2: CEs investment scheme

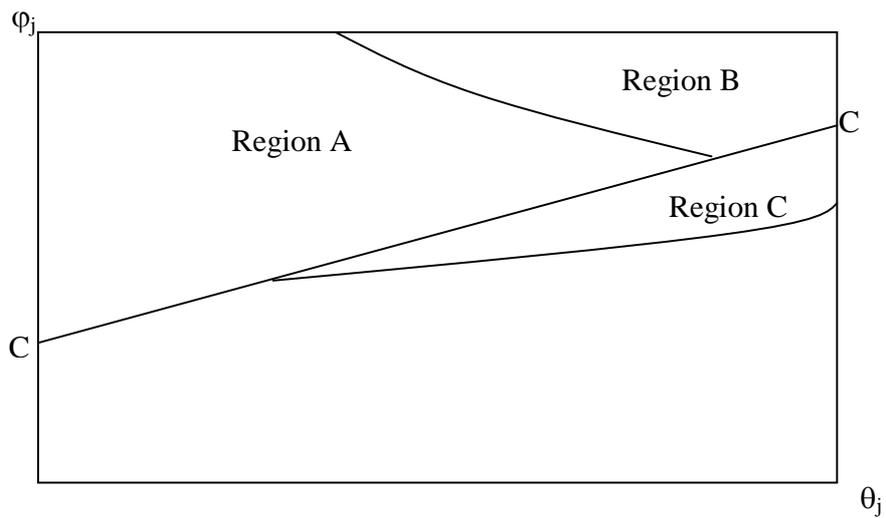


Figure 3: NCEs and CEs investment scheme

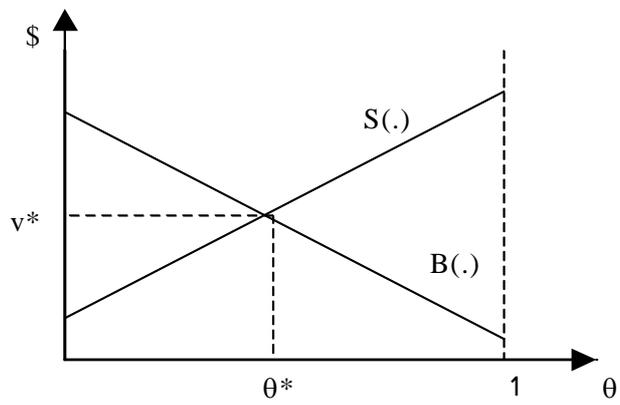


Figure 4: The equilibrium value of the constitutional index