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Unique Equilibrium in a Model of Rule of Law

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Unique Equilibrium in a Model of Rule of Law *

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Abstract

This paper presents a model of Rule of Law in which a continuum of agents plays against the State for the appropriation of the economic assets of a stylised economy. The model shows how each agent can either challenge the State or acquiesce, with the latter having the choice of either protecting property rights or abandoning the economy to anarchy. Players' payoffs are affected by strategic complementarities, not only *between* State and agents but also *among* agents themselves. As a consequence of this, a Coordination Failure is generated. The solution of the game is given by two Pareto-ranked Nash equilibria. Introducing idiosyncratic information and sequential play generates a unique equilibrium, according to the global game approach. On the one hand, this model predicts that high uncertainty and sunk costs in law enforcement have a negative effect, pushing the economy towards a Pareto-dominated equilibrium. On the other hand, the high value given to the economy's assets (embedded social norms) has a positive influence, leading to a Pareto-dominant equilibrium.

Keywords: Rule of Law, Coordination Failure, Global Games
JEL Classification: D81, C72, K42

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1 Introduction

This paper focuses on an economy in which the Rule of Law is potentially weak, i.e. in countries in the process of transition from planned to market economy, as well as underdeveloped countries with weak property rights' institutions, and aims to answer the following two questions: is it possible to avoid the trap of an *anarchic* state of the economy, with low property law enforcement, strong power concentrated in the hands of few rich oligarchs, no clear mechanism for enforcing checks and balances between the three branches of power and no clear separation between legitimate and illegitimate actions? Furthermore, what are the key explanations for lawlessness and missing institutional change in those countries?

By applying a global game approach (Carlsson and van Damme (1993a); Carlsson and van Damme (1993b); Morris and Shin (1998); Morris and Shin (2000a); Morris and Shin (2000b)) this paper builds a simple model that tries to explain why some countries are not able to enforce the Rule of Law, despite the fact that they are relatively advanced in their transition/development. In a coordination game, a continuum of agents plays against the State[1]. They have the incentive to break the Rule of Law (for example in societies with weak social norms), and to refrain from cooperating for its enforcement/protection[2]. The lack of foresight on other players actions and strategic complementarities (the simultaneous action of many players affects players' payoffs) generate multiple equilibria. Under some general 'global game' conditions a unique equilibrium can be reached. The society could be blocked in a Pareto non-efficient equilibrium, even in the case of an economy being relatively strong as far as its institutions are concerned.

For example, this model applies to the transition period, considered a 'window of opportunity', where pro-development reforms can be more easily implemented. However, enforcing the Rule of Law in countries experiencing a transformation from a centralised to a democratic society has proven to be extremely difficult[3]. In other words, it is not clear how to enforce a Rule of Law mechanism in an effective way when

[1]Throughout the paper State and Government will be used interchangeably.

[2]Mauro (1995) wrote a seminal article on the corruption-growth relationship. This paper is about property right protection and national governance, without a specific focus on growth.

[3]The European Bank for Reconstruction and Development has been working on this issue for over a decade. A joint EBRD-World Bank project has been conducted with the aim of collecting and analysing data and related information on the "Business Environment and Enterprises Performance surveys" (BEEPs) in 27 transition economies. One of the questions the study is trying to answer is the reason behind the weak enforcement of property rights and, consequently, the feeble penetration and respect of the "rule of the game" in the legal, judicial or court systems of ex-centralised economies. See Transition Report (2005).

an important part of the society does not believe in its value.

In section 2 this paper will first look at the previous studies on the impossibility of enforcing the respect of the Rule of Law in transition and developing countries. This has become an important issue in recent literature on the topic, (Roland (2000); Dixit (2004); Rigobon and Rodrik (2005)). Indeed, theoretical and empirical papers have dealt with the Rule of Law enforcement activity from different perspectives and with multidisciplinary approach incorporating political science, political economy and 'law & economics'. Some scholars argue that the Rule of Law enforcement is a "second order phenomenon": as soon as the property rights are sufficiently widespread (despite the fact that they are not yet protected), citizens and economic agents (firms, corporations, etc) will form political constituencies acting as social pressure groups that will lobby politicians to adopt policies to protect the rule of law and those same property rights (e.g. Boycko, Shleifer and Vishny (1995)). Looking at Russia in the aftermath of mass privatisation programmes, it is noticeable that law enforcement was not effective. Even after a few years there was no clear sign of progress towards its actual implementation. The Russian example is not isolated[4]. The reasons for this riddle are not fully understood[5] and such an interest in the literature might lie in the belief that '*making certain that the laws are obeyed*' is indeed affected by coordination failure and therefore the social optimum can be reached only under specific circumstances and institutional contexts.

Section 3 will unfold the logic of the model of an economy where strategic complementarities do not allow agents to internalise the effect of other agents' actions. In numerous economic and social contexts (Hoff (2000); Cooper (1999)), this coordination failure might be characterised by multiple equilibria outcomes. The *non uniqueness* of the equilibrium does not allow for neat policy implications. Exploiting the global game framework, the paper will rely on two key assumptions -imperfect information (idiosyncratic noisy signals) and sequential play- in order to lead to a unique equilibrium.

Tentative and specific policy implications are then discussed in the conclusions.

[4]The following quotation by Cooter (1996) captures the idea: "The Soviet Union exemplified the rule of *State law*, [...]. Since state law did not respond to morality, spontaneous support for law by citizens was weak. Soviet citizens, who were accustomed to a low level of spontaneous support for law by citizens, must have expected this tradition to continue after the Soviet government collapsed. These expectations created a self-fulfilling prophesy and caused the system to equilibrate with low private support for state law, which in turn made state law ineffective. The situation is the opposite of the rule of *law State* [...]".

[5]A recent strand of the literature looks at the relationship between political institutions and resource abundance in developing or transition countries. See for example Robisnson, Torvik and Verdier (2006) and Egorov, Guriev and Sonin (2006).

2 Related Literature

2.1 Coordination Failure & Multiple Equilibria

Rosenstein-Rodan (1943) investigated the importance of *external economies* in the industrialisation process of depressed-underdeveloped areas. A simultaneous (coordinated) investment into a variety of industries[6] would allow the social value of investment to be higher than the sum of the private evaluation of each and every industry. In other words, industries might fail to coordinate because they do not internalise crucial pro-development forces. This could be avoided when a *big push* into many industries is planned and implemented by a benevolent State.

Murphy, Schleifer and Vishny (1989) analyse a similar context of un-coordination of investment across sectors. In a model of imperfect competition and demand spillover two equilibria emerge: one allows industrialisation[7] and one does not. The three authors argue that coordination failure and multiple equilibria imply the possibility of remaining trapped in a Pareto-dominated status.

An investigation has emerged in the literature (Carlsson and van Damme (1993a); Kandori, Mailath and Rob (1993)) as far as multiple equilibria in the presence of coordination failure/strategic complementarities are concerned. Different ideas have been proposed within the literature on equilibrium selection (Cooper (1999)) where there is a trade-off between Risk dominance and Pareto dominance.

The Harsanyi-Selten criterium of *risk dominance* (Harsanyi and Selten (1988)), for example, has been a useful tool when dealing with multiple equilibria. An equilibrium Risk-Dominates another if it is associated with the largest product of deviations losses, *viz* it implies a higher joint loss in the counterfactual case in which every agent plays the alternative action. Carlsson and van Damme (1993a), Carlsson and van Damme (1993b) have started to move from this equilibrium selection investigation towards the study of a game theoretical framework with incomplete information, the so called *global game theory*. They model a coordination game where the hypothesis of full information is removed and each player observes the fundamentals of the game with a noise. The unique equilibrium solution could be a "natural" outcome of this game.

Morris and Shin (1998) apply the global game tool in a context of *currency attack*. In the presence of complete information (all the agents have a correct knowledge of

[6] Rosenstein-Rodan (1943) refers to a specific historical example: light, medium and heavy industries development in the World War II period.

[7] They have a case for a unique equilibrium when pecuniary externalities are manifested through profits only, therefore unprofitable investments have the effect of reducing the size of other sectors. In their model, this kind of externalities can conduce to a unique equilibrium.

the strength of the economy), the decision to "attack" the rule of law system can be driven by self-fulfilling expectations, leading either to a good or to a bad equilibrium. However, if the hypothesis of incomplete knowledge of the economy's fundamentals is introduced, the traditional multiple equilibria result is discarded.

This methodology is applied to a *Rule of Law* stylised model. This allows for tentative and preliminary policy considerations, which can prove to be much more difficult exercise for multiple equilibria models investigated in the literature. In fact, Fevrier and Linnemer (2006) have recently pointed out how in very simple games Pareto and Risk Dominance (PD, RD) could lead to different directions in the equilibrium selection. Furthermore, Cooper (1999) and Hoff (2000) have emphasised how coordination failure is not a rare phenomenon, i.e. many economic problems could be analysed within this theoretical framework. The Rule of Law context is one of these. The next section will investigate this aspect.

2.2 The Rule of Law

Different social disciplines have studied the (im-)possibility of enforcing the rule of law, particularly in countries experiencing important institutional changes, such as transition or developing countries.

North and Weingast (1989) -in the *political science/economic history* literature- have enlightened the coordination problem occurrence in a precise historical context, the 1688 Glorious Revolution in England, which entailed a delicate relationship between State and civic society. Citizens did not "trust" the state's action and became protagonist of the institutional change.

In a subsequent paper, Weingast (1997) models a framework of a coordination game as a self-interested sovereign State deciding in favour of the Rule of Law (or opposing it) against two groups of citizens. The Pareto optimal equilibrium (no transgression and the acquiescence of both groups) is not always reached due to coordination failure. The acquiescing group faces a high cost in case of a challenge by the other group (the risk of being the only acquiescent is not worth taking). The forward looking State expects both groups to challenge its decision and maximises its payoffs by transgressing, instead of implementing the Rule of Law.

In the *law and economics* literature Cooter (1996) assesses the strong differences between rule of *law State* and rule of *State law*. The former is considered a good equilibrium entailing the enforcement of property rights, widespread respect of the law and low level of corruption. The latter is a bad equilibrium with the exact opposite outcomes, namely anarchy. Economies can show a tendency to move to one or the other equilibrium, depending on the embedded social norms characterizing the underlying

society. Agents are not always able to coordinate among themselves because they do not trust each other (the citizens promoting the Rule of Law could be worse off than the ones opposing it).

Finally, the literature analyse the same problem in both a static and a dynamic environment (Roland and Verdier (2003); Hoff and Stiglitz (2003); Hoff and Stiglitz (2004a); Hoff and Stiglitz (2004b)) from a *political economy* perspective. In models of this kind strategic complementarities imply the existence of multiple equilibria for agents (e.g. managers of big firms) who have to choose whether to strip assets (be predators) or to build value (acquiesce).

Economic models with multiple equilibria do not allow for clear policy recommendations. There is no specific indication of which equilibrium is selected because this depends on exogenous parameters as well as on the subjective perceptions of the parameters by agents. The Rule of Law models so far mentioned show the following weakness: they need an *exogenous* element to qualify the outcome in terms of equilibrium. In other words, they need to resort to forces *outside* the model to select the equilibrium.

This paper will build on the framework studied by Hoff and Stiglitz (2004a) and aims to broadly extend their results. It starts from the two major concepts of Coordination Failure and Rule of Law and it attempts to move a step forward by modeling a stylised economy in which a unique equilibrium emerges *despite* coordination problems faced by the players. However, with incomplete information and sequential play agents are uncertain about other agents' actions and this leads to a good or a bad equilibrium, depending on the economic conditions and the institutional underpinnings. Under particular circumstances, there might be a reduced probability for the good equilibrium to be established in spite of the high values of the fundamentals and the underlying positive conditions of the economy. The analysis is based on the global game framework applied to multiple equilibria models[8]. In a context of good fundamentals, the policy implication would be to require the government to intervene to decrease uncertainty and, at the same time, to convey the "right" positive signals to the economy. Conversely, in a context of bad fundamentals, the sole reduction of uncertainty would not be sufficient. This paper will explore the different policy implications ensuing from the above propositions.

[8]The global game result, namely the uniqueness of the equilibrium, has been recently challenged by different scholars. The introduction of endogenous information aggregation (Angeletos and Werning (2004)) or price formation (Hellwig, Mukherji and Tsyvinki (2004)) allows for multiple equilibria in currency crises models.

2.3 State Failure vs Market Failure

In the heterogenous context of transition economies, Russia still appears to have some features of a purely state-controlled economy, despite the fact that it has been struggling to reinforce stronger market institutions and property protection laws since the beginning of the 90s. There are many concerns about the ability (or willingness) on the part of the government to move in the "right" direction and to avoid stepping back on reforms. The literature is still looking for explanations.

On the theoretical ground, Dixit (2004) points out important market failures, even under "ideal" well functioning state law: "imperfect information, externalities and imperfect competition are well-recognised causes of market failures, and they can exist *regardless* of whether a government adequately protects property rights and enforces contracts.". On the other hand, lawlessness may emerge in relative advanced market economies.

On the empirical side, an investigation conducted by the EBRD (Transition Report (2005)) discovered interesting results, and points towards several "institutional" directions. According to the data collected by the Business Environment and Enterprises Performance Surveys in 1999, 2002 and 2005 in 27 transition countries, the following stylised phenomena emerge: on the one hand senior managers are spending less time dealing with public officials (reduction of the so called time-tax), and the bribe tax (share of annual revenues spent on bribes) dropped in almost all countries. On the other hand, new private firms pay more than privatised and state firms in bribes, whereas showing higher growth in efficiency. In particular, "studies have clearly demonstrated that corruption tend to have a negative impact on the performance of a given economy. However, this need not rule out individual firms gaining from corruption. The fact that corruption can help boost sales for individual firms should be a matter of concern for policy makers. [...] In fact, governments have continued to extract resources from firms, [...] public official are preying on the more successful firms".

The paper aims to build a simple representation of the set of puzzling stylised facts just sketched. In an economy with imperfect information, externalities and imperfect competition, i.e. rent-seeking possibility by single firm-agent (Murphy, Shleifer and Vishny (1993); Sonin (2003)) there is an *individual* incentive to break the Rule of Law (i.e. paying bribes and avoiding taxes) for agents, while the State is not necessarily gaining from the law enforcement. The market mechanism fails and therefore the "Payoff Dominant" equilibrium is reached only if institutions are strong. This creates a direct relationship between the Rule of Law implementation and the institutional strength of an economy. This is the focus of the next section.

3 The Model

In coordination games, externalities are not internalised by individual agents. Actions of players are strategic complements, i.e. increased activity of some players affects the payoffs structure of other players, who will be better off by increasing their own activity (Cooper (1999)). This may lead to multiple Pareto-ranked equilibria: self-fulfilling expectations (optimistic or pessimist believes) could determine the games' outcome. This theoretical framework has wide applications in currency attacks (Obstfeld (1996); Morris and Shin (1998)), bank runs, liquidity black hole (Postlewaite and Vives (1987); Morris and Shin (2004); Angeletos and Werning (2004)), as well as debt crises, financial crashes, riots and political regime changes[9].

A traditional coordination game is played in a perfect information setting where every agent knows the other agents' payoffs and the so called common knowledge hypothesis is valid. However, the lack (or the partial violation) of such a hypothesis does characterise many social interaction or economic behavior contexts. In the following sections I will present a model in which this is the case: an idiosyncratic perception of a noisy signal of the fundamentals by each and every agent determines a blurred perception of other agents' action. This allows for the heterogeneity in perception about the economy's fundamentals and, as a direct consequence, about other players' actions. This leads to a lower probability of reaching a Pareto-Optimal equilibrium, and -eventually- allows for the "success" of the coordination failure. The model will be solved in an imperfect information sequential game framework.

3.1 Strategies

In a stylised economy a continuum[10] of agents plays against the State, the ultimate owner of the monopoly of public order[11].

I define θ as an exogenous stochastic variable representing the "institutional health" of the economy (the fundamentals), that is assumed uniformly distributed on the [0,1] interval. A proxy of this variable could be the progress in transition[12] or the degree of social norms compatible with the establishment of the Rule of Law as pointed out by Cooter (1996). Neither the agent's nor the government's actions have any effect on the fundamentals determined once and for all by nature[13]. High θ is attached to strong 'advanced' economies, while low θ characterises a weak economy.

[9] For a summary of the main application of the global games see Angeletos and Werning (2004).
[10] The population size is one.
[11] As in Hoff and Stiglitz (2004a).
[12] E.g. EBRD Transition Indicators, Transition Report (2005).
[13] In a repeated game context this hypothesis could be relaxed in order to analyse a dynamic model.

Agents attempt an appropriation of the economy's assets against State's action and the latter decides to oppose their action or not. A taxonomy of State's and agents' actions follows.

- **State** The State decides whether to fully enforce the Rule of Law, i.e. protecting economy's assets valued γ[14], or to abandon the economy to anarchy[15];
- **Agents** Either they attempt to *appropriate* the assets valued γ, breaking the Rule of Law, or they conform to property rights[16].

Therefore, Government and agents compete for the same assets, playing one against the others. In the case of both competing, the former "takes all". This is a way to model the aforementioned monopoly of public order. However, the situation of direct fight (government enforcing and agents appropriating) leaves the economy with a Pareto-sub-Optimal outcome[17]. Agents might not have interest in the Rule of Law. This is true despite the fact that a common conforming attitude to the Rule of Law respect would potentially make everyone better off, both in terms of overall welfare and personal payoffs.

3.2 The Enforcing & Appropriation Technology

I call $\alpha \in [0, 1]$ the percentage of agents appropriating. The payoffs of Government and agents are mutually affected. The former gains in two cases: the economy is strong (high θ); and the number of appropriating agents is low (small α). In other words, it is easier to enforce the Rule of Law in an institutionally strong economy in which few appropriate. Agents face the opposite situation. Their gain is in proportion to the prevailing behavior of the other agents (high α) and in proportion to the weakness of the economy (low θ).

The government faces a cost in enforcing, while the agents face a cost in appropriating. Two cases are explained in order.

[14]The rule of law value in the economy does not depend on the fundamentals. A possible extension is when γ depends on the past θ in a dynamic repeated game $\gamma_t(\theta_{t-1})$.

[15]I refer to the anarchy concept as in Hoff and Stiglitz (2003), Hoff and Stiglitz (2004a) and Hoff and Stiglitz (2004b). In a broader sense I could use the concept of social embeddedness or informal institutions analysed in Williamson (2000).

[16]Using the wording of the papers reviewed in the literature review (section 2) I could use an alternative terminology: to become a robber vs producer, to strip assets vs build value and to challenge vs acquiesce.

[17]"The winner takes it all" hypothesis puts this game in different type of context with respect to the "Invest, share" models described by Dixit (2004). However, this paper will characterise special cases of one-sided prisoner dilemma, sequential game, and two sided prisoner dilemma in the next sections.

- In an economy where the fundamentals θ are *fixed* by nature, the higher the number of appropriators, the higher the enforcing cost for the government and the lower the appropriation cost of the players. This is the appropriation spillover effect, negative between State and agents and positive among agents[18]. Strategic interactions among players have been modelled by Cooter (1996) and Roland and Verdier (2003) in a similar theoretical investigation;

- Consider now a *fixed* percentage of appropriators α: the stronger the fundamentals, the lower the government enforcing cost and the higher the players appropriation cost.

It is now possible to compute government's and agents' payoffs as the difference between the value and the cost of their actions (given the actions of all others players). I will review case by case and summarise payoffs in table 1.

- **State enforcing** The value of the property rights protected under the Rule of Law (assets' value) is γ. In the case in which the government enforces the Rule of Law, it pays a cost divided in two components: k is the sunk cost[19], and $c(\alpha, \theta)$ is the variable cost, knowing that α is the proportion of stripping agents and θ is the strength of the economy. The overall cost is increasing in k, α and decreasing in θ, $\frac{\partial c}{\partial \alpha} > 0, \frac{\partial c}{\partial \theta} < 0$. If the government enforces the property rights, its payoffs is the assets' value *minus* the cost of the enforcement action, $\gamma - [k + c(\alpha, \theta)]$;

- **State not enforcing** It does not protect any asset and does not pay any cost. Its payoffs is 0 and anarchy prevails;

- **agents appropriating** The agents pay a cost, as well, divided in two components: a fix transaction cost t[20]; a variable cost increasing in θ and decreasing in α. In other words, they pay t and gain $c(\alpha, \theta)$ (the opposite of government variable costs) [21]. They are rewarded differently accordingly to the State action:

[18]However, the direct spillover effect among agents is *not* necessary to obtain the coordination failure result in Morris and Shin (1998). On the contrary, in this model that effect does affect the welfare and the ranking of the equilibria. This will be crucial in terms of policy implications.

[19]I call it sunk cost because its effect is independent from agents' action.

[20]Think of a state with an effective police force. However, I am not introducing any hypothesis on the financing process of public order enforcement.

[21]Notice that the hypothesis that the agents' variable costs are equal in value and opposite in sign with respect to the government's variable costs is a simplification taken for convenience. Any other couple of costs functions with the above characteristics, increasing in α and decreasing in θ for the government and viceversa for the agents would lead to the same conclusions. For an interpretation see Appendix 5.

– **State enforcing** the value of appropriating is 0, the reason being that the State neutralises their action and "take possession" of γ: the payoffs of appropriating is $0 - [t - c(\alpha, \theta)] = c(\alpha, \theta) - t$;

– **State not enforcing** the value of appropriating is γ and private agents indeed appropriate all the assets: the payoffs is $\gamma - [t - c(\alpha, \theta)]$[22].

- **agents not appropriating** They get 0, having no gain and no costs.

$1 \diagdown 2$	Rule of Law	not Rule of Law
Not App.	$0; \gamma - [k + c(\alpha, \theta)]$	$0; 0$
App.	$-[t - c(\alpha, \theta)]; \gamma - [k + c(\alpha, \theta)]$	$\gamma - [t - c(\alpha, \theta)]; 0$

Table 1: Payoffs Matrix: (1) Agent(s) & (2) State

3.3 Characterising the Parameter Space

3.3.1 Dominated Strategies

Hitherto I have assumed a generic monotonic variable cost function $c(\alpha, \theta)$, in order to keep the analysis as general as possible. Introducing a linear function, both monotonic and continuous, I satisfy the conditions for the existence of a unique equilibrium and I simplify the analysis. The following exercise is therefore a subcase[23] of Morris and Shin (1998), i.e. they derive and prove the result for a generic monotonic and continuous $c(\alpha, \theta)$.

However, the model presented in this paper has a major element of difference in respect to Morris and Shin (1998). The agents' cost of appropriating is endogenously determined by the number of appropriators, in line with Cooter (1996) and Roland and Verdier (2003) models of Rule of Law. There is a "positive" externality in case of many agents appropriating. The policy implications are indeed affected by this new feature of the model.

I assume that $c(\alpha, \theta) = \alpha - \theta$. This is the simplest linear function increasing in the proportion of appropriators α and decreasing in the strength of the economy θ.

[22]The hypothesis underneath table 1 is that each agent i appropriates a tiny fraction of the whole γ, i.e. $\gamma(1 - \rho_i)$, being the population a continuum of size 1. In case *all agents* appropriated, the entire γ would be completely depleted-stolen, $\sum_{i \in A} \gamma(1 - \rho_i) = \gamma$. However, this is just a *scale effect* that is not affecting any result of the model in both the equilibrium solution and the welfare analysis.

[23]Any *non linear* but monotonic and continuous function would guarantee the same result, but the computations would be cumbersome.

Strictly dominated strategies emerge for particular parameters' values. In other words, there is a set of parameters conducing to dominant strategies.

- $\theta = 0$**, i.e. worst fundamentals:** if state's payoffs $\gamma - k - c(\alpha, 0) < 0 \quad \forall\alpha \Rightarrow \gamma - k - c(0,0) < 0 \Rightarrow k > \gamma$. When the economy has the minimum "institutional strength" ($\theta = 0$), the number of appropriating agents is irrelevant. Even with $\alpha = 0$, the cost for the government is higher than the value of the Rule of Law;

- $\alpha = 1$**, i.e. all appropriating:** if state's payoffs $\gamma - k - c(1, \theta) < 0 \quad \forall\theta \Rightarrow \gamma - k - c(1,1) < 0 \Rightarrow k > \gamma$. In the case in which *all* agents appropriate, the government has a negative payoffs despite the fact that the fundamentals could be the best ($\theta = 1$);

- $\theta = 1$**, i.e. best fundamentals:** if agent's payoffs $\gamma - t + c(\alpha, 1) < 0 \quad \forall\alpha \Rightarrow \gamma + c(1,1) - t < 0 \Rightarrow t > \gamma$. When the economy has the maximum "institutional strength" ($\theta = 1$), no matter how many agents decide to appropriate (even $\alpha = 1$), the transaction cost will always overcome the gain.

3.3.2 Tripartite Space

Following Obstfeld (1996) and Morris and Shin (1998) I can divide the fundamentals' θ space in three intervals:

- **hell** $[0, \underline{\theta}]$, $[\underline{\alpha}, 1]$. I derive the conditions under which anarchy is the dominant strategy for the State: a) $k + c(\alpha, \underline{\theta}) > \gamma \quad \forall\alpha \Rightarrow \underline{\theta} = k - \gamma > 0 | \alpha = 0$. Below $\underline{\theta}$ not to enforce is a dominant strategy for the government; b) $k + c(\overline{\alpha}, \theta) > \gamma \quad \forall\theta \Rightarrow \overline{\alpha} = \gamma + 1 - k > 0 | \theta = 1$. Above $\overline{\alpha}$ not to enforce is a dominant strategy for the government.

- **heaven** $[\overline{\theta}, 1]$, $[0, \underline{\alpha}]$. I derive the conditions under which not appropriation is a dominant strategy for the agents: a) $\gamma - t + c(\alpha, \overline{\theta}) < 0 \quad \forall\alpha \Rightarrow \overline{\theta} = \gamma + 1 - t | \alpha = 0$. Above $\overline{\theta}$ agents have no incentive to appropriate, their costs outweigh their benefits, then not to appropriate is a dominant strategy; b) $\gamma - t + c(\underline{\alpha}, \theta) < 0 \quad \forall\theta \Rightarrow \underline{\alpha} = t - \gamma | \theta = 0$. Below $\underline{\alpha}$ agents have no incentive to appropriate. Their costs outweigh their benefits, then not to appropriate is a dominant strategy;

- **no corner solutions' area** $[\underline{\theta}, \overline{\theta}]$ $[\underline{\alpha}, \overline{\alpha}]$. This is the interval within which not trivial solutions appear and a multiplicity of equilibria emerge.

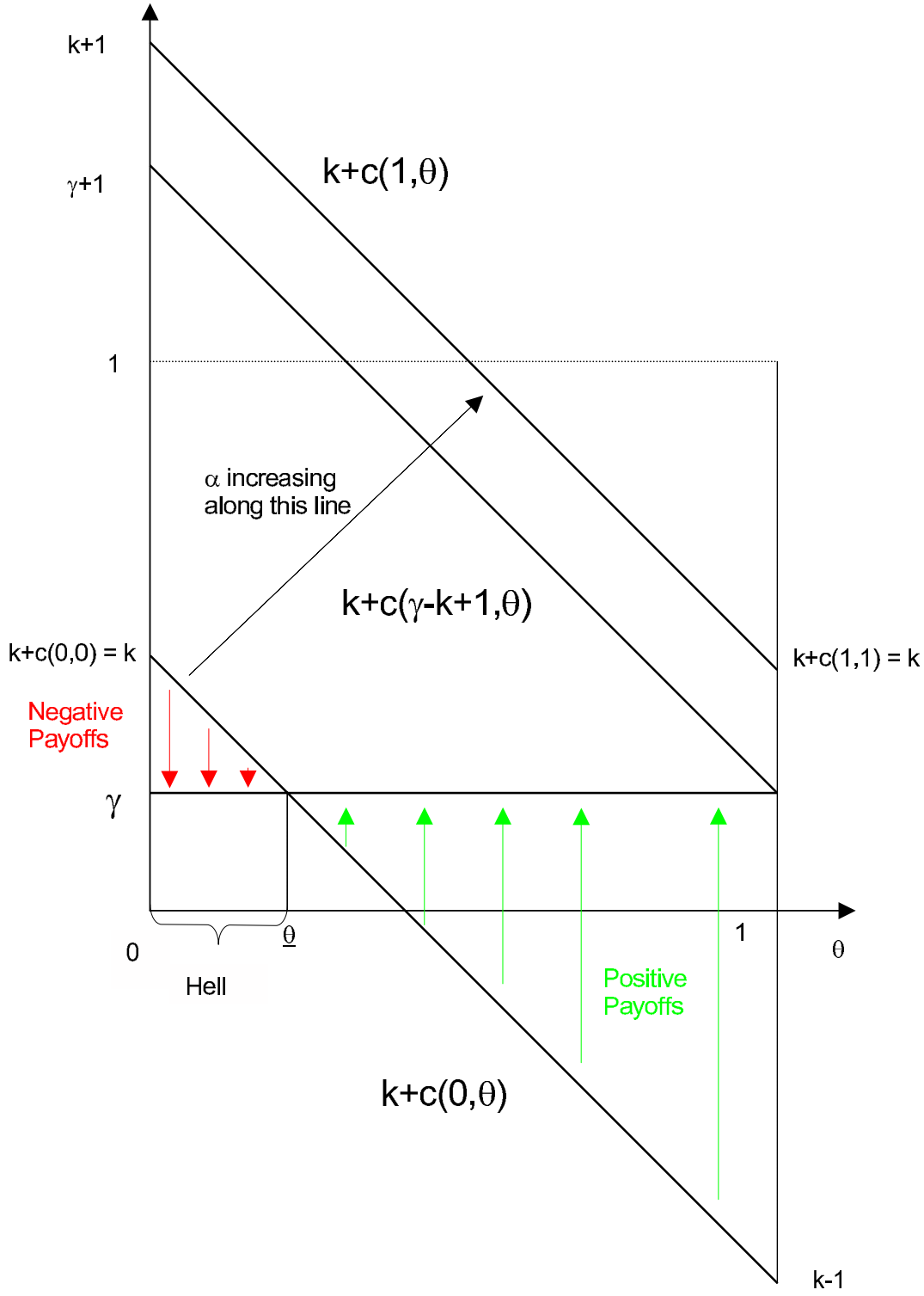


Figure 1: State Payoffs: $\gamma - [k + c(\alpha, \theta)]$

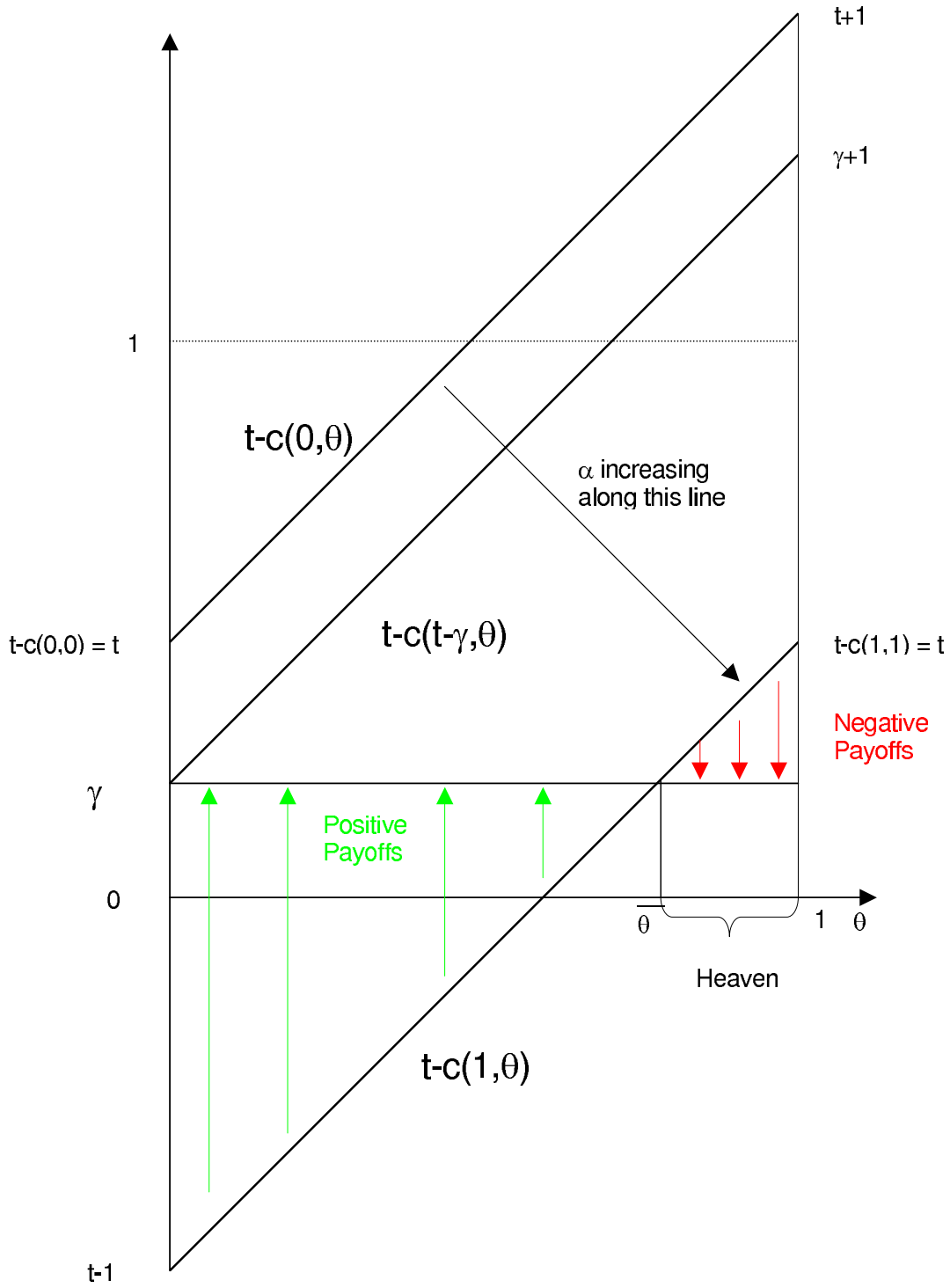


Figure 2: Agents Payoffs: $\gamma - [t - c(\alpha, \theta)]$

Non strictly dominant strategies emerge if

$$\theta \in [max\{0, k-\gamma\}, min\{1, \gamma+1-t\}] \quad (1)$$

$$\alpha \in [max\{0, t-\gamma\}, min\{1, \gamma+1-k\}] \quad (2)$$

In fact, outside these thresholds there are strictly dominant strategies and corners solutions appear[24]. The equilibrium analysis follows and investigates the internal solutions of the game, supposing that equations (1) and (2) are both satisfied[25].

3.4 The Single Agent Game without Uncertainty

I suppose that a unique agent plays against the State, i.e. the coordination failure *among* agents vanishes, while the coordination failure *between* the single agent and the State remains in place. For what concerns the model this means that $\alpha \in \{0, 1\}$ and no longer $\alpha \in [0, 1]$. This is simply a corner case in which all agents appropriate or not. The population has size one and the payoffs matrix in table 1 is consistent.

The outcome will indeed be different according to the time structure, either simultaneous or sequential, of the "collapsed" two players' game with perfect information. At this stage there is no role for uncertainty. θ is predetermined and perfectly known by everybody.

3.4.1 Simultaneous Game

Let me suppose that the government and the agent play simultaneously in period 1 as described in figure 3.

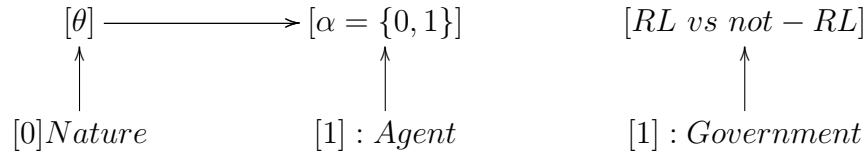


Figure 3: Timing: Simultaneous Play

Proposition 1 *In a simultaneous game with no uncertainty about the fundamentals and no coordination failure among agents (i.e. one agent, static game with perfect information) there are* ***two Nash Equilibria****. One in which the government leaves*

[24] Additional implicit conditions are $k-\gamma \leq 1, t-\gamma \leq 1, \gamma+1-t \leq 1, \gamma+1-k \leq 1$, i.e. $\gamma \leq k \leq \gamma+1$ and $\gamma \leq t \leq \gamma+1$ as shown in figure 1 and 2.

[25] See Appendices 5 and 6 for an interpretation.

the economy to anarchy and the agent appropriates, and another in which the Rule of Law is enforced when the agent does not appropriate.

Proof 1 *See Appendix 7.*

The multiplicity of equilibria is generated by the *coordination failure* between the government and the single agent due to the negative effect of the agent's decision on the cost of the government, namely the negative externality.

3.4.2 Sequential Game

Now consider a sequential setting as depicted in figure 4, the government plays in period 2.

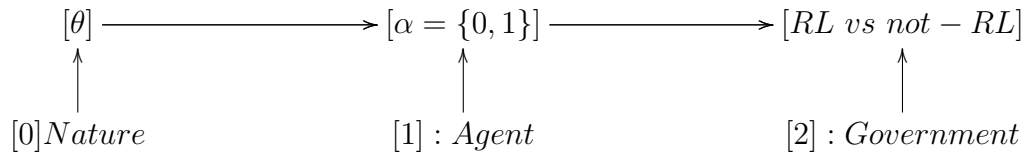


Figure 4: Timing: Sequential Play

Proposition 2 *In a sequential game with no uncertainty about the fundamentals and no coordination failure among agents (i.e. one agent, dynamic game with perfect information) there is* ***one Sub-Game Perfect Nash Equilibrium*** *where agents appropriate and the Rule of Law is not enforced.*

Proof 2 *See Appendix 8.*

The uniqueness of the equilibrium is generated by the sequential structure of the game. The agent, exploiting the *first mover's advantage*, will appropriate leading the economy to a Pareto-dominated Sub-Game Perfect Nash equilibrium.

This second proposition could describe Russia at the very beginning of transition. The oligarchy was fully in control of the economy's assets (no uncertainty) and pursued a common strong interest (no coordination failure) of "appropriation". It was a static and stable situation. There was no real hope for the State (in its broad definition as a civic and judiciary society) to enforce property rights. This is the period of massive stripping of assets, privatisation in favour of few big businessman or politicians, and when contract enforcement was very difficult, at best.

3.5 The Multiple Agents Game with Uncertainty

I now remove the unrealistic hypotheses of a unique agent and perfect information to take on board market failure (Dixit (2004)). Multiple agents now receive an imperfect information about the fundamentals from the Nature, as in Morris and Shin (1998): $x_i = \theta + \varepsilon_i$ ($x_i \sim Uniform$ on $[\theta - \varepsilon, \theta + \varepsilon]$ with $\varepsilon > 0$[26]).

3.5.1 Simultaneous Game

I first consider the simultaneous game, as shown in figure 5. The result of proposition 1 is replicated.

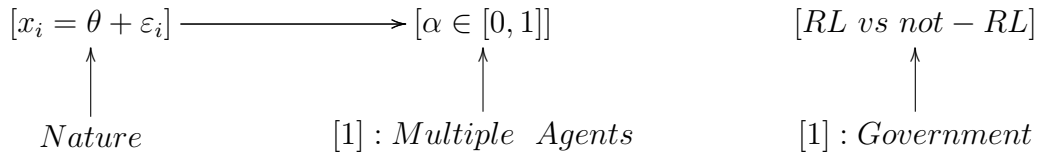


Figure 5: Timing: Simultaneous Play and Uncertainty

Proposition 3 *In a simultaneous game with uncertainty about the fundamentals and coordination failure among agents (static game with imperfect information) there are* ***two Bayes-Nash Equilibria****.*

Proof 3 *The proof of this proposition is based on the following argument: agents will act according to the believes of other agents' actions, thus generating a self-fulfilling expectation*[27]*. If they expect the State to enforce the Rule of Law, they will not appropriate, but if their perception of the economic environment is such that there will be no enforcement, then they will appropriate. The decision is led by the overall "perceived" environment, and this mechanism generates the self-fulfilling result. Both equilibria could be reached because there is no possibility of assessing how believes will be formed*[28]*.*

3.5.2 Sequential Game

Suppose now that the sequence of the game is the following: each and every agent receives an imperfect information about the fundamentals and the government plays

[26] It is also needed that ε is bounded, see Morris and Shin (1998) note 4 page 590.

[27] For a similar argument see Obstfeld (1996) and Morris and Shin (1998).

[28] In the intermediate case of a simultaneous game with many agents and *no uncertainty* there are still **two Nash-Equilibria**. Every agent has to guess α despite knowing θ. She is aware that the State will chose anarchy only if $\alpha > \gamma - k + \theta$. There is no mechanism leading to strictly dominant strategies, neither for agents nor for the State.

only after having observed α and θ[29] as figure 6 characterises[30].

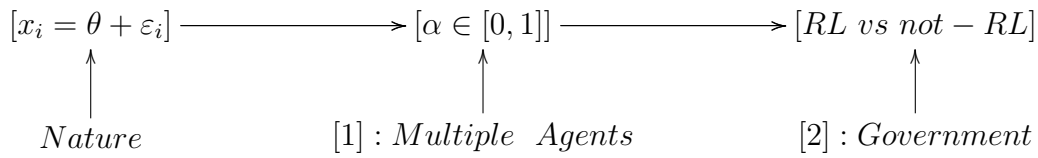


Figure 6: Timing: Sequential Play and Uncertainty

The signal x is uniformly drawn on the interval $[\theta - \varepsilon, \theta + \varepsilon]$ with $\varepsilon > 0$. Using backward induction, agents are conscious that the decision of the State is simply based on the observed α and θ. However $\alpha(\varepsilon_i)$ depends on ε_i, which is a random variable. The agents decision is taken only through the $E(\alpha)$, i.e. the expected value of the number of appropriators. It will turn out that this new feature of the model, under the non implausible conditions derived in section 3.3.2, leads to a unique equilibrium.

Proposition 4 *In a sequential game with uncertainty about the fundamentals and coordination failure among agents (dynamic game with imperfect information) there is* ***one Sequential Nash Equilibrium***[31] *determined by:*

$$x^* = \theta^* + \frac{\varepsilon[3\gamma - 2(k+t)]}{\gamma + 2t + 1} \tag{3}$$

$$\theta^* = \frac{\varepsilon[1 + 2(k-\gamma)] + \gamma(1 + k - \gamma) - t + \frac{1}{2}}{\gamma + 2\varepsilon + 1} \tag{4}$$

The Rule of Law is enforced if the value of θ selected by nature is greater than θ^*. Otherwise anarchy prevails.

Proof 4 *Follows in Sections 3.5.3, 3.5.4, 3.5.5 and 3.5.6.*

3.5.3 Period 2: Government

The sequential model is solved by backward induction. I start looking at State's action. The Government has the advantage of playing without uncertainty, because θ is revealed in period 2. At the same time it has the disadvantage of moving *only* in period

[29] There is no uncertainty on the parameter of the game for the government, which although moves after the agents.

[30] In a different context, regulatory barriers and entry models, Bennet and Estrin (2006) use a similar sequential game approach where the profitability of a new sector becomes common knowledge only in a second period.

[31] Also called Weakly Sequential Equilibrium.

2, passively facing agents' actions taken in period 1. Therefore, the decision rule of the government is extremely simple, namely to implement the Rule of Law if a sufficiently low number of agents appropriate, and viceversa if many of them appropriate[32].

$$\gamma - k - c(\alpha, \theta) \geq 0 \Rightarrow RL \tag{5}$$
$$\gamma - k - c(\alpha, \theta) < 0 \Rightarrow not - RL \tag{6}$$

The proportion of appropriators α whose actions are sufficient to induce the abandonment of the Rule of Law by the State[33], with $c(\alpha, \theta) = \alpha - \theta$ is:

$$\alpha(k, \theta, \gamma) \begin{cases} 0 & \text{if } 0 \leq \theta < k - \gamma \\ \gamma - k + \theta & \text{if } k - \gamma \leq \theta \leq 1 \end{cases}$$

The function $\alpha(k, \theta, \gamma)$ is increasing in θ (the higher the institutional strength, the easier the implementation of the Rule of Law) and γ (the higher the value of the Rule of Law, the higher the effort in defending). The function is negatively affected by the sunk cost k.

The State decides by observing the proportion of appropriators in the economy and by comparing it with $\alpha(k, \theta, \gamma)$, the maximum number of appropriator before anarchy prevails. The stronger the economy, the fewer the appropriators and the higher the likelihood of Rule of Law enforcement. Viceversa, the weaker the economy the higher the number of appropriators and the lower the likelihood of Rule of Law enforcement.

3.5.4 Period 1: Agents

To simplify the analysis I assume that each agent chooses in the following way[34] (Indicator function):

$$I_{x^*}(x_i) \begin{cases} 1 & \text{if } x_i < x^* \Rightarrow Appropriate \\ 0 & \text{if } x_i \geq x^* \Rightarrow Not - Appropriate \end{cases}$$

Any agent receives a noisy signal about the fundamentals and she appropriates or not according to a simple threshold rule: strong signal, above $x^* \Rightarrow$ not appropriate;

[32] This passive role of the state in Rule of Law modelling has been challenged. For a different way of dealing with the role of the government see Katz and Owen (2004).

[33] The attribution of the equal sign to the RL or not-RL is irrelevant. The probability that $\gamma - [k + c(\alpha, \theta)] = 0$ is zero.

[34] It turns out that this is the "optimal" strategy, see Morris and Shin (1998).

weak signal, below $x^* \Rightarrow$ appropriate. The number of agents who will *actually* appropriate (call it $S(.,.)$) depends on the distribution of the signal, $x_i \sim [\theta - \varepsilon, \theta + \varepsilon]$ and on the fundamentals θ. I distinguish three cases:

- $x^* > \theta + \varepsilon \Rightarrow \theta < x^* - \varepsilon$, the fundamental is lower than the minimum signal any agent can see and everyone appropriates;
- $x^* < \theta - \varepsilon \Rightarrow \theta > x^* + \varepsilon$, the fundamental is higher than the maximum signal any agent can see and non-appropriation prevails;
- $x^* \in [\theta - \varepsilon, \theta + \varepsilon]$ the appropriation choice derives from the expected value of α, i.e. the overall level of appropriation:

$$E(\alpha) = \frac{1}{2\varepsilon}\int_{\theta-\varepsilon}^{\theta+\varepsilon} I_{x^*}(x)dx = \frac{1}{2\varepsilon}\int_{\theta-\varepsilon}^{x^*} I_{x^*}(x)dx + \frac{1}{2\varepsilon}\int_{x^*}^{\theta+\varepsilon} I_{x^*}(x)dx = \frac{1}{2\varepsilon}\left[x^* - (\theta - \varepsilon)\right] = \frac{1}{2} - \frac{(\theta - x^*)}{2\varepsilon}$$

Summarising, the share of agents attacking is:

$$S(\theta, I_{x^*}(x_i)) \begin{cases} 1 & \text{if } x^* > \theta + \varepsilon & \theta < x^* - \varepsilon \\ \frac{1}{2} - \frac{1}{2\varepsilon}(\theta - x^*) & \text{if } x^* \in [\theta - \varepsilon, \theta + \varepsilon] & \theta \in [x^* - \varepsilon, x^* + \varepsilon] \\ 0 & \text{if } x^* < \theta - \varepsilon & \theta > x^* + \varepsilon \end{cases}$$

3.5.5 The Equilibrium and the State

The two functions $\alpha(k, \theta, \gamma)$ (increasing in θ) and $S(\theta, I_{x^*}(x_i))$ (decreasing in θ) cross at the equilibrium point θ^*:

$$\gamma - k + \theta = \frac{1}{2} - \frac{1}{2\varepsilon}(\theta - x^*) \Rightarrow \tag{7}$$

$$\theta^* = \frac{1}{1 + 2\varepsilon}\{x^* + \varepsilon[1 + 2(k - \gamma)]\} \tag{8}$$

$$\begin{cases} \theta > \theta^* & \Rightarrow \alpha(k, \theta, \gamma) > S(\theta, I_{x^*}(x_i)) \quad RL \\ \theta < \theta^* & \Rightarrow \alpha(k, \theta, \gamma) < S(\theta, I_{x^*}(x_i)) \quad Not - RL \end{cases}$$

The Government defends property rights and the Rule of Law is established if the proportion of agents appropriating is lower then the maximum bearable percentage. The opposite happens if the inequality is reversed and anarchy prevails[35]. See figure 7.

[35] If the θ^* was implicitly derived through $\alpha(k, \theta, \gamma) = S(\theta, I_{x^*}(x))$, then it could be shown that $0 < \frac{\partial \theta^*}{\partial x^*} < 1$: any increase in the agents' threshold rule positively affects (less then proportionally) the fundamental threshold under which there is appropriation, that is intuitively appealing. See figure 7.

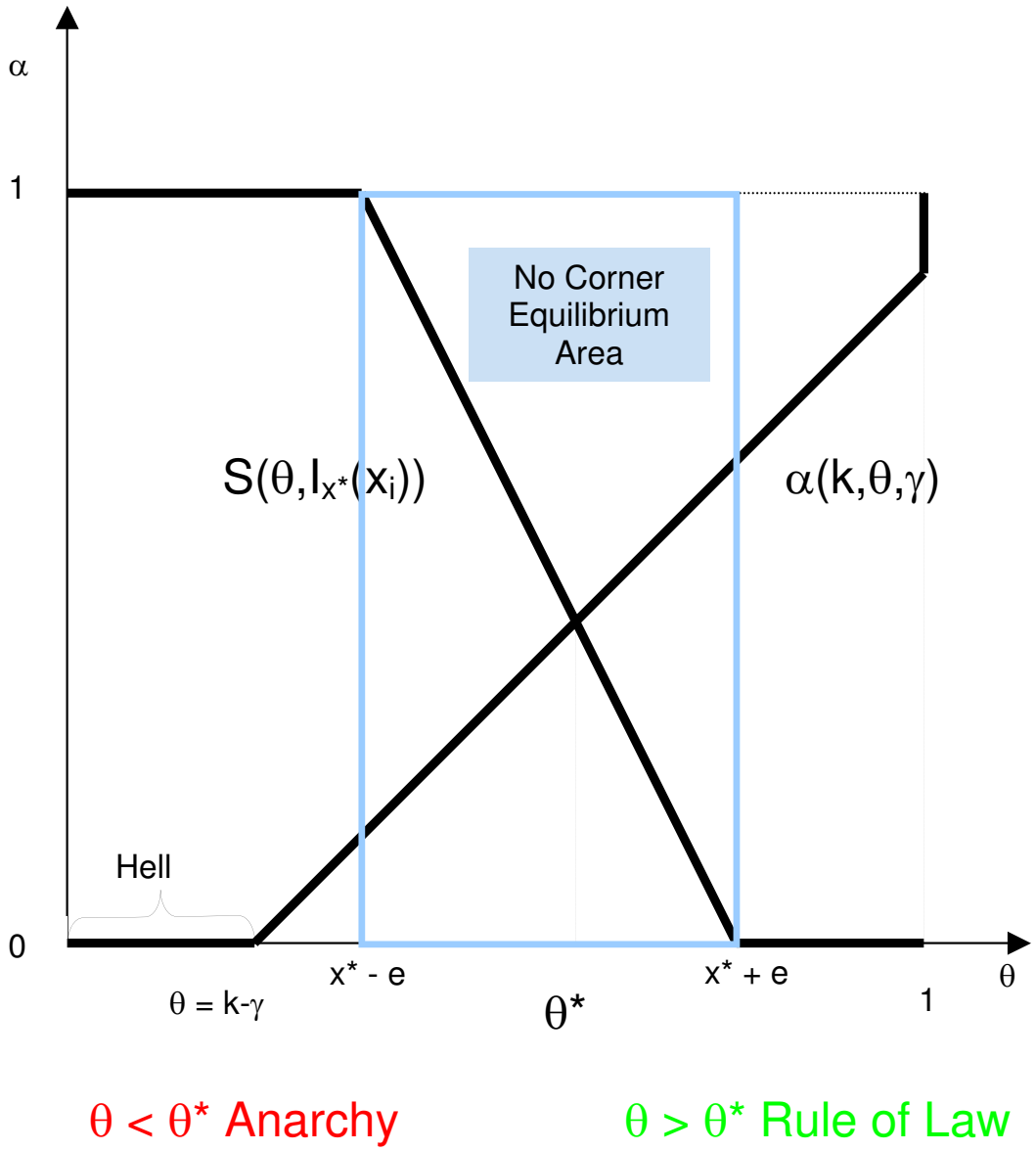


Figure 7: Equilibrium: θ^*

3.5.6 The Equilibrium and the Agents

I now turn to the analysis of the agent's uncertain payoffs. I start from the payoffs in case of appropriation, which depends on the subsequent action of the State as regards the implementation, or not, of the Rule of Law.

$$h(\theta, x^*) = \begin{cases} c(\alpha,\theta) - t & ;\theta > \theta^* \quad ;\alpha(\theta) > S(\theta, I_{x^*}(x)) \quad RL \\ \gamma + c(\alpha,\theta) - t & ;\theta < \theta^* \quad ;\alpha(\theta) < S(\theta, I_{x^*}(x)) \quad Anarchy \end{cases}$$

$h(\theta, x^*)$ represents the realised payoffs in case of common knowledge (no uncertainty). However, I know that only the government chooses when θ is revealed (see section (3.5.3)) in period 2. On the contrary, agents observe an idiosyncratic noisy signal, taking their appropriation decision on the basis of $E_i\{h(\theta, x^*)|x_i\} = u(x_i, x^*) \lesseqgtr 0$. Solving for the expected value of the indifferent agent I will show that x^* is indeed unique and that the strategy summarised by the indicator function $I_{x^*}(x)$ is the optimal strategy.

Every agent is identical and knows that the other agents face exactly the same problem, therefore a generic agent (I dropped the subscript i for simplicity) will compute the following expected value, knowing that the signals are distributed around $x_i \sim U[\theta - \varepsilon, \theta + \varepsilon] \Rightarrow \theta \in [x - \varepsilon, x + \varepsilon]$:

$$\frac{1}{2\varepsilon}\int_{x-\varepsilon}^{\theta^*}[\gamma + c(\alpha,\theta) - t]d\theta + \frac{1}{2\varepsilon}\int_{\theta^*}^{x+\varepsilon}[c(\alpha,\theta) - t]d\theta =$$
$$\frac{1}{2\varepsilon}\left[\int_{x-\varepsilon}^{x+\varepsilon}[c(\alpha,\theta) - t]d\theta + \gamma\int_{x-\varepsilon}^{\theta^*}d\theta\right]$$
$$\frac{1}{2\varepsilon}\left[\int_{x-\varepsilon}^{x+\varepsilon}[c(\alpha,\theta) - t]d\theta + \gamma(\theta^* - x + \varepsilon)\right]$$

The indifferent agent is the one observing exactly x^* (this agent exists due to the uniform distribution hypothesis of the noisy signals) and she does not gain nor lose from appropriation, in other words $E_i\{h(\theta, x^*)|x_i^*\} = u(x_i^*, x^*) = 0$.

$$\frac{1}{2\varepsilon}\left[\int_{x^*-\varepsilon}^{x^*+\varepsilon}[c(\alpha,\theta) - t]d\theta + \gamma(\theta^* - x^* + \varepsilon)\right] = 0 \tag{9}$$
$$\frac{1}{2\varepsilon}\left[\int_{x^*-\varepsilon}^{x^*+\varepsilon}[\alpha - \theta - t]d\theta + \gamma(\theta^* - x^* + \varepsilon)\right] = 0 \tag{10}$$

Solving for θ^* and exploiting 8:

$$x^* = \theta^* + \frac{\varepsilon[3\gamma - 2(k+t)]}{\gamma + 2\varepsilon + 1} \tag{11}$$

$$\theta^* = \frac{\varepsilon[1 + 2(k-\gamma)] + \gamma(1+k-\gamma) - t + \frac{1}{2}}{\gamma + 2\varepsilon + 1}.\blacksquare \tag{12}$$

End of the proof.

For $\varepsilon \to 0 \Rightarrow x^* = \theta^*$, the case in which agents observe perfectly θ and therefore choose according to the known θ. The function describing the share of agents attacking would become a step function $S(\theta^*, I_{x^*}(\theta))$.

$$S(\theta, I_{x^*}(\theta)) \begin{cases} 1 & \text{if } x^* = \theta^* > \theta \\ 0 & \text{if } x^* = \theta^* < \theta \end{cases}$$

Therefore:

Lemma 1 *In a sequential game with no uncertainty about the fundamentals and coordination failure among agents there is* ***one Sub-Game Perfect Nash equilibrium*** *determined by:*

$$x^* = \theta^* = \frac{\gamma(1+k-\gamma) - t + \frac{1}{2}}{\gamma + 1} \tag{13}$$

The Rule of Law is enforced if the value of θ selected by nature is greater than θ^*, otherwise anarchy prevails[36].

3.6 Comparative Statics

The advantage of obtaining a closed form solution for the equilibrium is that I am able to compute the derivative of the threshold for the signal (x^*) and the threshold for the fundamentals (θ^*) with respect to ε (the degree of uncertainty), γ (the value of the Rule of Law for the State), k (the sunk cost of the government) and t (the transaction cost of appropriating). It turns out that

[36]Note that proposition 2, i.e. no uncertainty and no inter-agents coordination failure, implies the uniqueness of the equilibrium, namely anarchy (regardless of institutions). On the other hand, according to lemma 1 in a sequential game with inter-agents coordination failure the strength of institutions *does* determine which equilibrium will prevail, anarchy or rule of law.

$$\frac{\partial x^*}{\partial \varepsilon} = \frac{\gamma[3\gamma - 2(t+k)]}{\gamma + 2\varepsilon + 1} < 0, \frac{\partial \theta^*}{\partial \varepsilon} = \frac{2(k+t) - 3\gamma}{(\gamma + 2\varepsilon + 1)^2} > 0;$$

$$\frac{\partial x^*}{\partial \gamma} = \frac{[2\varepsilon(1+k+t+\varepsilon) + k + t + 1/2 - \gamma(2+\gamma+4\varepsilon)]}{(\gamma + 2\varepsilon + 1)^2} > 0,$$

$$\frac{\partial \theta^*}{\partial \gamma} = \frac{1/2 + k + t - \varepsilon[4(\varepsilon+\gamma)+1] - \gamma(\gamma+2)}{(\gamma + 2\varepsilon + 1)^2} < 0;$$

$$\frac{\partial x^*}{\partial k} = \frac{\gamma}{(\gamma + 2\varepsilon + 1)} > 0, \frac{\partial \theta^*}{\partial k} = \frac{2\varepsilon + \gamma}{\gamma + 2\varepsilon + 1} > 0;$$

$$\frac{\partial x^*}{\partial t} = -\frac{2\varepsilon + 1}{(\gamma + 2\varepsilon + 1)} < 0, \frac{\partial \theta^*}{\partial t} = -\frac{1}{\gamma + 2\varepsilon + 1} < 0$$

where the inequalities' signs are determined by exploiting the conditions $k > \gamma$, $t > \gamma$ and the fact that the sunk cost and transaction cost are not too high, i.e. bounded from above[37].

In case of uncertainty there is a social loss. There are more agents whose signals is far away from the true fundamentals and this determines a higher proportion of appropriators[38]. The economy needs higher fundamentals in order to escape the anarchy trap.

On the other hand, if the value of the assets/rule of law (γ) in the economy is higher, the effect is positive because fewer agents are willing to appropriate (or the government is more willing to fight) and even a lower fundamental value allows for the establishment of the Rule of Law. This is an interesting result, because both agents and the State gain from higher γ and from "fighting" (see table 1). Therefore assessing the effect of the variable γ would not be straightforward *a priori*. In other words, the overall effect is in favour of the State, due to its monopoly of the public order.

An higher sunk cost for the government[39] increases the willingness to appropriate and obviously weakens the government[40].

Finally higher transaction cost induces lower appropriation and higher probability of Rule of Law establishment.

[37] See footnote 24.

[38] Notice this is true notwithstanding the decrease of x^*: this effect would *per se* increase the probability of the Rule of Law enforcement, but it not enough to counteract the simultaneous increase of ε, i.e. the *uncertainty* area.

[39] This could be the case of Russia at the end of the 90s. Before and after the 1998 crises, "corruption" was widespread and rule of law implementation was probably limited.

[40] In this stylised model the government is always honest and the agents are always "dishonest" when this is profitable. This assumption is not realistic in general terms but it is meant to show the trade-off between cultural independence and enforcement of law implied in the model (see also Cooter (1996)). In this model a "weaker" government is a kind of proxy of "corrupted" or expropriating State.

3.6.1 Welfare Analysis and Policy Implications

Consider now the sum of the payoffs for the government and the continuum of agents. An utilitarian welfare function would assume the following shape:

$$W^T = \sum_{i \in App.} W_i + \sum_{j \in N-App.} W_j + W_S \tag{14}$$

where the superscript T stands for total and the subscripts i, j and S for appropriating agents, not-appropriating agents and State, respectively. Therefore, exploiting the hypothesis that the population of agents has size 1, the overall welfare for the economy in case of Rule of Law is:

$$\alpha[c(\alpha,\theta) - t] + (1-\alpha) * 0 + \gamma - k - c(\alpha,\theta) = \\ \alpha^2 - (\theta + 1 + t)\alpha + (\theta + \gamma - k))$$

and in case of anarchy is

$$\alpha[\gamma + c(\alpha,\theta) - t] + (1-\alpha) * 0 + 0 = \\ \alpha^2 + (\gamma - \theta - t)\alpha$$

In figure 8 the two functions are represented and it turns out that

$$\begin{cases} \alpha < \frac{\gamma - k + \theta}{1+\gamma} & \Rightarrow \quad W(RL) > W(not - RL) \\ \alpha > \frac{\gamma - k + \theta}{1+\gamma} & \Rightarrow \quad W(RL) < W(not - RL) \end{cases}$$

This highlights an important trade-off. On the one hand each agent and the State prefer the good equilibrium (Rule of law and no appropriation) if $t - \gamma > \alpha - \theta$ and $k - \gamma < \theta - \alpha$ (see table 1). On the other hand, the welfare in the Rule of Law case is higher for a sufficiently small $\alpha < \frac{\gamma - k + \theta}{1+\gamma}$. However, this is no more true when the aforementioned threshold is violated. The Payoff dominant equilibrium is now the "bad" one and welfare is maximised in the anarchy case.

In this model the payoffs dominant equilibrium switches according to α and this explains an apparently puzzling result. In economies in which the uncertainty of the institutional fundamentals is high and hence the expectation of the Rule of Law implementation is low[41], both from an individual point of view and from a "collective

[41] Notice that under very similar hypotheses the "bad" equilibrium *risk dominates* the "good" one (see Harsanyi-Selten criterium of risk dominance in section 2.1).

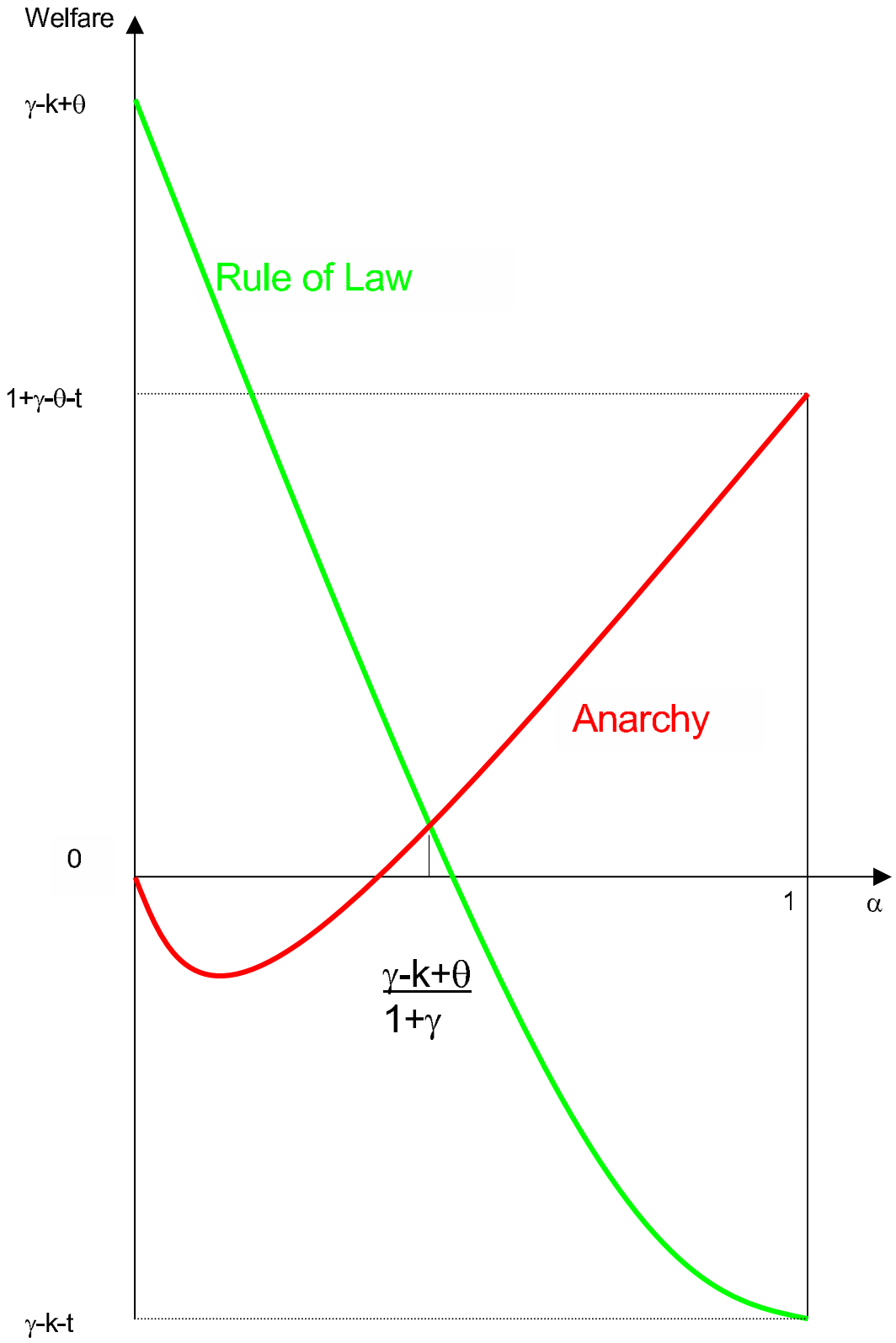


Figure 8: Welfare in the Rule of Law vs Anarchy

action" perspective, the anarchy implementation (embedded informal institutions *á la* Williamson (2000)) is the preferred outcome.

This model allows for tentative policy implications in terms of what is needed to counteract the risk of anarchy, namely many agents appropriating and government not enforcing property rights (or expropriating). If the fundamentals of the economy are weak (poor institutions) and the government knows that there is a widespread "corruption" attitude, there are really few options in order to lead to economy towards a virtuous path. This is probably the case in countries where institutions change very slowly (Roland (2001); Roland (2004)) and the economy is not recovering fast enough from a negative shock (e.g. transition period) or underdevelopment[42]. The policy maker should internalise as much as possible the value of the Rule of Law and work as hard as possible on the reduction of any distorted signals (uncertainty), such as allowing free media and information flows (see also a recent paper by Egorov, Guriev and Sonin (2006)).

The *big push* argument *á la* Murphy, Schleifer and Vishny (1989) in this context would be justified by the need to escape from the coordination failure characterizing the collective action problem.

The best case scenario is less interesting: if good economic results and institutional development are jointly showing up, they simply allow for an easier establishment of the Rule of Law[43].

However, the mixed cases are the more interesting. Russia is probably a good example, the reason being that the economy is sufficiently developed (thanks, for instance, to revenues from oil, high γ) and still unable to enforce domestic investors compliance with the Rule of Law because of weak cultural consensus on the importance of cooperation and on property rights respect (low θ). The biggest effort should therefore be put on institutions in broad sense. The government and the civic society have to seize any chance on the importance of the reciprocal collaboration. This is because the overall cooperative action guarantees higher payoffs for everybody. Agents should be more informed on the effects of the not-cooperative actions on their own payoffs. At the same time the government should be more aware of the importance of the establishment of the Rule of Law[44].

Viceversa, if institutions are already in place (high θ) but the economy is not recovering sufficiently fast (low γ), then allowing pro-cyclical policies (like Hoff and

[42]Think of country like Turkmenistan or Belarus.

[43]Think of the Visegrad countries, now members of the EU.

[44]Despite the fact that in the model there is the unrealistic hypothesis that the government is honest, k is implicitly capturing the degree of state laziness. A corrupted government would be more lazy (higher sunk costs), a honest one would be the opposite.

Stiglitz (2004b) suggest) could improve the situation.

Depending on the combination of economic conditions and institutional development, the outcome of the coordination failure will be more or less severe.

4 Conclusions

This paper extends the Hoff and Stiglitz (2004a) theoretical investigation on a model of Rule of Law and exploits the *global games* approach (Carlsson and van Damme (1993b) and Morris and Shin (1998)) to solve a coordination game for a unique equilibrium.

I have analysed the role of Coordination Failure in a stylised economy in which institutions (formal and/or informal) and economic conditions determine whether anarchy or the Rule of Law prevails. This theoretical investigation starts from the assumption that uncertainty plays a crucial role, as one characterisation of market failure. A mechanism of imperfect information conveys a noisy signal to agents, whose choice is based on the expectation of other players' actions. Some agents will appropriate if they expect that many others will appropriate. Vice-versa, other agents will respect property rights if they expect that few others will appropriate. However, this game's outcome *is not* generated by self-fulfilling expectations (like in Cooter (1996)). Institutionally strong countries will always guarantee the enforcement of the Rule of Law, while institutionally weak countries will be confronted with anarchy.

This theoretical framework solves the model for a unique equilibrium and this is crucial for policy implications. On the one hand, this model predicts that high uncertainty and sunk costs of law enforcement have a negative effect, pushing the economy towards a Pareto-dominated equilibrium. On the other hand, the high value given to the economy's assets (embedded social norms) has a positive influence, leading to a Pareto-dominant equilibrium.

The stylised framework of this paper appears to offer a sufficiently realistic representation of the period of uncertainty and poor institutional performance transition countries and low/middle income countries are passing through, i.e. this simple stylised economy can describe countries in which property rights' protection is low, despite being in a relative advanced stage of transition and in good economic conditions. This riddle has not yet been fully explained by the existing literature.

5 Appendix: The Cost Function

The linear cost function $c(\alpha, \theta) = \alpha - \theta$ has a simple interpretation. The government benefits whenever the fundamentals are "higher" than the number of appropriators ($\alpha < \theta$), given that the population size is normalised to 1. Viceversa, each agent benefits whenever the opposite happens ($\alpha > \theta$). Think of α as the total number of appropriators out of a pool of θ potentially honest agents, as if the economy showed a natural level of dishonest people $1 - \theta$. If all the potentially honest people were appropriating ($\alpha > \theta$), then the government would be paying a cost to enforce, while the agents would benefit by widespread dishonesty. By the same token, if $\alpha < \theta$, then the government is in a stronger position and agents lose from appropriating.

6 Appendix: Sunk and Transaction Costs

In the text I derived the condition $k > \gamma$ and $t > \gamma$ for the determination of dominant/dominated strategies. An interpretation is the following: in an economy where the enforcement depends only on the variable part $c(\alpha, \theta), k = 0$, the government will take a chance to enforce, despite the fact that the economy is extremely weak. A possibility that I want to rule out when $k > \gamma$ (there will always be a Hell). Conversely, I have a condition $t > \gamma$ on the agents, who are no more attracted by the appropriation option in a strong economy (there will always be a Heaven).

7 Appendix: Proof of Proposition 1

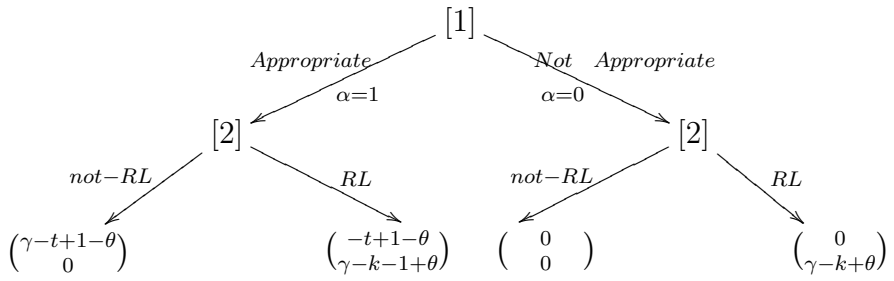
Representing the game in strategic (or normal) form and substituting for the functional form $c(\alpha, \theta) = \alpha - \theta$, I obtain the following payoffs matrix and the two Nash equilibria emerge if equation (1) and (2) are satisfied: (Not-App.; RL), (App.; Not-RL)

$1 \diagdown 2$	RL	not-RL
Not App.	$0; \gamma - k + \theta$	$0; 0$
App.	$-t + 1 - \theta; \gamma - k - 1 + \theta$	$\gamma - t + 1 - \theta; 0$

Table 2: Payoffs Matrix: (1) Agent & (2) State

8 Appendix: Proof of Proposition 2

I can write the game in extensive form



Using backward induction, the government will choose to give up the enforcement of the Rule of Law if the agent appropriates, and viceversa, it will enforce if she does not. The agent, exploiting the *first mover's advantage*, will appropriate and the Sub-Game Perfect Nash equilibrium (App.; Not-RL) prevails.

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