Governance in the Wild:
A Theory of State vs. Private Firms under Weak Institutions

Gani ALDASHEV[*] and Giorgio ZANARONE[**]

September 2020

Abstract

We study the relative efficiency of state and private firms in different institutional environments. The two types of firms rely on different "social contracts" with the government to sustain production. In a state firm, the government must promise not to expropriate suppliers and to pay for their inputs. In a private firm, the government must promise not to expropriate suppliers and the firm's owner, and to enforce their contracts. We show that although the private firm is potentially more productive than the state firm, the contract needed to support it may be less credible if the quality of third-party enforcement (judicial institutions) and constraints on the government's expropriation power (political institutions) are weak. Our model explains why privatizations succeeded in developing countries with stronger institutions and failed in countries with weaker ones, and why the relative importance of state firms in East Asian countries decreased along the development trajectories as those countries reformed their political and judicial institutions.

Keywords: Private firms; State firms; Institutions; Enforcement; Power.
JEL codes: D23; K00; P48.

---

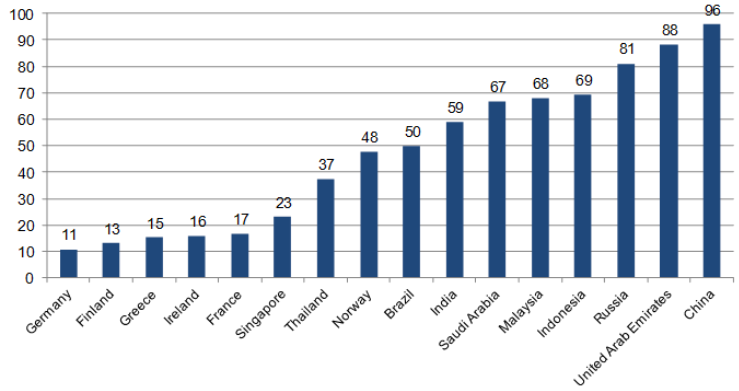
[*] ECARES, Université libre de Bruxelles (ULB); e-mail: gani.aldashev@ulb.ac.be. [**] Washington University in St. Louis; e-mail: gzanarone@wustl.edu. We are grateful to Benito Arruñada, Jean de Bettigny, Scott Gehlbach, Robert Gibbons, Ricard Gil, Sergei Guriev, Ruitian Lang, Rocco Macchiavello, Jim Malcomson, Ameet Morjaria, Andy Newman, Jens Prüfer, Debraj Ray, Gerard Roland, Klaus Schmidt, Marta Troya, Alex Wolitzky, and participants to the 6th Workshop on Relational Contracts, NES Conference (Moscow), SIOE Conference (Paris, Montreal), SIDE Conference (Rome), and seminars at MIT, Queen's University, DIW (Berlin), ECARES, U of Frankfurt, U of Kent, CEREC (U Saint-Louis, Brussels), and ISE (Almaty) for useful comments. We are grateful to the MIT Sloan School of Management's Program on Innovation in Markets and Organizations for supporting this project. This study received financial support from the Spanish Ministry of the Economy, Industry and Competitiveness through grant ECO2017-85763-R, and from the National Bank of Belgium (2016 call) grant "Enforcement Institutions and Economic Development: Theory and Applications".

1. Introduction

Do private firms always create more value than state-owned ones? If not, under what conditions is one or the other type of firm more efficient? The empirical evidence does not provide clear-cut answers to these important questions. On the one hand, privatizing state-owned enterprises (SOEs[1]) has been largely successful in developed countries (Megginson and Netter, 2001) and in the more advanced developing ones (e.g., Biais and Perotti, 1999). On the other hand, privatizations have been observed to *reduce* firm productivity in Russia (Karas *et al*., 2010) and Eastern Europe (Knyazeva *et al*., 2013). Consistent with these patterns, there is abundant evidence (e.g., Megginson, 2005; OECD, 2016; Kowalski *et al*., 2013) that SOEs play a much stronger role in developing countries than in developed ones, as illustrated by Figure 1 below.

Figure 1. SOE shares among countries' top ten firms (%)

(Sources: Kowalski et al. 2013; Büge et al., 2013)



[1] We define SOEs as entities recognized by national law as enterprises in which the state is the ultimate beneficiary owner of the majority of voting shares or where the state exercises effective control over an enterprise (other than through *bona fide* regulation).

This paper provides a formal theory of the costs and benefits of private vs. state firm ownership "in the wild" – that is, under weak institutions – which can explain the empirical puzzles discussed above while offering a novel perspective on how institutions affect governance. Our paper therefore begins to answer Gerard Roland's call for an institutional theory of the firm: "While there is often a tension […] between theories that assume a benevolent government maximizing social welfare versus a malevolent government seeking to prey on economic workers, there is no finer analysis of government ownership under specific kinds of governments" (Roland, 2008, p. 27).

In our model, there is a seller who may supply, in each period, an essential input to a firm owned by the ruler (state firm) or, alternatively, to a firm owned by a private buyer (private firm). Following an extensive literature (see Shleifer, 1998, and Roland, 2008, for a review), we assume the private firm uses a more efficient technology than the state one. This productivity advantage implies that if the seller expects the private buyer to pay for the input (credible contractual enforcement, or strong judicial institutions), and if both of them expect the ruler not to expropriate their gains from trade (strong political institutions), private ownership is the efficient governance form.

A tradeoff between private and state ownership arises, however, under weak institutions. If political institutions are weak, the ruler may use her coercive power to expropriate traders. To encourage production in the face of this threat, the ruler must offer a self-enforcing "social contract" (e.g., Olson, 1993; Greif *et al*., 1994; Acemoglu, 2003; Aldashev and Zanarone, 2017), which interacts with the standard "business contract" between the buyer and the seller. Under state ownership, the two contracts coincide: the ruler promises to pay the seller upon receiving the input (business contract) and not to expropriate this payment once it is made (social contract), and the

seller stops trading if the ruler reneges. In such a setting, it is optimal for the ruler to compensate the seller's input cost while retaining the firm's residual surplus. This allocation maximizes the ruler's long-term gains from her relationship with the seller and therefore facilitate self-enforcement (Levin, 2003). In contrast, under private ownership there is a potential conflict between the business contract and the social contract. While allocating firm surplus to the ruler discourages expropriation and strengthens the social contract, it also reduces the private buyer's gains from his relationship with the seller. This dilution of the buyer's own "relational" incentives undermines the business contract, and hence the private firm's credibility, if judicial institutions are weak, such that the ruler cannot verify the business contract and force the buyer to honor it.

Our analysis therefore implies that when political and judicial institutions are weak, such that both a relational social contract and a relational business contract are needed, the state firm is more credible than the private one. By making the ruler a central party in both relational contracts, the state firm efficiently concentrates relational capital that would be dispersed in the private firm.

Our model can explain why privatization programs increased firm productivity in developing countries that, despite having an authoritarian government, provided a reasonable guarantee of private property rights (Chile), whereas privatizations decreased productivity in developing countries that had both insecure property rights and poor judicial institutions (ex-Soviet Union countries). Our model can also explain why the leadership of economic growth in Eastern Asian countries (most notably China, Taiwan, and South Korea) was initially assigned to firms owned or patronized by the state, but switched to genuinely private firms in the late 1990s and early 2000s, after the (simultaneous) modernization of political and judicial institutions.

Our formal model has important advantages over existing informal arguments, according to which private firms are less likely to succeed in the absence of secure property rights and

contractual enforcement (e.g., Nellis 2007; Hanousek et al. 2008). First, although these arguments imply that weak institutions may reduce the advantage of private firms over SOEs, they cannot explain why SOEs would ever *outperform* private firms in weakly institutionalized environments. Second, by highlighting precise mechanisms through which political and judicial institutions jointly affect the costs of private ownership, our model generates nuanced predictions that can be tested in future empirical work.

The rest of this paper is organized as follows. Section 2 discusses our contributions to the literature. Section 3 presents the model. Section 4 analyzes the tradeoff between private and state firm ownership. Section 5 studies an extension of the model in which the ruler has a longer time horizon than the buyer and the seller, and shows robustness of the main results. Section 6 discusses applications of the model to SOEs, privatization programs, and state-led economic development. Section 7 discusses potential future extensions and concludes.

2. Relation to the literature

Our paper contributes to a (small) theoretical literature in organizational economics, which uses an incomplete contracting approach to study the choice between state and private firm ownership (Roland, 2008, provides a concise review).

Early works in this literature are Sappington and Stiglitz (1987) and Laffont and Tirole (1993, ch. 17). Sappington and Stiglitz (1987) argue (without a formal model) that if contracts between the government and firms are incomplete, it is easier for the government to intervene in a state-owned firm than in a private firm, both when the intervention is socially optimal and when it is opportunistic. This creates a potential tradeoff between the two ownership structures. Laffont and Tirole (1993) provide the first formal analysis of private versus state firm ownership from the

incomplete contracting perspective. In their model, the state has stronger incentives, relative to a private firm's shareholders, to hold up managerial investments ex post by redeploying the firm's assets to serve social goals. The downside of private firms is that their managers face two principals – regulators and shareholders – and this potentially dilutes the managers' incentives.

More recent studies are Schmidt (1996), Hart et al. (1997), and Williamson (1999). Schmidt (1996) argues that under private ownership the government does not observe production costs and can therefore credibly commit not to subsidize the firm. This lack of subsidy may cause inefficient bankruptcies ex post but has the benefit of incentivizing the firm's manager to invest in cost reduction ex ante. Hart et al. (1997) and Williamson (1999) study a make-or-buy problem in which government may produce a public service in-house or outsource it to a private contractor. They argue that in-house production mutes the profit-oriented incentives typical of private contractors, and is therefore preferable when profit maximization induces overinvestment in cost cutting at the expense of service quality. Unlike our paper, none of the studies discussed so far models how institutions affect the choice between private and state firm ownership.

Che and Qian (1998) are closer to us in that they model firm ownership under an autocratic government. Focusing on the case of China, they show that since the owner of a private firm appropriates revenues hidden from the government, she exerts more productive effort than the manager of state firm; however, she also chooses a less inefficient production technology in order to facilitate revenue hiding. Aside from the modeling approach and specific predictions, the main difference between Che and Qian (1998) and our paper is that they do not allow for variation in institutions and hence do not study how institutional differences affect optimal firm ownership. Another important difference is that since the cost of private ownership in Che and Qian (1998) is

a distortion in the production technology, their model cannot explain the short-run negative effects of privatizations in weakly institutionalized environments.

Our paper also relates to the literature on economic governance under weak institutions. A common theme in this literature is the commitment problem faced by a powerful ruler. We discuss the contributions most relevant to our paper below, while referring readers to Dixit (2004), and North, Wallis and Weingast (2009), for a more comprehensive and in-depth discussion of this literature.

Olson (1993) is one of the earliest studies to argue that even an autocrat with unconstrained power may be able to promote trade and economic growth. The mechanism informally suggested by Olson is a self-enforcing agreement, sustained by repeated interactions with productive agents, which commits the ruler not to entirely appropriate the gains from trade and therefore turns her from a "roving bandit" into a "stationary bandit". A series of subsequent papers formally analyze how institutions that coordinate multilateral retaliation against the ruler in case of defection may strengthen the self-enforcing agreements described by Olson (1993). Examples of coordination institutions studied in this literature are merchant guilds (Greif *et al*., 1994), federalism (Weingast, 1995), democratic elections (Fearon, 2011), and uniform legal codes (Hadfield and Weingast, 2012). Aldashev and Zanarone (2017) study the separate problem of how a ruler may use self-enforcing agreements to commit to enforce contracts between traders. Acemoglu and Wolitzky (2020) analyze a similar problem focusing on the case in which multiple individuals, rather than a unitary ruler, may act as enforcers.

There are two key differences between this literature and our paper. First, all of the existing studies assume a fixed organization of production. In contrast, our paper studies how the allocation of firm ownership among productive agents and the ruler affects the ruler's commitment problem.

Second, most of the existing papers (with the exception of Aldashev and Zanarone, 2017) assume the ruler is an autocrat – that is, she can only make commitments by entering self-enforcing agreements with productive agents. In contrast, our paper allows the ruler to be also constrained by formal institutions of varying strength. This innovation allows us to explore how the degree of the weakness of institutions modify optimal firm ownership.

3. The model

3.1. Environment

In any given period $t = 1, \dots, \infty$, a seller S (he) and a private buyer B (he) have the opportunity to trade in a state governed by a ruler R (she). All players are risk-neutral, live forever, and discount next-period payoffs by a common factor $\delta \in [0,1]$. Additionally, R, S and B have high enough initial wealth (respectively, ω_R, ω_S, and ω_B), such that they face no liquidity constraints.

S supplies an input $a_t \in \mathbb{R}^+$ at cost $c(a_t)$, assumed to be increasing and convex. This input can be combined with a machine to produce output (to be defined momentarily) under one of two possible governance forms. In a *private firm*, B owns the machine and S sells the input to B, who pays S and receives the output. In a *state firm*, R owns the machine and S sells the input to R, who pays S and receives the output (B plays no role in the state firm). In the absence of trade, all players receive a payoff of zero.

Regardless whether she owns the firm or not, in every period R has the opportunity to expropriate S and B – that is, R may use her coercive power to grab the total wealth S and B have

in the state.[2] This expropriable wealth consists of the firm's output and all monetary transfers S and B receive from trading with each other or with R (as defined below more precisely), but does not include their initial wealth, ω_S and ω_B, which is assumed to be outside the state. However, S and B can make portions of their initial wealth expropriable by bringing cash into R's state.

By assuming unlimited liability and initial outside wealth, we allow S and B to make and receive arbitrary monetary transfers as well as to post bonds to R. As we shall see, this assumption facilitates efficient trade under both private and state firm ownership, thereby stacking our cards against identifying a tradeoff between the two governance forms. Yet, we will show that under weak institutions, a tradeoff between the private and state firm does emerge. Our model's key results would continue to hold if we assumed $\omega_R = \omega_S = \omega_B = 0$.

3.2. Key assumptions

There are two important differences between state and private firm ownership in our model. First, we assume that for any given input the state firm produces less output than the private firm.

Assumption 1*: Let $v(a)$ be the private firm's output given input a, with $v(\cdot)$ increasing and concave. Then, the state firm's output is $(1-\theta)v(a)$, with $\theta \in (0,1)$.*

This assumption captures in a reduced form various potential deficiencies of the state firm, from R's lack of specialization (due to her involvement in both production and government activities) to private benefits that may lead R to engage in nepotism, impose soft budget

[2] The threat of coercion induces B and S to deliver any income generated in the state that the ruler demands. We implicitly assume that the cost of exerting coercion is low enough relative to the gains from expropriation, such that the ruler is willing to coerce.

constraints, or use an inefficiently labor-intensive technology (e.g., Laffont and Tirole, 1993; Shleifer and Vishny, 1994; Shleifer, 1998).

The second difference between the private and state firm is informational (e.g., Schmidt, 1996). Under state ownership R buys the input and receives the output so she observes a_t. In contrast, under private ownership it is B who buys the input and receives the output: since R is now an outsider with respect to the firm, she does not observe a_t. However, we assume R has access to an imperfect verification device, the court, which observes a_t (and reports it to R) with probability $q \in (0,1)$.

> ***Assumption 2****: In any given period t, R perfectly observes a_t and $v(a_t)$ under state firm ownership. Under private ownership, the private buyer B perfectly observes a_t and $v(a_t)$ whereas R observes them with probability q, and fails to observe them with probability $1-q$.*

In the language of contract theory, Assumption 2 implies that the input a_t is observable to the buyer and seller who exchange it but only imperfectly verifiable by third parties. Note that the switch from state to private ownership affects R's information because it changes R's role vis-à-vis the productive exchange (from buyer to third party). In this sense, our model sharply differs from classic theories of the firm (e.g., Grossman and Hart, 1986; Hart, Shleifer & Vishny, 1997), which study the allocation of ownership between a buyer and a seller who have fixed roles in production and hence fixed information.

3.3. Institutions

The goal of our model is to determine which governance form – the private or state firm – maximizes total surplus (output minus input cost) under different constraints on the ruler, or

"institutions". Following Acemoglu and Johnson (2005), we distinguish between *judicial* institutions, whose strength is measured by the verification probability q, and *political* institutions, which determine the actions R can commit to (or not to) take.

Under *strong political institutions*, R can commit both to make payments and not to expropriate B and S. Examples of strong political institutions are England after the Glorious Revolution, and advanced liberal democracies in modern times. In these regimes the parliament can veto taxes proposed by the executive (commitment not to expropriate). Moreover, there are constitutional mechanisms to remove the executive for breaking the law, which force the executive to honor its contracts with private citizens and firms (commitment to pay).

Under *intermediate political institutions*, R can commit not to expropriate S and B but cannot commit to make payments. Examples are England between the Civil War and the Glorious Revolution, as described by North and Weingast (1989), 19th-century constitutional monarchies, and modern semi-authoritarian democracies. In these regimes the parliament is strong enough to veto taxes but too weak to remove the ruler or micro-manage her budget.

Finally, under *weak political institutions*, R cannot make any commitments. Examples would be absolute monarchies in the Ancien Régime, and modern autocratic regimes.

Two remarks are at order here. First, weak political institutions do not imply a weak state. In our model R's power (in the sense of expropriation technology) is fixed whereas R's ability to use this power to expropriate depends on political institutions. Second, in treating institutions as exogenous we build on a vast literature that emphasizes institutional inheritance and persistence (see Glaeser and Shleifer, 2002, and the ensuing "legal origins" literature, and Acemoglu et al., 2001, and the ensuing literature on extractive vs. inclusive institutions). We therefore aim to study how governance (private vs. state firm ownership), which can be modified frequently, depends on

institutions that may vary across countries but are infrequently modified over time (Williamson, 2000).

4. Optimal governance

In this section we characterize production in the state and private firm, and compare the two governance forms on efficiency grounds.

Given the presence of a ruler endowed with coercive power, production requires two distinct but overlapping agreements: a standard "business contract," under which S sells inputs to the buyer (R in the state firm, B in the private firm) in exchange for compensation; and a (less standard) "social contract" under which R promises not to expropriate S and B. We say that a given business contract and social contract are *enforceable* if they jointly describe a subgame perfect equilibrium of the infinitely repeated game. We focus on equilibria that punish deviations optimally (Abreu, 1988) and are stationary (i.e., prescribe the same equilibrium behavior in each period). Accordingly, hereafter we drop all time subscripts from the model.

4.1. State firm

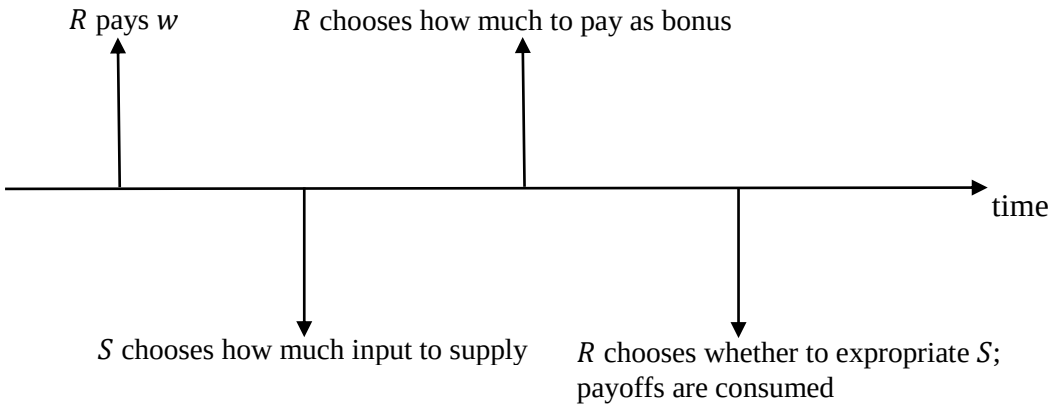
When production is organized through a state firm, the business contract specifies (1) a salary $w \in \mathbb{R}^+$ that R should pay S upfront, (2) an input $a \in \mathbb{R}^+$ that S should supply to R, and (3) a bonus $b \in \mathbb{R}^+$ that R should pay if and only if S supplies the required input. Additionally, the social contract prescribes that (4) R should not expropriate S.

If R deviates (by missing a payment to or expropriating S), S stops selling to R forever after. If S deviates (by not supplying the promised input or by attempting to sell to B), R stops buying

from and making payments to S and expropriates S in the current period (hereafter we call this punitive expropriation "fine" to distinguish it from R's deviations)[3]; moreover, B refuses to buy from S (that is, there is multilateral punishment of deviations as in Levin, 2002).

Figure 2 below summarizes the sequence of moves, and the deviation opportunities, within a period.

Figure 2. Timeline in the state firm



At the beginning of each period R pays w, the upfront salary. After receiving w, S chooses whether to supply the promised input a at cost $c(a)$. Then, R receives the state firm's output,

[3] The model's results would be qualitatively unchanged if we allowed the ruler to impose costly coercive punishments, such as prison, in addition to fines. The ruler would have no incentive to carry these additional punishments so the social contract should prescribe future termination if the ruler fails to punish. So long as the cost of coercive punishments is high enough, the tradeoffs between state and private firm ownership analyzed below would continue to hold. See Aldashev and Zanarone (2017), and Acemoglu and Wolitzky (2020), for analyses of the limited credibility of coercive punishments.

$(1-\theta)v(a)$, and chooses whether to pay the promised bonus b. Finally, R chooses whether to expropriate the wealth S has accumulated in the state, $w+b$, or not, and all payoffs are consumed.

In an optimally organized state firm, w, a, b maximize the total surplus

$s^{SF} \equiv (1-\theta)v(a) - c(a)$,

subject to the business and social contract being enforceable. First of all, R and S must gain from participating in these contracts. This leads to the participation constraints:

$\pi^{SF} \equiv (1-\theta)v(a) - w - b \geq 0$ for R, and (PCR)

$u_S \equiv w + b - c(a) \geq 0$ for S. (PCS)

Second, S must be willing to supply the prescribed input. This leads to the incentive constraint:

$w - c(a) + b + \frac{\delta}{1-\delta} u_S \geq (1-q)w$. (ICS)

Lastly, R must be willing to pay the bonus and not to expropriate S after the bonus is paid. This leads to two incentive constraints for the ruler, one on payment and one on expropriation:

$\frac{\delta}{1-\delta}\pi^{SF} \geq b$, and (ICP)

$\frac{\delta}{1-\delta}\pi^{SF} \geq w + b$. (ICE)

Clearly, (ICS) is less stringent than (PCS) and can therefore be ignored. Moreover, (PCS) must be binding or else we could relax (PCR), (ICP) and (ICE), while satisfying (PCS) and leaving surplus unaffected, by reducing $w+b$. Thus, S's compensation simply covers the input's cost: $w + b = c(a)$.

Under strong political institutions R is committed to pay S and not to expropriate him, so both (ICP) and (ICE) can be ignored and the optimal amount of input is $\overline{a}^{SF} \equiv argmax\{s^{SF}\}$. Note that the composition of S's total compensation does not matter here – that is, business contracts

prescribing only an upfront salary ($b = 0$), only a contingent bonus ($w = 0$), or a mix of the two are equally optimal so long as $w + b = c(a)$.

Under intermediate political institutions R is committed not to expropriate S but cannot commit to pay him, so we can ignore (ICE) but must consider (ICP). Unlike under strong political institutions, the composition of S's compensation is now important as it is more credible for R to motivate S through a "stick" (a fine equal to the upfront salary, w) rather than through a "carrot" (the bonus). Formally, the optimal business contract must prescribe $w = c(a)$ and $b = 0$, or else we could relax (ICP), leaving surplus and the remaining constraints unaffected, by decreasing b and increasing w by the same amount. This implies that (ICP) is slack and the optimal contract prescribes the same input amount $\overline{a}^{SF}$ as under strong political institutions.

This result suggests that so long as the ruler has "deep pockets" and political institutions are strong enough to prevent arbitrary taxation (e.g., there is an independent parliament), state firms can commit to pay their employees and suppliers through a clever contract design (i.e., by "frontloading" compensation). Thus, the surplus generated by state firms does not depend on the existence of more refined political institutions that fully commit the ruler to pay employees and suppliers, such as mechanisms to remove the ruler or control how she spends the budget.

Finally, under weak political institutions R cannot make any commitments so we must consider both (DEP) and (DEE). In this case the composition of S's total compensation is again irrelevant because R's reneging temptation, given by the left-hand side of the more stringent constraint among (ICP) and (ICE), is equal to the input cost, $c(a)$, regardless the values of w and b. Thus, the business contract and the social contract coincide, and the problem simplifies to choosing the amount of input that maximizes s^{SF}, subject to the enforceability condition:

$\frac{\delta}{1-\delta} s^{SF} \geq c(a)$. (SEC)

Clearly, S sells the same amount of input as under strong and intermediate political institutions ($\overline{a}^{SF}$) if constraint (SEC) is slack (that is, if δ is close enough to one), and a lower amount ($\underline{a}^{SF} < \overline{a}^{SF}$) if (SEC) is binding (that is, if δ is low).

Proposition 1*: In a state firm, S supplies input $\overline{a}^{SF}$ under both strong and intermediate political institutions. Under weak political institutions, there exists $\delta^{SF} \in (0,1)$ such that S supplies $\overline{a}^{SF}$ if the players are patient enough ($\delta \geq \delta^{SF}$) and a lower amount of input, $\underline{a}^{SF} < \overline{a}^{SF}$, if the players are impatient ($\delta < \delta^{SF}$).*

Our analysis of the state firm under weak political institutions is reminiscent of standard models of relational incentive contracts (MacLeod and Malcomson, 1989; Levin, 2003). In those models political institutions are strong, yet the principal cannot commit to pay the agent a bonus because the agent's effort is non-verifiable. In our model the principal (R) cannot commit because she has unconstrained coercive power. Either way, the principal and the agent must enter a self-enforcing agreement sustained by the value of future interactions. Moreover, insofar as free monetary transfers allow to separate incentive provision from distribution, the entire firm's surplus can be used to bond the relational contract.

We will now show that in the private firm case, weak institutions create a wedge between the business contract and the social contract and as a result, the optimal equilibrium differs from that in standard relational contracting models.

4.2. Private firm

The private firm case differs from the state firm one under several respects. First, in each period it is B, not R, who buys the input and pays S. Second, per our assumption 1, output is now given by $v(a)$, rather than $(1-\theta)v(a)$. Third, R is no longer residual claimant of the firm' output and can therefore make a profit only by collecting taxes. Fourth, per our assumption 2, R is now an outsider with respect to the firm, hence her ability to verify deviations by B or S and fine them is constrained by q, the quality of judicial institutions. This implies that B and S may need to post bonds in order to increase the expected fines and, through that channel, their commitment power.

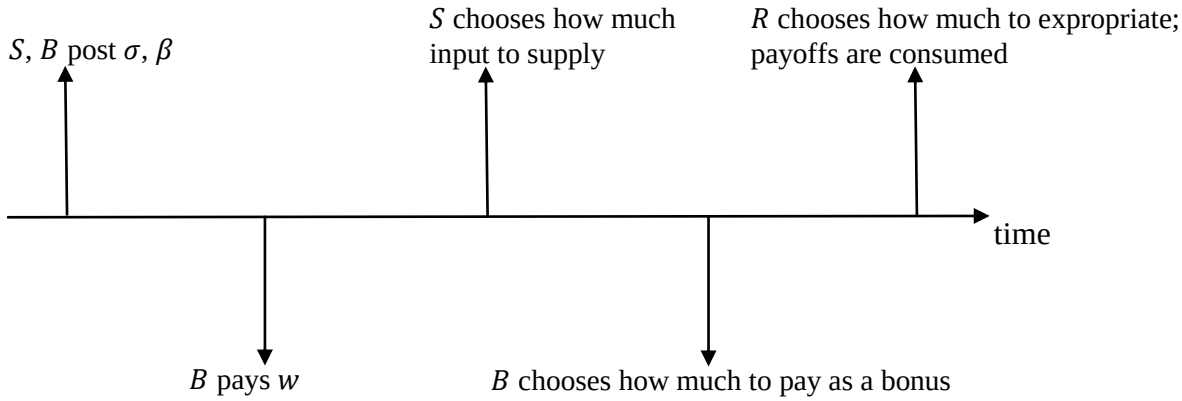
Keeping these observations in mind, in the private firm the business contract specifies, for each period: (1) the amounts of cash, $\beta \in \mathbb{R}^+$ and $\sigma \in \mathbb{R}^+$, that B and S should bring in from their outside wealth and post as bonds, (2) the input $a \in \mathbb{R}^+$ that S should supply, and (3) the upfront salary $w \in \mathbb{R}^+$ and the bonus $b \in \mathbb{R}^+$ that B should pay to S. Additionally, the social contract prescribes (4) that R should not expropriate S and B, and (5) establishes a tax $x \in \mathbb{R}^+$ that R should collect from B.[4] If R deviates (by expropriating B or S), both B and S stop trading in R's territory. If S deviates (by not supplying the promised input), B stops buying from and making payments to S; moreover, R fines S in the current period if she verifies his deviation, and refuses to buy from S in future periods if S tries to replace B as a buyer. Lastly, if B deviates (by not paying S), S stops selling to B, and R fines B if she verifies his deviation.

[4] In theory S may also be taxed. Note, however, that the sole purpose of taxes in this model is to reallocate surplus to R. Any feasible level of R's profit can be obtained by fixing the upfront salary w to leave S with zero surplus and taxing B accordingly. Thus, assuming no taxes on S is without loss.

Bonds can be interpreted as making an investment or opening a bank account in R's territory or, alternatively, as formalizing assets that were being held in the informal economy. A natural interpretation of fines in the private firm case is as (imperfect) third-party enforcement of the business contract between B and S.

Figure 3 below summarizes the sequence of moves and deviation opportunities within a period.

Figure 3. Timeline in the private firm



At the outset B and S post the promised bonds. Subsequently, B pays S the upfront salary, after which S chooses whether to supply the promised input a at cost $c(a)$. Then, B receives the output $v(a)$ and chooses whether to pay the promised bonus, b. Finally, R chooses whether to expropriate S and B – that is, whether to take any of S's in-state wealth, $\sigma + w + b$, and any of B's wealth in excess of the prescribed tax, $\beta + v(a) - x - b$.

In the optimal equilibrium $\sigma, \beta, w, a, b, x$ are chosen to maximize total surplus

$s^{PF} \equiv v(a) - c(a)$,

subject to the business contract and the social contract being enforceable. First, all players must benefit from these contracts (participation constraints):

$\pi^{PF} \equiv x \geq 0$ for R, (PCR)

$u_S \equiv w + b - c(a) \geq 0$ for S, and (PCS)

$u_B \equiv v(a) - x - w - b \geq 0$ for B. (PCB)

Second, S must be willing to supply the prescribed input and B must be willing to pay the bonus (incentive constraints):

$\sigma + w - c(a) + b + \frac{\delta}{1-\delta} u_S \geq (1-q)(\sigma + w)$ for S, and (ICS)

$\beta + v(a) - x - b + \frac{\delta}{1-\delta} u_B \geq (1-q)(\beta + v(a) - x)$ for B. (ICB)

Finally, R must be willing not to expropriate S and B (non-expropriation constraint):

$x + \frac{\delta}{1-\delta}\pi^{PF} \geq w + \sigma + \beta + b + [v(a) - b]$, which can be written as

$\frac{\delta}{1-\delta}\pi^{PF} \geq w + \sigma + \beta + v(a) - x$. (ICE)

Under strong or intermediate political institutions R can commit not to expropriate B so (ICE) can be ignored. In that case, S supplies the first best input $\overline{a}^{PF} \equiv argmax\{s^{PF}\} > \overline{a}^{SF}$. To see this point, suppose the business contract and the social contract are as follows: S posts no bond ($\sigma = 0$); S supplies $\overline{a}^{PF}$ B; compensates S with bonus $b = c(\overline{a}^{SF})$, pays no upfront wage ($w = 0$), and posts bond $\beta = [(1-q)c(\overline{a}^{SF})]/q$; and R gets all the surplus ($x = v(\overline{a}^{SF}) - c(\overline{a}^{SF})$). It is easy to check that these contracts satisfy all the participation and incentive constraints and are therefore enforceable.

Under weak political institutions R cannot make any commitments so the non-expropriation constraint (ICE) matters: unless the parties are patient (δ close enough to one), S supplies an

inefficiently low amount of input, $\underline{a}^P < \overline{a}^P$. Moreover, (ICE) becomes more stringent, and $\underline{a}^P$ smaller, as judicial institutions weaken (i.e., as q decreases).

***Proposition 2**: In a private firm, S supplies the first best input $\overline{a}^{PF} > \overline{a}^{SF}$ under both strong and intermediate political institutions. Under weak political institutions, there exists $\delta^{PF} \in (0,1)$ such that S supplies $\overline{a}^{PF}$ if the players are patient enough ($\delta \geq \delta^{PF}$) and a lower amount of input $\underline{a}^{PF} < \overline{a}^{PF}$, increasing in the quality of judicial institutions, if the players are impatient ($\delta < \delta^{PF}$).*

Proof: in appendix.

When political institutions are weak but judicial ones are strong ($q \approx 1$), R can verify breach of the business contract so a mild fine equal to the input's price will induce B to pay. Since short-term incentives suffice to enforce the business contract, taxes can be raised to allocate the firm's surplus to R, which provides her with long-term incentives not to expropriate – that is, to honor the social contract.

When both political and judicial institutions are weak ($q \approx 0$), this efficient allocation of short-term and long-term incentives is undermined, and a tension between the business contract and the social contract arises. To see this point, suppose first that R retains the whole firm's surplus but fines are raised above the input's price, such that B has a short-term incentive to honor the business contract despite the low likelihood of enforcement (Becker, 1968). To enable these "punitive" fines, B must post a bond (i.e., bring outside wealth into the state), which increases R's temptation to expropriate him and therefore weakens the social contract. Suppose, alternatively, that B is given a share of the firm's surplus to compensate his weaker short-term incentives with stronger long-

term ones. Then, R's own long-term incentives not to expropriate are diluted: once again, strengthening the business contract comes at the cost of weakening the social contract.

4.3. State vs. private firm

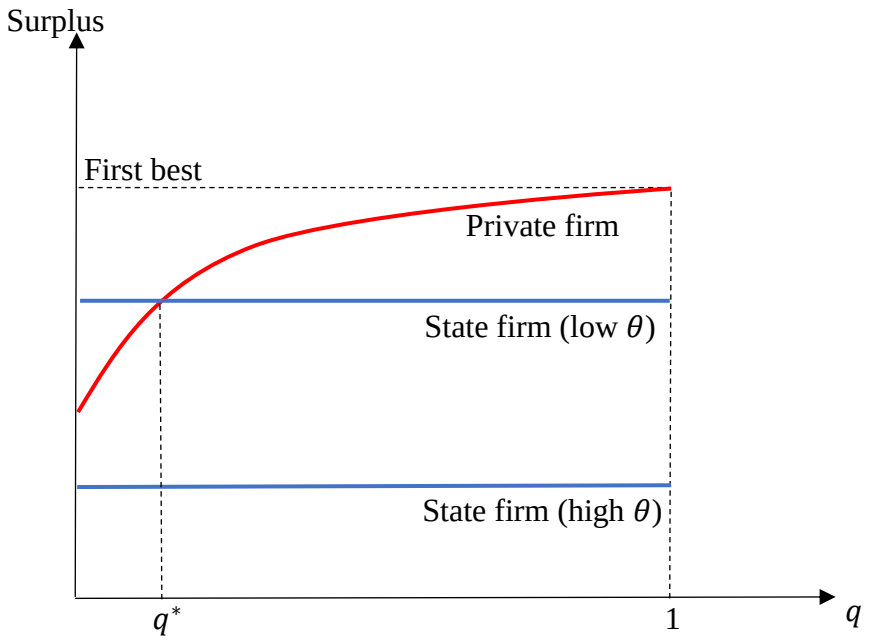
Having characterized optimal equilibria for both the private and the state firm, we can now compare these two governance forms on efficiency grounds. Under strong or intermediate political institutions, neither firm is plagued by the ruler's lack of commitment. Then, it follows from propositions 1 and 2 that the private firm is efficient because it has access to a superior technology and therefore produces more: $0 < \overline{a}^{SF} < \overline{a}^{PF}$.

Under weak political institutions, however, which governance is efficient is a priori ambiguous and depends on the private firm's productivity advantage and on the quality of judicial institutions.

Proposition 3*: (i) Under strong and intermediate political institutions, the private firm is efficient. (ii) Under weak political institutions, there exists* $\theta^* \in [0,1)$ *such that the private firm is efficient if its productivity advantage is high enough* ($\theta > \theta^*$)*. If the productivity advantage is not too high* ($\theta < \theta^*$)*, (iii) there exists* $q^* \in (0,1)$ *such that the private firm is efficient if judicial institutions are strong* ($q > q^*$)*, and the state firm is efficient if judicial institutions are weak* ($q < q^*$)*.*

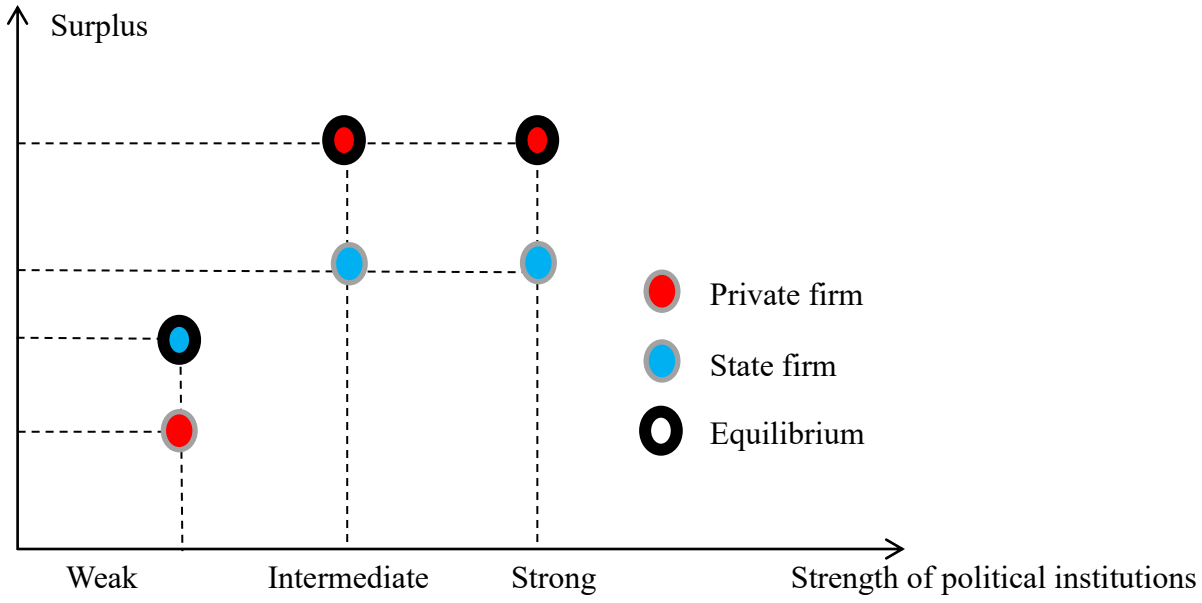
Proof: in appendix.

Figure 4. State vs. private firm under weak political institutions



Proposition 3 highlights the novel tradeoff between private and state firm ownership captured by our model. As shown by Figure 4, the benefit of the private firm is its higher productivity, measured by θ. The potential downside of the private firm is its lower credibility, which comes from the tension between business contract and social contract that arises "in the wild," that is, when *both political and judicial institutions are weak*. The model therefore provides an explanation for our introductory puzzle: while private firms are on average more productive than state firms, privatization may *reduce* firm productivity in weakly institutionalized environments.

Figure 5. Coase meets Heckman in the wild



This point is further illustrated by Figure 5 above, which depicts the total surplus generated by a private firm (red) and a state firm (blue) under different political institutions, assuming judicial institutions are relatively weak ($q < q^*$). Observed private firms (bold red) are more efficient than observed state firms (bold blue) because private firms are optimal under strong political institutions and can therefore fully exploit their specialization advantage. However, observed state firms are more efficient than the counterfactual private firms over which they were chosen (light red) because weak (political and judicial) institutions severely constrain the productivity of private firms. Thus, privatizing a state firm in a weakly institutionalized setting would reduce, rather than increase, total surplus. (Our figure echoes the "Coase meets Heckman" one in Gibbons (2005), which frames Coase's observation that observed firms must be more efficient than counterfactual

markets under high transaction costs. That is why we named our figure "Coase meets Heckman in the Wild").

5. Extension: asymmetric time horizons

So far, we have followed the convention in models of repeated games and assumed all players live forever and share the same discount factor. While this is the natural place to start, there may be settings in which the time horizons of state and private actors are different. Asymmetric time horizons would obviously not affect our results under strong political institutions. They may do so, however, under weak institutions. On the one hand, in a "failed state", R may face significant chances of being suddenly deposed and hence have a shorter time horizon than B and S. This is clearly not the environment we aim to model here: our goal is to analyze strong states (in the sense that R's power is stable) under stronger or weaker political institutions (in the sense that R may be more or less autocratic). On the other hand, in a strong but autocratic state (i.e., one with weak political institutions), R may have a longer horizon than private traders. For instance, Greif, Milgrom & Weingast (1994) analyze a model in which sequences of merchants engage in anonymous trade in the territory of a powerful ruler.

In this section we show that our results on the tradeoff between state and private firms survive (in fact, are reinforced) in this scenario. To do so, we follow Greif *et al*. (1994) and modify our baseline model by assuming that while R lives forever, the buyer and the seller die at the end of each period and are replaced by an identical pair in the following period. Accordingly, we denote the seller and buyer in period t as S_t and B_t, respectively. We also follow Greif *et al*. (1994) in assuming that future buyers and sellers observe how their predecessors behaved and were treated by the ruler. This assumption is consistent with the circulation of information within traders'

communities (e.g., Greif *et al*., 1994; Hadfield and Weingast, 2012; Masten and Prufer, 2014) and allows for the provision of relational incentives to the ruler via social contracts, as in our baseline model.

Assumption 3*: for any period t,* S_t *and* B_t *die at the end of the period and are replaced by identical players,* S_{t+1} *and* B_{t+1}*, at the beginning of period t+1, whereas* R *lives forever and discounts next-period payoffs by* $\delta \in [0,1]$.

Assumption 4*: all actions taken up to period* t *are perfectly observed by the future buyers and sellers (*S_{t+1}, B_{t+1}, S_{t+2}, B_{t+2}, *…).*

Equilibria are as in the baseline model, except that now: (1) if R deviates, she is punished by the buyers and sellers in future periods, who will refuse to trade in her state; and (2) if a buyer or seller deviates, his only punishment consists of the fine imposed by the ruler (buyers and sellers cannot be punished through termination as they are short-lived).

The analysis of the state firm is identical to section 4.1, except that now the seller's incentive constraint does not feature future payoffs:

$$w - c(a) + b \geq (1 - q)w. \quad (2)$$

Proposition 1 implies that long-term incentives are not needed for the seller and therefore continues to apply when sellers are short-lived. Similarly, the analysis of the private firm is identical to section 4.2, except that now the seller's and the buyer's incentive constraints do not feature future payoffs:

$$\sigma + w - c(a) + b \geq (1 - q)(\sigma + w) \text{ for } S_t, \text{ and} \quad (3)$$

$$\beta + v(a) - x - b \geq (1 - q)(\beta + v(a) - x) \text{ for } B_t. \quad (4)$$

Consider an equilibrium in which S posts no bond ($\sigma = 0$), B compensates S with bonus $b = c(a)$, pays no upfront wage ($w = 0$), and posts bond $\beta = [(1 - q)c(a)]/q$, and R gets all the

surplus ($x = v(a) - c(a)$). This equilibrium is optimal because it satisfies (PCB), (PCS), and the new incentive constraints (3) and (4), while relaxing the non-expropriation constraint (ICE). Substituting into (ICE) we obtain:

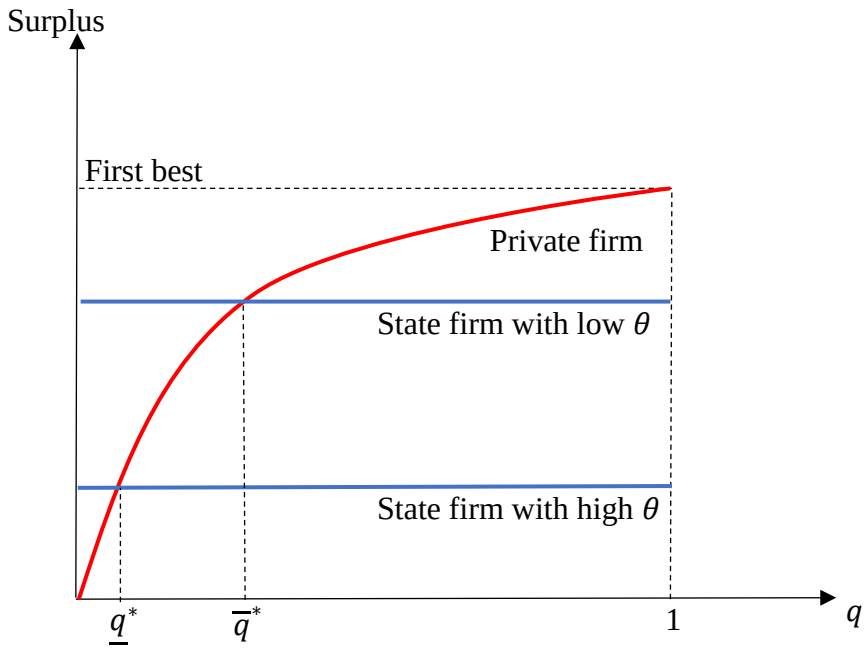
$$\frac{\delta}{1-\delta} s^{PF} \geq \frac{c(a)}{q}. \qquad (5)$$

As in section 4.2, under strong or intermediate political institutions constraint (5) can be ignored and the private firm achieves the first best: $a = \overline{a}^P$. Under weak political institutions the optimal equilibrium maximizes s^{PF} subject to (5). If R is patient enough (i.e., for $\delta \geq \tilde{\delta}^{PF} \equiv \frac{c(\overline{a}^P)}{c(\overline{a}^P)+q[v(\overline{a}^P)-c(\overline{a}^P)]}$), condition (5) is slack and the first best is again achieved. However, if R is impatient (i.e., for $\delta < \tilde{\delta}^{PF}$) condition (5) is binding, and S undersupplies in the optimal equilibrium: $a \equiv \underline{\tilde{a}}^P < \overline{a}^P$. Moreover, the equilibrium input and surplus are increasing in q because better judicial institutions relax (5). Proposition 2 is therefore qualitatively still valid, although the private firm is less efficient than in the case in which the buyer and seller have a long time horizon because relational incentives for the buyer are no longer available. In particular, in section 4.2 the private firm could procure a positive but low amount of input even under extremely weak judicial institutions ($q \approx 0$) by giving some surplus to the buyer and therefore replacing weak third-party enforcement of the business contract with relational enforcement sustained by repeated interaction. This possibility is no longer available here because the buyer and seller have a short time horizon and hence cannot be provided with long-term incentives.

For the same reason, Proposition 3, on the comparison between state and private firm, is also qualitatively still valid. Due to its productivity advantage, the private firm is efficient under strong and intermediate political institutions, and even under weak political institutions provided judicial

institutions are strong enough to limit the use of bonds. When both political and judicial institutions are weak the private firm's credibility gap outweighs its productivity advantage and the state firm becomes efficient. However, since the private firm's credibility gap is now stronger than in the case where all parties have a long time horizon, there is a wider region in which the state firm dominates. This point is illustrated by figure 6 below: because the private firm now produces zero surplus under very weak judicial institutions, there is a region in which the state firm dominates even if it has very low productivity ($\theta > \theta^*$).

Figure 6. State vs. private firm under asymmetric time horizons



6. Applications

6.1. Privatization

Our model provides a useful theoretical framework to understand the performance and timing of privatizations in transition and developing countries. An extensive empirical literature, reviewed by Megginson and Netter (2001), finds that privatization in the OECD countries has been generally successful in increasing the productivity and profitability of firms. Some developing and transition economies, most notably Chile and the Czech Republic, also undertook successful privatizations (Biais and Perotti, 1999). Contrarily, in several developing countries, particularly in the former Soviet area, privatizations have been shown to reduce the productivity of former state firms (e.g., studies in Roland, 2008; Knyazeva et al., 2003; Brown et al., 2006; Guriev and Megginson, 2007). In Russia, Karas et al. (2010) find that private banks perform worse than state-owned banks, even in the late 2000s, and that this difference cannot be explained by the choice of production process, the bank's environment, management's risk preferences, the bank's activity mix, or bank size. Anderson et al. (2000) study the early-1990s privatization in Mongolia and find that after privatization, firms with residual state ownership appear to be more efficient than fully private firms. Djankov and Nenova (2000) analyze the privatization in Kazakhstan relying on a dataset of about 6 600 firms and find that whereas the newly created private firms established after 1992 perform better than privatized firms or those that remain state-owned, the privatized firms perform as badly as, or worse than, the state-owned enterprises. They explain that privatization failed to improve performance because divested firms were used as short-term vehicles for extracting

private benefits. More generally, Nellis (1999) argues that "the farther east one travels, the less likely is one to see rapid or dramatic returns to privatization" (p. 6).

Our model can explain these seemingly conflicting facts. The OECD countries had relatively developed political institutions as they started to privatize state firms in the 1990s (mostly to ease their government budgetary constraints). In all of those countries, the government's taxation power was constrained by an independent elected parliament, though there were differences across them in the strength of broader checks and balances on the government's discretion. Thus, in the language of our model, all of the OECD countries fall into either the "strong" or the "intermediate" political institutions categories. Consistent with the empirical evidence, our model predicts that in such a context, privatized firms should perform better than the state firms they replaced.

In contrast, many developing countries on which privatizations were imposed (often as a precondition for international loans) had weak political and judicial institutions. In particular, despite their formal transition to democracy the ex-Soviet countries in the 1990s had weak protection of property rights, obsolete legal codes, and corrupted judicial systems. For instance, Black et al. (2000) write in their conclusion of the study of Russian privatization: "The profit incentives to restructure privatized enterprises (instead of looting them), and to create new businesses that could draw workers from shrinking enterprises, can be swamped by a hostile business environment. In Russia, that environment includes a punitive tax system, official corruption, organized crime, an unfriendly bureaucracy, and a business culture in which skirting the law is seen as normal, even necessary behavior" (Black et al. 2000).

Our model predicts that privatizing state-owned enterprises in such a context reduces firm performance. This is not the case, however, for the privatizations implemented by Chile and the Czech Republic during their transition to democracy (1986-91 and 1991-94, respectively). In both

of these countries property rights protection and judicial institutions in the pre-democratization period already were significantly stronger than in the ex-Soviet republics – that is, Chile and the Czech Republic appear to have "intermediate" rather than "weak" political institutions at the respective moments of privatization. Consistent with the evidence, our model predicts that privatization should increase firm performance in these contexts.[5]

When watched through the lens of our model, the different cross-country success rates of privatizations suggest that their timing is important and should be closely adapted to the institutional environment. Economists have informally advanced this idea in the past. For instance, Smith and Trebilcock (2001) argue that: "a successful privatization requires many elements that are often not available in developing countries, e.g., a stable political environment, an absence of corruption and effective competition in the private sector […] Each less developed country (LDC) should tailor its reform strategy to its current political and economic climate, and should modify this strategy as these circumstances change" (p. 218). Milton Friedman used a similar argument to correct his formerly unconditional support for privatizations: "Privatization is meaningless if you don't have the rule of law. What does it mean to privatize if you do not have security of property, if you can't use your property as you want to?" (Friedman 2002: xvii-xvii). Similarly, Guriev and Megginson (2007) write: "The benefits of privatizations depend on market institutions being in place. The countries that manage to ensure property rights protection and the rule of law, impose hard budget constraints, increase competition, and improve corporate governance reap the largest

[5] Interestingly, Brown et al. (2013) find that after 2002 (and before 2006, where their data stops), there was a qualitative change in the performance of privatized firms in Russia, reverting the negative trend of the 1992-2002 period. Whether this change can be attributed to institutional change remains an open question for future exploration.

benefits. If appropriate institutions are not in place, privatization often fails to improve performance at the firm level and for the economy as a whole." (p. 286).[6]

Our model provides a clear illustration and a theoretical micro-foundation for these arguments. At the same time, our model goes beyond the existing informal arguments by elucidating how the *interaction* between different types of institutions (political and judicial) determines the success or failure of privatizations.

6.2. Development trajectories in East Asia

A second important case to which our model applies is the development trajectory of East Asian growth "miracles", such as South Korea, Taiwan, and China. More specifically, our model can explain why these countries initially relied on state-led economic development but switched to private-sector-led development after political (and judicial) institutions became stronger. Below we briefly illustrate the co-evolution of political and legal institutions on one hand, and firm ownership structure on the other, in these countries. We then discuss the common patterns in these three cases in the light of our theoretical model.

6.2.1. South Korea

Prior to 1987 (the Sixth Republic), South Korea was essentially governed by military rule (although in 1963-1987 the political regime was nominally democratic). In 1987, anti-government protests induced a regime change and led to the first direct presidential election in 16 years. Although the first president in this new regime (Roh Tae-woo) came from the military, his

[6] See a similar argument in Guriev (2020), with much more details about the political-economic trajectory of Russia from pre-1991 to 2018.

government promoted democratization (by increasing freedom of the press, liberalizing international travelling, and giving autonomy to the universities). As a result of these reforms, in 1992 South Koreans elected the first civilian president in 30 years (Kim Young-sam). Since then, South Korea has been effectively a democratic regime.

Amsden (1989) argues that the sustained economic growth of South Korea in a period characterized by weak political institutions (1960-1980) was enabled by the state's involvement in productive activities and by its tight links to business conglomerates (*chaebols*). Consistent with that, Lane (2019) shows that firms in sectors declared as militarily strategic by the state in 1973 (e.g., the heavy chemicals industry) grew 80 per cent more than comparable manufacturing firms not targeted by the state. Milhaupt and Pistor (2008) investigate in greater depth the role of the *chaebols*. They note that in the absence of investor protections and a legal framework for financial contracts, the *chaebols* engaged in a symbiotic relationship with the government, which could influence their business decisions but provided in exchange capital protection from competition, licenses, and favorable regulations. In other words, the *chaebols* could be seen as quasi-state actors.

The Korean *chaebol* system was fairly productive when Korean industry primarily relied on the diffusion of foreign know-how and best practices (Amsden, 2001). However, once the country reached the technological frontier, those legal imperfections started to bind and the Korean model of economic development began showing weaknesses. In additional to the lack of modern legal institutions, the corrupt interlinkage between government and the *chaebols* was financially harmful for the state (Pirie 2007: 76). Moreover, the *chaebols* wanted to relax (at least partially) their alliance with the government to gain access to international credit markets (Hundt 2009: 94).

As a result of these deficiencies, economic reformers gradually took control of the government's agenda and engaged in a vast liberalization program in 1997, following the financial crisis. Reforms between 1997 and 2000 deregulated economic activity and established an independent financial regulator, an autonomous central bank, and other market-supporting institutions (Pirie 2007: 107-122). At the same time, the government strengthened South Korea's legal institutions by codifying the fiduciary duty of corporate directors, imposing liability on controlling "activist" shareholders, enforcing rules that limited improper intragroup transactions against *chaebol* insiders, and promoting shareholder derivative litigation against corporate directors (Milhaupt and Pistor 2008, p. 119). Altogether, these reforms sparked a new and different growth model, based on private economic initiative, which led to a rapid increase in South Korea' R&D intensity (Santacreu and Zhu 2018) and innovation (Jamrisko et al. 2019).

6.2.2. Taiwan

After World War II, and the retreat of the *Kuomintang* (KMT) party from mainland China in 1949, Taiwan was an autocracy ruled under martial law until the late 1980s. Pressure for democratization built up from 1979 until 1986, when the first opposition political party (the Democratic Progressive Party, or DPP) was allowed to register. Under President Lee Teng-hui, democratization continued throughout the 1990s, culminating in the end of KMT rule in 2000. Democratization was followed by important reforms in legal institutions and the legal environment for business, which were relatively under-developed during the dictatorship period (Wade, 1990; Shao and Tseng, 2014; World Bank, 2018).

The impressive economic development of Taiwan after the 1960s was initially driven by SOEs. For instance, Evans (1995) writes: "the KMT retained control, generating one of the largest state-

owned sectors in the non-Communist world […] Taiwan's state-owned enterprises accounted for over half of all fixed industrial production in the 1950s, and, after falling off a bit in the 1960s, their share expanded again in the 1970s" (pp. 55, 256). As noted by Wade (1990), Taiwanese SOEs were overall profitable: "Public enterprise prices have more than covered costs of production. Over the 1970s their surpluses contributed an average of 10 percent of the government's net revenue, which makes Taiwan an exception to the familiar thesis that government-owned corporations tend to deplete rather than add to government revenues" (p. 180).

Nevertheless, during the 1980s and 1990s, the government started to reduce the role of SOEs. Their share of domestic capital formation declined from 20.4% in 1971 to 10.2% in 2005 (Pao et al. 2008: 326), and a privatization program was launched in 1989. It is important to note that this process was gradual, rather than stark. As Evans (1995) notes: "the KMT regime progressively exposed its "greenhouse capitalists" to the rigors of the market, making export quotas dependent on the quality and price of goods and diminishing protection over time" (p. 58). Over time, this transition from state-led to private-sector-led development has been highly successful, leading *The Economist* to define Taiwan as "one of the world's most robust frameworks to encourage lending to small- and medium-sized enterprises (SMEs), the kinds of firms that have ideas but few resources." (*The Economist* 2019).

6.2.3. China

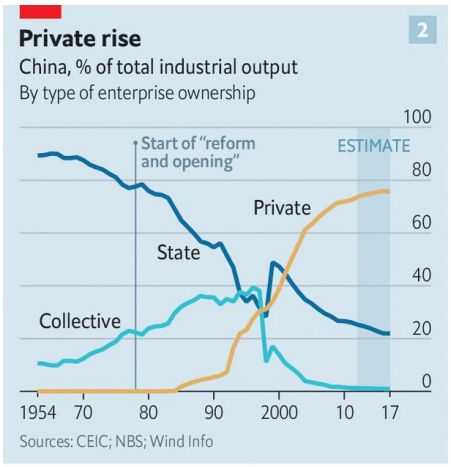
Unlike South Korea and Taiwan, China has not undergone a democratization process. However, when Chinese leaders targeted economic growth as a key objective in 1978, they sought to protect economic agents from governmental expropriation by incentivizing regional leaders to pursue growth, mostly through a promotion-based incentive scheme (Xu, 2011). While these

incentive programs made some progress towards improving Chinese political institutions (at last from the perspective of investors), legal institutions remained underdeveloped in China until recently (e.g., Allen, 2005). Indeed, several scholars (e.g., Peerenboom, 2002; Clarke *et al.*, 2008; Xu, 2011) argue that to maintain a high growth in the future, it is now urgent for China to shift the focus of reforms on modernizing its legal institutions. In particular, Xu (2011) argues that "without a properly developed legal system, many problems cannot be resolved by regional competition, regional experimentation, personnel control, and other methods deployed by the RDA [regionally-decentralized authoritarian] regime. […] As the private sector and markets become fundamentally important to the economy, the negative impacts of bad laws and the absence of the rule of law will become even more manifest" (pp. 1132-33, 1140).

In terms of firm ownership structure, it is noteworthy that despite the pro-growth agenda initiated by its leaders in 1978, China only started to privatize (some of) its SOEs after 1997. The change in the relative importance of private firms along the path of Chinese development is illustrated by Figure 5 below, which shows the evolution of total industrial output between 1954 and 2017 by firm ownership type. In the early stages of economic reform (1978-1992), there was no rise of private firms and most dynamics corresponds to the conversion of SOEs into collectively-owned enterprises. From the mid-1990s a proper private sector started to emerge, growing most rapidly in the early 2000s.

Figure 5. Chinese industrial output by firm type[7]

[7] The figure can be accessed at: https://www.economist.com/china/2018/12/08/forty-years-after-deng-opened-china-reformists-are-cowed. Similarly, Song et al. (2011) document that the ratio of employment in domestic private firms to total domestic employment in manufacturing in China increased from a mere 4% in 1998 to 56% in 2007.



The Economist

6.2.4. Discussion

Our model can explain the joint evolution of institutions and firm ownership in South Korea, Taiwan, and China. In all of these countries, the emergence of private firms, the privatization of SOEs and (in the case of South Korea) the emancipation of private firms from governmental protection and patronage, proceeded in parallel with improvements in legal and judicial institutions and the imposition of stronger constraints on the government's expropriation power. In Korea and Taiwan these political constraints were imposed by democratization, whereas in China they arose indirectly, through the pro-growth incentives that the central government gave to regional leaders. Consistent with these facts, our model predicts that when both legal and political institutions are weak, a social contract in which production is carried by private firms is less viable than one in which production is carried by SOEs (or quasi-SOEs, as in South Korea). As a result, SOEs are constrained-optimal in such an environment despite their lower productivity.

Our model also predicts that given the slow co-evolution of judicial and political institutions in China, the late timing of privatizations there was then probably efficient. When there are both weak property rights and dysfunctional judicial institutions (as was the case in China in the 1978-

1998 period), state firms are more viable than private ones. Given the minimal property-rights protection (through the tournament-scheme incentives that the regional leaders faced), as judicial institutions improve (which was the case in China from the late 1990s onwards), private firms gradually become the efficient organizational form; consequently, privatization programs start to become more attractive. This argument is also consistent with the fact that observed privatizations in China have been on average successful (in increasing firm productivity). In fact, Song et al. (2011, Figure 3) document that in the 1998-2007 period, the *observed* private firms (both domestic and foreign-owned) are consistently more profitable than the *observed* state-owned firms in China.

7. Conclusion

This paper has investigated how institutions determine the optimal choice between state and private firm ownership. Our model shows that the optimal organizational form solves a tradeoff between productive specialization (maximized by private ownership) and credibility (maximized by state ownership). The disadvantage of state ownership is that its owner (the state's ruler) is not fully specialized in production. The disadvantage of private ownership is that since the ruler does not run the private firm, she has limited ability to enforce intrafirm contracts. Weak judicial institutions exacerbate this problem, requiring the private firm's owner to hold large amounts of wealth in the state to bond his obligations towards input suppliers. In turn, weak political institutions facilitate expropriation by the ruler and hence reduce the private owner's willingness to post such a bond. Thus, a combination of weak judicial and political institutions undermines the private firm's credibility and makes it less efficient than the state firm despite its productive specialization. Our model can explain privatization failures and the continued prominence of state-

owned firms in weakly institutionalized environments, while generating novel testable predictions on the optimal timing of privatization in developing countries.

Future work may extend our framework to study the organization of production in other contexts in which powerful individuals, like the state ruler in this paper, cannot fully commit to use their power efficiently. For instance, a company's CEO has considerable power over its subordinates, which she may use to opportunistically reallocate resources among divisions and projects. The logic of our model suggests that in the absence of corporate governance mechanisms that limit her power, the CEO may find it difficult to delegate employee supervision to middle managers despite the specialization advantages of delegation. We hope that future work, both theoretical and empirical, may further develop this insight.

References

ABREU, D., (1988), "On the Theory of Infinitely Repeated Games with Discounting," *Econometrica* 56: 383-396.

ACEMOGLU, D., (2003), "Why Not a Political Coase Theorem? Social Conflict, Commitment, and Politics," *Journal of Comparative Economics* 31: 620-652.

ACEMOGLU, D., and S. JOHNSON, (2005), "Unbundling Institutions," *Journal of Political Economy* 113: 949-995.

ACEMOGLU, D., and A. WOLITZKY, (2020), "Sustaining Cooperation: Community Enforcement versus Specialized Enforcement," *Journal of the European Economic Association* 18: 1078–1122.

ACEMOGLU, D., S. JOHNSON, and J. ROBINSON, (2001), "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review* 91: 1369-1401.

ALDASHEV, G., and G. ZANARONE, (2017), "Endogenous Enforcement Institutions," *Journal of Development Economics* 128: 49-64.

ALLEN, F. (2005), "Corporate Governance in Emerging Economies," *Oxford Review of Economic Policy* 21: 164-177.

AMSDEN, A., (1989), *Asia's Next Giant: Late Industrialization in South Korea*. Oxford, UK: Oxford University Press.

AMSDEN, A., (2001), *The Rise of "the Rest": Challenges to the West from Late-Industrializing Economies*. Oxford, UK: Oxford University Press.

ANDERSON, J., Y. LEE, and P. MURRELL, (2000), "Competition and Privatization Amidst Weak Institutions: Evidence from Mongolia," *Economic Inquiry* 38: 527-549.

BECKER, G., (1968), "Crime and Punishment: An Economic Approach," *Journal of Political Economy* 76: 169-217.

BIAIS, B., and E. PEROTTI, (2002), "Machiavellian Privatization," *American Economic Review* 92: 240-258.

BLACK, B., R. KRAAKMAN, and A. TARASSOVA, (2000), "Russian Privatization and Corporate Governance: What Went Wrong," *Stanford Law Review* 52: 1731-1808.

BROWN, J., J. EARLE, and A. TELEGDY, (2006), "The Productivity Effects of Privatization: Longitudinal Estimates from Hungary, Romania, Russia, and Ukraine," *Journal of Political Economy* 114: 61-99.

BROWN, J., J. EARLE, and S. GELBACH, (2013), "Privatization," in Alexeev, M., and S. Weber (eds.), *Oxford Handbook of the Russian Economy*, Oxford: Oxford University Press, pp. 161-188.

BÜGE, M., M. EGELAND, P. KOWALSKI, and M. SZTAJEROWSKA, (2013), "State-owned enterprises in the global economy: Reason for concern?" *VoxEU.org*, May 2. https://voxeu.org/article/state-owned-enterprises-global-economy-reason-concern

CHE, J., and Y. QIAN, (1998), "Insecure Property Rights and Government Ownership of Firms," *Quarterly Journal of Economics* 113: 467-496.

CLARKE, D., P. MURRELL, and S. WHITING, (2008), "The Role of Law in China's Economic Development," in Brandt, L., and T. Rawski (eds.), *China's Great Economic Transformation*, Cambridge: Cambridge University Press, pp. 319-361.

DIXIT, A., (2004), *Lawlessness and Economics*, Princeton, NJ: Princeton University Press.

DJANKOV, S., and T. NENOVA, (2000), "Why Did Privatization Fail in Kazakhstan?" Working Paper, Washington, DC: World Bank.

EVANS, P. (1995), *Embedded Autonomy: States and Industrial Transformation*, Princeton, NJ: Princeton University Press.

FEARON, J., (2011), "Self-Enforcing Democracy," *Quarterly Journal of Economics* 126: 1661-1708.

FRIEDMAN, M. (2002). "Economic Freedom Behind the Scenes," In *Economic Freedom of the World Report: 2002 Annual Report*. Washington, DC: Cato Institute.

GIBBONS, R., (2005), "Four Formal(izable) Theories of the Firm?" *Journal of Economic Behavior & Organization* 58: 200-245.

GLAESER, E., and A. SHLEIFER, (2002), "Legal Origins," *Quarterly Journal of Economics* 117: 1193-1229.

GREIF, A., P. MILGROM, and B. WEINGAST, (1994), "Coordination, Commitment, and Enforcement: The Case of the Merchant Guild," *Journal of Political Economy* 102: 745-776.

GROSSMAN, S., and O. HART, (1986), "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration," *Journal of Political Economy* 94: 691-719.

GURIEV, S. (2020), "Political Economy of Transition Reforms," in Douarin, E., and O. Havrylyshyn (eds.), *Palgrave Handbook of Comparative Economics*, London: Palgrave Macmillan.

GURIEV, S., and W. MEGGINSON, (2007), "Privatization: What Have We Learned?" In BOURGUIGNON, F. and B. PLESKOVIC (eds.), *Annual World Bank Conference on Development Economics: Beyond Transition*. Washington, DC: World Bank.

HADFIELD, G., and B. WEINGAST, (2012), "What is Law? A Coordination Model of the Characteristics of Legal Order," *Journal of Legal Analysis* 4: 471-514.

HANOUSEK, J., E. KOCENDA, and J. SVEJNAR, (2008), "Privatization in Central and Eastern Europe and the Commonwealth of Independent States," in ROLAND, G. (editor), *Privatization: Successes and Failures*, New York: Columbia University Press, 2008.

HART, O., A. SHLEIFER, and R. VISHNY, (1997), "The Proper Scope of Government: Theory and an Application to Prisons," *Quarterly Journal of Economics* 112: 1127-1161.

HUNDT, D., (2009), *Korea's Developmental Alliance: State, Capital and the Politics of Rapid Development*. London, UK: Routledge.

JAMRISKO, M., L. MILLER, and W. LU, (2019), "These Are the World's Most Innovative Countries," *Bloomberg.com*, January 22. https://www.bloomberg.com/news/articles/2019-01-22/germany-nearly-catches-korea-as-innovation-champ-u-s-rebounds

KARAS, A., K. SCHOORS, and L. WEILL, (2010), "Are Private Banks More Efficient than Public Banks? Evidence from Russia," *Economics of Transition* 18: 209-244.

KNYAZEVA, A., D. KNYAZEVA, and J. STIGLITZ, (2013), "Ownership Change, Institutional Development and Performance," *Journal of Banking and Finance* 37: 2605–2627.

KOWALSKI, P. et al. (2013), "State-Owned Enterprises: Trade Effects and Policy Implications," *OECD Trade Policy Papers*, No. 147, OECD Publishing, Paris. http://dx.doi.org/10.1787/5k4869ckqk7l-en.

LAFFONT, J. J., and J. TIROLE, (1993), *A Theory of Incentives in Procurement and Regulation*. Cambridge, MA: MIT Press.

LANE, N., (2019), "Manufacturing Revolutions: Industrial Policy and Industrialization in South Korea," Working paper, Monash University, Australia.

LEVIN, J., (2003), "Relational Incentive Contracts," *American Economic Review* 93: 835-857.

MACLEOD, B., and J. MALCOMSON, (1989), "Implicit Contracts, Incentive Compatibility, and Involuntary Unemployment," *Econometrica* 57: 447-480.

MASTEN, S., and J. PRÜFER, (2014), "On the Evolution of Collective Enforcement Institutions: Communities and Courts," *Journal of Legal Studies* 43: 359-400.

MEGGINSON, W., (2005), *The Financial Economics of Privatization*. Oxford, UK: Oxford University Press.

MEGGINSON, W., and J. NETTER, (2001), "From State to Market: A Survey of Empirical Studies on Privatization," *Journal of Economic Literature* 39: 321-389.

MILHAUPT, C., and K. PISTOR, (2008), *Law & Capitalism: What Corporate Crises Reveal About Legal Systems and Economic Development Around the World*. Chicago, IL: University of Chicago Press.

NELLIS, J. (1999), *Time to Rethink Privatization in Transition Economies?* Washington, DC: World Bank.

NELLIS, J., (2007), "Privatization in Developing Countries: A Summary Assessment," *SAIS Review* 27: 3-29.

NORTH, D., J. WALLIS, and B. WEINGAST, (2009), *Violence and Social Orders: A Conceptual Framework for Interpreting Recorded Human History*, Cambridge: Cambridge University Press.

NORTH, D., and B. WEINGAST, (1989), "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England," *Journal of Economic History* 49: 803-832.

OECD (2016), *State-Owned Enterprises as Global Competitors: A Challenge or an Opportunity?,* OECD Publishing, Paris, https://doi.org/10.1787/9789264262096-en.

OLSON, M., (1993), "Dictatorship, Democracy, and Development," *American Political Science Review* 87: 567-576.

PAO, H., H. WU, and W. PAN, (2008), "The Road to Liberalization: Policy Design and Implementation of Taiwan's Privatization," *International Economics and Economic Policy* 5: 323-344.

PEERENBOOM, R. (2002), *China's Long March Toward Rule of Law*. Cambridge, UK: Cambridge University Press.

PIRIE, I., (2007), *The Korean Developmental State: From Dirigisme to Neo-Liberalism.* London, UK: Routledge.

ROLAND, G., (2008), "Private and Public Ownership in Economic Theory," in ROLAND, G. (editor), *Privatization: Successes and Failures*, New York: Columbia University Press, 2008.

SANTACREU, A., and H. ZHU, (2018), "How Did South Korea's Economy Develop So Quickly? *On the Economy Blog*, Federal Reserve Bank of St. Louis. Available at: https://www. stlouisfed. org/on-theeconomy/2018/march/how-south-korea-economy-develop-quickly.

SAPPINGTON, D., and J. STIGLITZ, (1987), "Privatization, Information and Incentives," *Journal of Policy Analysis and Management* 6: 567-585.

SCHMIDT, K., (1996), "The Costs and Benefits of Privatization: An Incomplete Contracts Approach," *Journal of Law, Economics and Organization* 12: 1-24.

SHAO, C., and W. TSENG, (2014), "The Evolution of Taiwan Company Law: A Focus on the Blockholder-Centric Model," Working paper, Taiwan National University.

SHLEIFER, A., (1998), "State versus Private Ownership," *Journal of Economic Perspectives* 12: 133-150.

SHLEIFER, A., and R. VISHNY, (1994), "Politicians and Firms,' *Quarterly Journal of Economics* 109: 995-1025.

SMITH, D., and M. TREBILCOCK, (2001), "State-Owned Enterprises in Less Developed Countries: Privatization and Alternative Reform Strategies," *European Journal of Law and Economics* 12: 217-252.

SONG, Z., K. STORESLETTEN, and F. ZILIBOTTI, (2011), "Growing Like China," *American Economic Review* 101: 196-233.

THE ECONOMIST, (2019), "Asian-Tiger Governments Are Steering Their Economies with A Lighter Touch," *Economist.com,* Dec. 5.

WADE, R., (1990), *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization*. Princeton, NJ: Princeton University Press.

WEINGAST, B., (1995), "The Economic Role of Political Institutions: Market-Preserving Federalism and Economic Development," *Journal of Law, Economics and Organization* 11: 1-31.

WILLIAMSON, O., (1999), "Public and Private Bureaucracies: A Transaction Cost Economics Perspective," *Journal of Law, Economics and Organization* 15: 306-342.

WILLIAMSON, O., (2000), "The New Institutional Economics: Taking Stock, Looking Ahead," *Journal of Economic Literature* 38: 596-613.

WORLD BANK, (2018), *Doing Business 2018: Reforming to Create Jobs - Taiwan, China*. Washington, D.C.: World Bank Group. http://documents.worldbank.org/curated/en/157711510218233319/Doing-Business-2018-reforming-to-create-jobs-Taiwan-China.

XU, C. (2011), "The Fundamental Institutions of China's Reforms and Development," *Journal of Economic Literature* 49: 1076-1151.

Appendix. Proofs

Proof of Proposition 2

Proposition 2*: In a private firm, S supplies the first best input* $\overline{a}^{PF} > \overline{a}^{SF}$ *under both strong and intermediate political institutions. Under weak political institutions, there exists* $\delta^{PF} \in (0,1)$ *such that S supplies* $\overline{a}^{PF}$ *if the players are patient enough (*$\delta \geq \delta^{PF}$*) and a lower amount of input* $\underline{a}^{PF} < \overline{a}^{PF}$*, increasing in the quality of judicial institutions, if the players are impatient (*$\delta < \delta^{PF}$*).*

Proof: If $\delta \approx 1$, (ICE) is slack so there is an equilibrium that achieves the first best. If $\delta \approx 0$, the only equilibrium prescribes $a = 0$ and generates zero surplus. Since s^{PF} is non-decreasing in δ, this implies that the δ^{PF} threshold exists. Suppose now that $\delta < \delta^{PF}$. If $q \approx 1$, an equilibrium with $\beta = 0$ and $x = v(a) - c(a)$ is optimal because it relaxes (ICE) while satisfying (ICB). If $q \approx 0$, these payments violate (ICB) so R must give some surplus to B, $x < v(a) - c(a)$. This makes (ICE) more stringent and therefore reduces both $\underline{a}^{P}$ and s^{PF}. As q grows from zero towards one, (ICB) becomes slack so R can increase x, thereby relaxing (DEE) and increasing s^{PF}. This proves that when $\delta < \delta^{PF}$, $\underline{a}^{P}$ and s^{PF} are both increasing in q. ■

Proof of Proposition 3

Proposition 3*: (i) Under strong and intermediate political institutions, the private firm is efficient. (ii) Under weak political institutions, there exists* $\theta^* \in [0,1)$ *such that the private firm is efficient if its productivity advantage is high enough* ($\theta > \theta^*$)*. If the productivity advantage is not too high* ($\theta < \theta^*$)*, (iii) there exists* $q^* \in (0,1)$ *such that the private firm is efficient if judicial institutions are strong* ($q > q^*$)*, and the state firm is efficient if judicial institutions are weak* ($q < q^*$)*.*

Proof: We only need to prove parts (ii) and (iii). Let $\tilde{s}^{SF}(\theta)$ and $\tilde{s}^{PF}(q)$ be, respectively, the equilibrium surplus in the state firm and in the private firm when political institutions are weak. It immediately follows from propositions 1 and 2 that: (1) $\tilde{s}^{SF}(\theta)$ is strictly decreasing in θ; (2) $\tilde{s}^{PF}(q)$ is constant in q if $\delta \geq \delta^{PF}$ and strictly increasing in q if $\delta < \delta^{PF}$; (3) $\tilde{s}^{SF}(\theta) < \tilde{s}^{PF}(1)$; (4) $\tilde{s}^{SF}(1) < \tilde{s}^{PF}(0)$; (5) $\tilde{s}^{SF}(0) = \tilde{s}^{PF}(0)$ if $\delta \geq \delta^{PF}$, and $\tilde{s}^{SF}(0) > \tilde{s}^{PF}(0)$ if $\delta < \delta^{PF}$. Facts (1), (4) and (5) imply that there is $\theta^* \geq 0$ such that $\tilde{s}^{SF}(\theta) \lesseqgtr \tilde{s}^{PF}(0) \leftrightarrow \theta \gtreqless \theta^*$, where $\theta^* = 0$ for $\delta \geq \delta^{PF}$, and $\theta^* \in (0,1)$ for $\delta < \delta^{PF}$. This result, together with facts (2) and (3), implies that $\tilde{s}^{SF}(\theta) < \tilde{s}^{PF}(q)$ if $\theta > \theta^*$, which proves part (ii). Suppose now that $\theta^* \in (0,1)$ and $\theta < \theta^*$, such that $\tilde{s}^{SF}(\theta) > \tilde{s}^{PF}(0)$. Then, facts (2) and (3) imply that there exists $q^* \in (0,1)$ such that $\tilde{s}^{SF}(\theta) \lesseqgtr \tilde{s}^{PF}(q) \leftrightarrow q \gtreqless q^*$. This proves part (iii). ■