Law enforcement and transition.[¤]

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Abstract

We present a simple model to analyze law enforcement problems in transition economies. Law enforcement implies coordination problems and multiplicity of equilibria due to a law abidance and a …scal externality. We analyze two institutional mechanisms for solving the coordination problem. A …rst mechanism, which we call "dualism", follows the scenario of Chinese transition where the government keeps direct control over economic resources and where a liberalized non state sector follows market rules. The second mechanism we put forward is accession to the European Union. We show that accession to the European Union, even without external borrowing, provides a mechanism to eliminate the "bad" equilibrium, provided the "accessing" country is small enough relative to the European Union. Interestingly, we show that accession without conditionality is better than with conditionality because conditionality creates a coordination problem of its own that partly annihilates the positive e¤ects of expected accession.

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1 Introduction

More than ten years after the fall of the Berlin wall, we can observe three di¤erent distinct kinds of trajectories of economic transition from socialism to capitalism.

A …rst characteristic trajectory is that of countries of Central Europe that started the transition process in 1990. The transition strategy was mostly of the big bang type with the will to introduce most reforms as fast as possible. The objective was to combine early price liberalization and stabilization with mass privatization of state-owned enterprises. After an important initial output fall, those countries have found, at varying degrees, the way to economic recovery and growth. These countries are now expecting accession to the European Union. The two most characteristic countries in this category are Poland and the Czech republic.[1]

A second trajectory is that of Russia. Russia also followed a strategy of fast reform that was very close in most respects to the strategy followed in Central Europe.[2] Nevertheless, Russia has witnessed a much stronger and persistent economic decline since the beginning of transition, culminating in the big default crisis of August 1998.[3]

A third trajectory is that of China. China has followed a very di¤erent strategy from Eastern European countries. Its gradual approach to reforms led to a sequencing of reforms over a longer time horizon and to a dual-track type of liberalization leading to a coexistence of a largely unreformed state sector with competitive non state enterprises developing everywhere else under very deregulated conditions.

INSERT FIGURE 1

[1] One important di¤erence between the two countries is the fact that privatization in Poland ended up to be of a gradual nature. Nevertheless, plans for mass privatization were seriously prepared. Due to political constraints, those plans were delayed for many years. The Czech republic which, like Russia, did implement a mass privatization plan is not performing as well as Poland. Still, the Czech republic's performances are clearly better than those of Russia.

[2] Russia was clearly less successful in its stabilization attempts, in part due to political constraints but the stabilization strategy of reformers did not di¤er from the ones tried in Central and Eastern Europe.

[3] The recent recovery is based mostly on the e¤ects of the Ruble devaluation and high prices for oil on the world market.

Figure 1 shows the di¤erence in output trajectories of the three countries. How can we explain these di¤erences in transition trajectories? A paradox is that di¤erences in reform strategies are much smaller between Poland and Russia on one hand, and China on the other hand, but that there is such a huge di¤erence between the trajectories followed by Poland and Russia. How to explain such a di¤erence?

In this paper, we try to explain these three typical trajectories by emphasizing the dimension of law enforcement in transition, a dimension that is receiving increasing attention (see e.g. Black, Kraakman and Tarassova, 2000: Johnson, McMillan and Woodru¤, 1999). The vision that markets evolve spontaneously with liberalization put forward by many transition experts has neglected another spontaneous emergence, namely that of criminal activity predating on private producers. Such a phenomenon reminds us of the importance of law enforcement to protect private economic activity from predatory behavior. This dimension has played a critical role in the takeo¤ of industrialization in economic history (North, 1990) and is likely to play an important role in determining economic success and failure in transition economies.

Focusing on the dimension of law enforcement, we see immediately that it is a big problem in Russia with the rise of the ma…a phenomenon. It is less of a problem in Poland and China. For example, Johnson, Kaufmann, McMillan and Woodru¤ (1999) using surveys in manufacturing …rms found that in Russia and the Ukraine around 90% of managers say …rms pay "ma…a protection" while the corresponding …gure in Poland is only 8% (15% in Slovakia and 1% in Romania).[4] The lack of the rule of law has led to an increase in predatory activities which are likely to have adverse e¤ects on productive activity and in particular to slow down the emergence of the new private sector. The question is then: why is there law enforcement in some countries and less (or hardly any) in other countries, a question that is also relevant beyond the realm of transition economies. Since the rule of law is enforced by government, the question is then: why are some governments too weak to enforce the law and others are not?

One sees immediately that there is an important coordination problem to be solved in law enforcement. This coordination problem has at least two dimensions. First of all, for given expenditures on repression, strong law

[4] They also found signi…cant di¤erences in government corruption, trust in courts, tax rates and the size of the uno¢cial economy between those two groups of countries.

abidance by all citizens ensures e¤ective repression whereas weak law abidance decreases the expectation of getting caught and thus the disincentive to break the law. On the other hand, coordination is also necessary to provide the public good of repression technology. This coordination is usually solved via tax collection, but tax collection itself is likely to be endogenously weak in countries where law enforcement is weak. These coordination problems in law enforcement typically lead to predict multiplicity of equilibria. Such multiplicity may serve as a point of departure to explain why countries with similar reform strategies may have such di¤erent outcomes in law enforcement.

However, multiplicity of equilibria does not provide us with great predictive power since we do not have well accepted theories to explain why some equilibria are selected and not others. Can we explain why there is law enforcement in some countries and not in others? In order to answer that question, we would like to know whether there are institutional mechanisms for eliminating the "bad " equilibrium?

In the context of transition, we identify two such mechanisms.

A …rst mechanism is what we call "dualism", following the scenario of Chinese transition. Dualism is the coexistence of an unreformed state sector where the government keeps direct control over economic resources with a liberalized non state sector following market rules. The dual-track approach to liberalization has been seen as a mechanism for achieving allocative ef…ciency (Byrd, 1987, 1989; Sicular, 1988), as a pareto-improving mechanism to satisfy political constraints while achieving e¢ciency (Lau, Qian and Roland 1997a,b), and as an instrument to prevent an output fall following liberalization (Roland and Verdier, 1999). In this paper, we point to a new interpretation of the bene…ts of dualism in transition, namely its law enforcement bene…ts. Indeed, keeping direct state control over su¢cient economic resources to deter predatory activity is a way to both credibly eliminate the …scal externality and to discourage predatory behavior, thus eliminating the bad equilibrium with low tax collection and low law enforcement. This points to an important trade-o¤ between the potential e¢ciency costs of maintaining state control over resources and the bene…ts in coordination. There is also in the model an additional trade-o¤ between the e¢ciency losses from state control and the gain in tax distortions. Indeed, under the dualist scenario, the government needs to rely less on private sector taxation to …nance its law enforcement apparatus, thereby reducing taxation distortions. This additional trade-o¤ has already been emphasized by Gordon, Bai and Li

(1999).

The second mechanism we put forward is accession to the European Union. An alternative to direct state control as a way of eliminating the "bad " equilibrium is exernal borrowing. However, we show that reimbursement constraints may dynamically jeopardize the "good " equilibrium. We show that accession to the European Union, even without external borrowing, provides a mechanism to eliminate the "bad" equilibrium, provided the "accessing" country is small enough relative to the European Union. The channel through which this works relates to the dynamics of coordination with the law abidance externality. Since agents can predict that there will be law enforcement in the future, this can make them strictly better o¤ if they choose today to be producers rather then predators. We show that this intertemporal incentive e¤ect can be su¢cient to achieve law enforcement today, even without external borrowing to ensure a su¢ciently e¤ective repression apparatus today. Interestingly, we show that accession without conditionality is better than with conditionality because conditionality creates a coordination problem of its own that partly annihilates the positive e¤ects of expected accession.

It is the law abidance externality that creates a wedge between the intertemporal payo¤ to become a producer or a predator. Indeed, in order to eliminate the "bad" equilibrium given the enforcement externality, the repression technology must discourage any number of agents from deviating. However, since in the good equilibrium, no agents deviate, the equilibrium expected punishment for an agent who would consider deviating is higher, yielding a strictly lower payo¤ than to producers as long as there is a positive mass of producers. This interesting dynamic coordination e¤ect with the enforcement externality allows also, under the dualistic scenario, to strictly reduce the amount of resources that must stay under government control in order to obtain credible law enforcement. To our knowledge, such dynamic e¤ects related to the enforcement externality had not yet been put forward in the literature.

While the …rst mechanism allows to explain the Chinese success in law enforcement, the second mechanism may explain why Central European countries are faring much better than Russia in terms of law enforcement, and also in terms of the e¤ects of law enforcement on growth and economic performance.

It is important to note that our analysis of law enforcement does not hinge on particular assumptions on the nature of government, i.e. whether

government behavior is assumed to be closer to the Pigovian social welfare maximizer than to the Leviathan government. The reason is that in either case, law enforcement is in the interest of government because without law enforcement government objectives cannot in general be ful…lled.

Multiplicity of equilibria in transition economies has been already analyzed by Johnson, Kaufmann and Shleifer (1998) where multiplicity is related to the size of the uno¢cial sector in transition economies. Private …rms have the choice between participating in the o¢cial sector, paying taxes and bene…tting from public goods or participating in the uno¢cial sector and paying ma…as for private protection. Multiplicity is related to the …scal externality and to convexity of public good provision: if tax revenues are su¢ciently low, public good provision by government is too small to outcompete public good provision by the ma…a in the uno¢cial economy. They then look at initial conditions of transition likely to lead to one of the two equilibria. In their framework, the ma…a acts only as private supplier of protection, not as a ruthless predator and the government does not use its resources to …ght the ma…a. It is important to avoid confusion between private protection agencies and ma…as. While it is logical that businessmen develop their own private protection militias when the state is de…cient, subcontracting such activities to ma…as presents such an obvious holdup problem that would make most people reluctant to recur to such subcontracting. Empirical work by Frye and Zhuravskaïa (1998) tends to suggest that private protection and criminal organizations are perceived to be distinct in Russia.

Section 2 introduces the basic model of agents'choices. Section 3 develops the basic coordination problem of law enforcement . Section 4 presents the dualism model of enforcement. Section 5 discusses a dynamic model of borrowing to achieve law enforcement. Section 6 studies the dynamic analysis of the accession e¤ects. Section 7 concludes.

2 The model

We start with a one period model. Take a transition economy where the population size is normalized to 1. Individuals are atomistic and choose to

$$\max_{\theta} \theta U^R + (1 - \theta) U^P$$

given the choices of others and where θ is the probability of being a predator (robber) and $(1 - \theta)$ is the probability of being a producer: We denote U^R and

U^P the utility from being respectively a predator and a producer. We assume risk neutrality throughout the paper and we restrict ourselves to symmetric Nash equilibria where individuals choose ® optimally given that ® is chosen by others.

In their economic activity, agents are assumed to meet another agent within the period according to a random matching process. Therefore, ® is the probability of meeting a predator and (1 ¡ ®) is the probability of meeting a producer. When a producer meets a predator, he is robbed with probability 1 of his income: Otherwise, his income remains una¤ected. We assume that when a predator meets another predator, their income remains likewise una¤ected because they have nothing to rob from each other.

Income generated by private production is AK_p with a marginal productivity $A > 1$ and where K_p denotes private capital. The total capital stock in the economy is equal to K. Capital is assumed to be used ine¢ciently when managed by the state and yields a marginal productivity of 1. In most of the analysis, we will assume $K = K_p$ but we will see that retaining $K ¡ K_p$ under state control may have other e¤ects than those directly related to economic e¢ciency.

We assume a predator is caught with probability q in which case he gets 0.[5] When a producer is robbed, his income is also 0 but when he is not robbed, his income is taxed by the government at rate ¿ in order to …nance law enforcement. Taking into account these payo¤s and the random matching, expected payo¤s from being a predator and a producer are respectively given by

$$U^R = (1 ¡ ®)AK_p(1 ¡ q) \tag{1}$$

$$U^P = (1 ¡ ®)AK_p(1 ¡ ¿) \tag{2}$$

As can be seen, both U^P and U^R increase with K_p and decrease with ®. The latter e¤ect is related to the matching assumption. Private production is discouraged when there is a lot of predatory activity but so is the latter because there are less producers to rob from their income. The main di¤erence between both payo¤s is the relative di¤erence between q and ¿.

Repression technology a¤ects q the probability a predator faces of being caught. We make several assumptions on q. First, we assume there is a …xed cost S that must be bourne before repression technology can be made

[5] This assumption can be interpreted in two ways: either the police catches the stolen goods of the predator or the punishment in‡icted on him is high enough so as to o¤set his illegal gains.

e¤ective. This speci…cation seems realistic. Otherwise, in…nitesimal amounts of government expenditures on repression would still have some positive effect. We also assume that q decreases with θ. This is again a reasonable assumption to make. The more predators there are the less easy it is to catch any single one of them (like in Moene, 1990). Finally, we assume that q is a concave function of public expenditures above the …xed cost threshold. Formally, we assume the following functional form

$$q(\max\{0; -S - \gamma\theta + G\}) \text{ with } \gamma > 0;\ q(0) = 0; \frac{\partial q}{\partial G} > 0; \frac{\partial^2 q}{\partial^2 G} < 0 \qquad (3)$$

Given the above assumptions, a …rst thing to see is that for a given G, $U^P > U^R$ and $\theta = 0 \ (\ ) \ q > \varepsilon$. In e¤ect, in order to decide to be honest producers, individuals must face a higher expected disutility from being a predator relative to the disutility from taxation when being honest. The assumption of risk neutrality keeps things simple but the economic e¤ects are realistic.

We assume that the repression technology is such that $q(-S - \gamma + K - \varphi) > \varepsilon \ \forall \varepsilon \in [0; 1)$: This means that the capital stock inherited from socialism, if used entirely for repression purposes, is deemed su¢cient to sustain as unique the equilibrium with $\theta = 0$, a reasonable assumption.

3 The coordination problem in law enforcement

We …rst look at the case of an economy where all the capital stock is privatized: $K_p = K$. The government then relies on the taxation of private income to …nance repression technology. We thus have

$$G = \varepsilon(1 - \theta)AK \qquad (4)$$

One is now facing a coordination problem. Agents will choose to be producers rather than predators if the probability of being caught as a predator is higher than the tax rate faced by honest producers. If all decide to be honest, then even a very low tax rate may be enough to …nance su¢cient repression technology to deter predators. This is the "good" enforcement equilibrium. On the other hand, if many agents decide to become predators, they will each face a lower probability of being caught, increasing the incentive to become a predator. At the same time, in order to deter predators,

producers must face a tax rate that is higher the smaller the number of honest producers, thereby encouraging them to be predators. We then have the "bad" equilibrium with no law enforcement. There will thus be multiplicity of equilibria because of this coordination problem.

De…ne $\underline{\iota}$ such that $\underline{\iota} = q(-S + \underline{\iota}AK)$: We can formulate the following proposition:

Proposition 1 For $\iota < \underline{\iota}$ the only equilibrium involves $\alpha = 1$. For $\iota > \underline{\iota}$, there are three possible classes of equilibria with the corner (stable) equilibria $\alpha = 0$; $\alpha = 1$ and the interior (unstable) equilibrium $\alpha = \alpha^{\pi}(S; \theta; AK; \iota) \in (0; 1)$:[6]

Proof of proposition 1: As seen above, $\alpha = 0$ whenever $\iota < q$ and $\alpha = 1$ whenever $\iota \geq q$ and $\alpha = \alpha^{\pi} \in (0; 1)$ whenever $\iota = q$. Given that q is concave in G and that $q(K - S) > \iota$; it follows that $q(\max\{0; -S + \iota AK\}) < \iota \ \forall \iota < \underline{\iota}$ and $q(-S + \iota AK) > \iota \ \forall \iota > \underline{\iota}$. Below $\underline{\iota}$, the only equilibrium can thus be $\alpha = 1$. Above $\underline{\iota}$, there are then Nash equilibria sustainable with $\alpha = 0$. If $\alpha = 1$, $G = q = 0 < \iota \ \forall \iota \in (0; 1]$ and $q = 0$ for $\iota = 0$. Equilibria with $\alpha = 1$ are thus also sustainable. Since q declines continuously in α and is concave in ι; there exists a single value $\alpha^{\pi} \in (0; 1)$ for which $\iota = q(-S - \alpha^{\pi}\theta + \iota(1 - \alpha^{\pi})AK)$. The latter equilibrium is however unstable. For ι given, a downward in…nitesimal deviation in α leads to increase q and thus to trigger a fall to $\alpha = 0$ whereas a deviation in the other direction will similarly lead to $\alpha = 1$. The latter is a stable equilibrium for all values of ι since $q = 0$ when $\alpha = 1$. The other corner equilibrium ($\alpha = 0$) is also stable for values of ι su¢ciently above $\underline{\iota}$ since by de…nition of $\underline{\iota}$, $q > \iota \ \forall \iota > \underline{\iota}$. Small increases in α will thus not perturb the equilibrium. ¥

A few remarks are in order. First, note that apart from the interior (unstable) equilibrium, ι can be indeterminate. It can be chosen arbitrarily in the equilibrium with $\alpha = 0$ as long as it is larger than $\underline{\iota}$ and it is irrelevant in the case with $\alpha = 1$. In the former case, with $\alpha = 0$, all is needed is to prevent any producer from deviating. The latter case $\alpha = 1$ is somewhat reminiscent of the Russian situation where tax rates are considered to be high

[6] In a simple evolutionary game-theoretic perspective, $[0; \alpha^{\pi})$ would be the basin of attraction of the corner equilibrium $\alpha = 0$ while $(\alpha^{\pi}; 1]$ would be the basin of attraction of the other corner equilibrium $\alpha = 1$. See the appendix for a simple interpretation in the present context.

but are irrelevant because tax collection is low (see Berkowitz and Li, 1997). It seems reasonable that the tax rate is not determinate. Indeed, countries where one observes law enforcement are not necessarily countries with a big size of government. From the point of view of welfare, in the framework of the model, it is best to set ¿ as small as possible. However, this will not necessarily be the case and will depend on the nature of government. Note that when ® = 0, a predatory government who would divert tax revenues for the private bene…ts of its members, would tend to increase ¿ above the minimum necessary but would always want to keep it below q in order not to lose its tax base. If taxation is decided independently by independent predatory government agencies, then an additional coordination problem would arise within government. In that case, excess taxation by independent agencies could be another cause of multiplicity of equilibria.

We could make choices more complicated by changing some of the assumptions of the model. For example, we could assume that only a certain proportion of the population has the skills to become predators. While the latter would face the same choice of being honest or not, honest people without the skills to become predators could still decide to choose whether or not to hide their income and choose a less e¢cient production technology (with or without a higher probability of meeting a predator). The qualitative results would still be the same with one equilibrium with high criminality and low tax revenues and another equilibrium with law enforcement and a broad tax base.

The multiplicity of equilibria is related to two externalities: the …scal externality and the enforcement externality (Moene, 1990). The …scal externality is due to the fact that people's choice of becoming a predator or a producer a¤ects the tax base which in turn a¤ects individual choices, and so on. It should be noted that these externalities are however not su¢cient conditions to generate multiplicity. The ® = 1 equilibrium can be eliminated if one assumes for example Inada conditions in private output and another assumption than random matching so that one has a strict incentive to deviate from ® = 1: (see for example Savvateev, 1998). In the current framework, the marginal product remains bounded at A and nobody has an incentive to become a producer if surrounded by predators. Similarly, with other assumptions on predation, the ® = 0 equilibrium can be eliminated if the marginal bene…t from predation becomes very large around ® = 0.

The multiplicity of equilibria should nevertheless be seen as relevant to understanding transition. Indeed, the massive societal change creates a huge

coordination problem and coordination in law enforcement is one of the important coordination problems. Russia can be seen as an example of the bad equilibrium where there is little law enforcement and where predatory activities have an adverse e¤ect on productive activity. Poland, and Central European countries candidates for accession to the European Union can be seen as examples of the good equilibrium.

Several questions are however raised: Can we know something about the selection of equilibria? Are there transition strategies that eliminate the multiplicity of equilibria? In the rest of the paper, we focus on the latter question.

4 Dualism as instrument for credible law enforcement.

An important reason for the …scal externality is that massive transfer of ownership into private hands gives the government access to an e¢cient repression technology only if it is able to collect su¢cient tax revenues. This massive transfer may be the deliberate e¤ect of policies of mass privatization to "get the state out of the economy" or of simple state collapse and private rent-grabbing. The outcome is the same. The bad equilibrium can therefore not be excluded since the government cannot levy taxes when private agents choose to be predators.

4.1 Solving the coordination problem via government control.

One possible way of eliminating the bad equilibrium, or more precisely of making it unstable, is if the state keeps direct control over enough resources so as to keep a su¢ciently e¤ective repression apparatus. Obviously, coordination problems can occur inside government and inside any social group. We however want to take seriously the incomplete contract idea that ownership and control rights matter (Hart, 1996). In this context, the spirit of incomplete contract theory implies that government ownership over assets gives the government direct control over their use whereas under private ownership, this is not the case and taxation is required to achieve transfer of

resources to government. Direct government control over assets thus allows to maintain a repression apparatus without resorting to taxation to …nance this apparatus. Even though such government control over assets is costly in terms of economic e¢ciency, it may be an important instrument for overcoming the coordination problem. The following proposition shows speci…cally how this works.

Proposition 2 If $K - K_p > S + \circ$ is left under state control and used to …nance G, then there are only stable equilibria with $\circledR = 0$ provided $¿$ is low enough[7]. Welfare is maximized at $¿ = 0$. Compared to the "good " equilibrium ($\circledR = 0$) under multiplicity, this equilibrium involves e¢ciency losses but economies in tax distortions.

Proof of proposition 2: Since $8K_p < K - (S + \circ)$, $q(-S - \circ + K - K_p) > 0$, it is always possible to set $¿ < q$, in which case any $\circledR > 0$ cannot be a equilibrium since $U^R < U^P$. Therefore, any slight deviation of $\circledR$ below $\circledR = 1$ would lead to $\circledR = 0$. U^P is maximized at $¿ = 0$. Thus, as long as $K - K_p = S + \circ + " > 0$ for any $" > 0$, the good equilibrium can be sustained and the stability of the bad equilibrium eliminated.

In terms of welfare, implementing $q(-S - \circ + K - K_p)$ involves a trade-o¤ between e¢ciency losses and economies in tax distortions. Welfare is equal to $A(K - S - \circ - ")$ compared to $(1 - ¿)AK$ under the good equilibrium with $\circledR = 0$ under full privatization where $¿ = q(-S - " + ¿AK)$ is, according to proposition 1, the minimum tax rate compatible with the good equilibrium and full privatization. Thus $¿ = \frac{q^{-1}(¿)+S+"}{AK} : \frac{q^{-1}(¿)}{AK}$ is a measure of the tax distortion. With no tax distortion under full privatization, the welfare loss is only of S which is unambiguously smaller than $A(S + \circ + ")$ the welfare loss under partial privatization. $(A - 1)(S + ")$ is then the e¢ciency cost of the public sector while $A\circ$ is the cost paid to eliminate the coordination problem due to the enforcement externality. Due to the tax distortion, $(1 - ¿)AK < (1 - \frac{S+"}{AK})AK$ the welfare level without tax distortion. If the tax distortion is

[7] In terms of the evolutionary perspective described in footnote (5), it should be noted that we consider here a public asset control scheme such that the bad equilibrium is never reached for any initial situation $\circledR_0 < 1$ of predators (ie. we ensure that the good equilibrium strategy $\circledR = 0$ is a dominant strategy). More generally, it is easy to see that one can get less stringent public control conditions such that starting from a given initial number of predators $\circledR_0$; the evolutionary process converges towards the equilibrium $\circledR = 0$. See again the appendix.

small enough welfare is higher under full privatization, otherwise it may be smaller ¥.

Note that using state control over resources is by assumption ine¢cient since the marginal product is smaller than 1. The higher A, the higher the cost of not privatizing and the higher the welfare di¤erence between the good equilibrium under multiplicity and the unique equilibrium under incomplete privatization. However, there is a bene…t to state control, namely the elimination of the bad equilibrium. This e¤ect of state control over resources as opposed to state taxation has not been put forward in the literature so far. There is also a second bene…t, namely the economy in tax distortion as in Gordon, Bai and Li (1998).

In equilibrium, q is strictly greater than ¿ and U^P is strictly greater than U^R. This wedge is necessary to prevent deviations from the enforcement equilibrium. However, this wedge will play an important role later when we extend the model to a dynamic model.

With the existence of a public sector, welfare is maximized at ¿ = 0 not because private taxation would be less e¢cient as a means of …nancing repression technology. It is actually more e¢cient in the model. The reason ¿ = 0 is that this is the cheapest way, in terms of welfare, of deterring individuals to become predators rather than producers. If ¿ > 0, then it is necessary to increase q purely for incentive purposes which requires in turn that ¿ be set high enough.

Proposition 2 has a clear ‡avor of the Chinese transition experience in at least two important ingredients: a) the state keeps direct control over resources;[8] b) taxation of the non-state sector is kept at a minimum level. This dualistic feature is quite typical of Chinese transition. In China, taxation is very low. In 1996, budgetary revenues in China formed only 11% of GDP, less than Russia! However, government-controlled output has remained important ans is still roughly one third of GDP (Bai et al., 1999). Thus, the Chinese government has been less dependent on tax collection to …nance government activities due to this dualism, in contrast to other transition economies where government has lost most of its control over resources.

The literature has so far emphasized the e¢ciency and political economy aspects of dual-track liberalization (Sicular, 1988; Byrd, 1987, 1989; Lau et al. 1997a,b) and its ability to prevent output fall (Roland and Verdier, 1999).

[8] This direct control has obviously huge disadvantages not modeled here, Tien Anmen repression being one example.

Here, we emphasize the law enforcement aspects of dualism. Interestingly, a key assumption necessary for dual-track liberalization to work is the state's enforcement capacity. Here, we have shown that dualism is a mechanism to obtain law enforcement. By keeping the tax rate as low as possible, one provides private agents with incentives to prefer to become producers rather than predators. This comes at a cost, namely the waste of productive assets.

Nothing in the model guarantees that state resources will be used for repression technology. State resources may very well be diverted and control over state resources may be used for abuse of power. Since these questions are outside the model, we do not want to dwell too much on them. The model only shows some conditions necessary to obtain coordination in law enforcement. As stated in the previous question, it is in the interest of a predatory government to prevent predatory private behavior. Institutional guarantees for adequate use of resources would imply for example separation of powers with sufficient repressive power to the judiciary arm of government in order to refrain the executive from deviating from policy announcements, together with mechanisms for adequate selection of policies like electoral accountability.

4.2 Dynamics of law enforcement.

The above model was static. Even though we have shown how state control can be an adequate instrument for coordinating on the good equilibrium of law enforcement, there is no dynamics. If the above model is repeated twice or more, the result should be the same because there is no state variable.

In order to obtain dynamics, we thus introduce a two period model that will be useful for examining further instruments of guaranteeing law enforcement.

The most simple, and at the same time reasonable, modification of the above model, is to assume that expenditures in repression technology can partly be seen as an investment. Many aspects of repression technology can be seen as investments that must be bourne initially but carry benefits into the future. Immediate examples that come to mind are the training of specialized police forces or the establishment of information networks on criminal activity. Another example would be the establishment of reputation for efficiency and incorruptibility which can be initially very costly to

achieve but are e¤ective means of deterring criminal activity. In order to take into account this investment aspect of repression technology, we thus model expenditures in the following way:

$$G_t = (K - K_{pt}) + \zeta_t A K_{pt}(1 - R_t) + (1 - \pm)G_{t-1} \qquad (5)$$

with K_{pt} and ζ_t as decision variables in period t and R_t the number of predators in period t.

The new element is the last term on the right hand side showing that past expenditures have persistence. The higher the $\pm$, the lower the persistence.

We also assume that a choice to be a predator in period 1 cannot be reversed in period 2 while a choice to be a producer always can, a reasonable assumption it seems. This assumption will play an important role in the rest of the analysis. There will thus always be at least $R_1 = \alpha_1$ predators in period 2. Call α_2 the choice variable of an individual who was producer in period 1. The number of predators in period 2 is thus $R_2 = \alpha_1 + (1 - \alpha_1)\alpha_2 < 1$: We also assume that undoing privatization is prohibitively costly so that it is, in e¤ect, irreversible. This implies that $K_{pt} \geq K_{pt-1}$.

We then get the following proposition.

Proposition 3 There is a unique stable enforcement equilibrium with $\alpha_1 = \alpha_2 = 0$ with $K_{p2} = K_{p1} = K_p^{\ddagger}$. Moreover $K_p^{\ddagger} > K - (S + \circ + \text{"})$ the static privatization level, independently of $\pm$.

Proof of proposition 3: In period 2, an individual who was producer in period 1 faces the choice of remaining a producer or becoming a predator. His choice is exactly the same as in the one period model. We will thus have $\alpha_2 = 0$ if $q_2 > \zeta_2$. Moreover, following proposition 2, any $\alpha_2 > 0$ can be prevented if $\zeta_2 = 0$ and K_{p2} is chosen such that

$G_2 = K - K_{p2} + (1 - \pm)[(K - K_{p1}) + \zeta_1 A K_{p1}(1 - \alpha_1)] = S + \circ + \text{"}$. We thus have $K_{p2} = K(2 - \pm) - (1 - \pm)K_{p1} + (1 - \pm)\zeta_1 A K_{p1}(1 - \alpha_1) - (S + \circ + \text{"})$: Note already that $K_{p2} > K - (S + \circ + \text{"})$, the static model's level of privatization as soon as $\pm < 1$.

Given the period 2 unique equilibrium with $\alpha_2 = 0$, and assuming that all repression technology is …nanced by keeping resources under state control, thus with $\zeta_1 = 0$;an individual prefers in period 1 to become a producer rather than a predator if

$$(1 - \alpha_1)[AK_{p1} + AK_{p2}] > (1 - \alpha_1)AK_{p1}[1 - q_1(-S - \alpha_1 \circ + K - K_{p1})]$$

$+(1 - \alpha_1)AK_{p2}[1 - q_2(K - K_{p2} + (1 - \pm)(K - K_{p1}) - (S + \alpha_1\circ + "))]\ 8\alpha_1$:

which gives simply the condition:

$$(1 - \alpha_1)[AK_{p1}q_1 + AK_{p2}q_2] > 0\ 8\alpha_1 < 1 \qquad (6)$$

with $q_1 = q_1(-S - \alpha_1\circ + K - K_{p1})$ and q_2 being the equilibrium $q_2 = q_2(K - K_{p2} + (1 - \pm)(K - K_{p1}) - (S + \circ + "))$:Given that $\alpha_2 = 0$, $q_2(K - K_{p2} + (1 - \pm)(K - K_{p1}) - (S + \circ + "))$ is thus strictly > 0 and 6 is always satis…ed for $\alpha_1 < 1$. Therefore any $\alpha_1 > 0$ equilibrium is eliminated and by continuity the $\alpha_1 = 1 - \acute{}$ equilibrium (for $\acute{}$ arbitrarily small) is also eliminated. So the $\alpha_1 = 1$ equilibrium can be considered as eliminated at the limit (ie. its stability is destroyed) . Note also that as soon as $q_2 > 0$, for any $\alpha_1 < 1$; the law enforcement equilibrium can be sustained with $q_1 = 0$ (with $¿_1 = 0$) so that K_{p1} can not only be larger than $K - (S + \circ + ")$, the equilibrium privatization level in the static model, but can even be equal to K. Since we assume irreversibility of privatization, and since it is necessary to have $K_{p2} < K$ for the enforcement equilibrium, we therefore have $K_{p1} = K_{p2} = K_p^¤$ which following the above de…nition of K_{p2} , evaluated at $\alpha_1 = 1$ is then $K_p^¤ = K - \frac{S+\circ+"}{2-\pm}$:¥

The …rst part of proposition 3 is straightforward and just states that the enforcement equilibrium can be sustained as a unique stable equilibrium. The second part stating that in the dynamic two period model, a higher level of privatization, i.e. a lower level of expenditures, can be sustained from the beginning of transition is less straightforward. It relates both to the enforcement externality and to the assumption that the choice to become a predator is irreversible. The second period repression technology serves strategically as a deterrent in the …rst period, thereby reducing the need for deterrence in period 1. There is thus an intertemporal credible deterrent e¤ect. The assumption of irreversible choice of predation acts in a way as a "trigger strategy " that allows to reduce expenditures on deterrence today. This intertemporal deterrent e¤ect is so strong that if privatization were not irreversible, the enforcement equilibrium could be sustained with $K_p = K$ in period 1.

5 Borrowing as a substitute for dualism.

If A is very high, then the above strategy becomes very costly as a way to obtain law enforcement. It may then be better to borrow to pay the cost of credible enforcement and to relinquish state control over assets immediately at the beginning of transition. Such a strategy of borrowing is presumably easier in the case of smaller countries like the Central European countries. We thus assume $K_{pt} = K$ 8t. However, loans must be paid back. In period 1, an amount B is borrowed and is reimbursed in period 2 at interest rate ½. It is assumed that a sovereign loan is reimbursed as long as tax revenues are su¢cient for that purpose. There is thus no strategic default. We also assume as above that a choice to become a predator cannot be reversed: Finally we consider the following timing: in period 1 the government commits to a certain policy schedule $(B; ¿_1; ¿_2)$, then agents choose between being predators and producers in period1 and in period 2. Finally the government, whenever it can, reimburses the debt.

What are under this scenario the conditions to have $®_1 = ®_2 = 0$ as a unique stable equilibrium? The borrowing constraint already changes the nature of the equilibrium since in period 2, the loan must be paid back out of tax revenues from law-abiding citizens:

$$B(1 + ½) < ¿_2 AK \tag{7}$$

Constraint (7) sets a lower bound on $¿_2$. Moreover, in the second period, in order to have $®_2 = 0$, one must have:

$$q_2(¡S ¡ ° ¡ B(1 + ½) + ¿_2 AK(1 ¡ ®_2)(1 ¡ ®_1) + (1 ¡ ±)(B + ¿_1 AK(1 ¡ ®_1))) ¸ ¿_2 8®_2 \tag{8}$$

Finally, in order to prefer choosing being a producer rather than a predator in period 1, for any $®_1$; and given that $®_2 = 0$, we must have

$$\begin{aligned} & (1 ¡ ®_1)[AK(1 ¡ ¿_1) + AK(1 ¡ ¿_2)] \\ > \; & (1 ¡ ®_1)[AK(1 ¡ q_1(¡S ¡ ®_1 ° + G_1)) + \\ & AK(1 ¡ q_2(¡S ¡ ®_1 ° + G_2))] 8®_1 \\ \text{with } G_1 \; = \; & B + ¿_1 AK(1 ¡ ®_1) \text{ and} \\ G_2 \; = \; & ¿_2 AK(1 ¡ ®_1) + \\ & (1 ¡ ±)(B + ¿_1 AK(1 ¡ ®_1)) ¡ B(1 + ½) \end{aligned} \tag{9}$$

Conditions for the existence of a unique equilibrium law enforcement path are expressed in the following proposition:

Proposition 4 A unique stable law enforcement equilibrium with external borrowing involves $¿_1, ¿_2 > 0$ which are both increasing in B. This equilibrium may not exist if ± is high or A and K are too low.

Proof of proposition 4: In order to satisfy both the reimbursement constraint and have $®_2 = 0$, we must have $q_2(¡S ¡ ° ¡ B(½ + ±) + (1 ¡ ±)¿_1AK(1 ¡ ®_1)) = ¿_2$ while satisfying $B(1 + ½) = ¿_2AK$. The latter sets a minimum threshold $\frac{B(1+½)}{AK}$ on $¿_2$ which is an increasing function of B. In order to have $®_2 = 0$, we must thus have

$$B(1 + ½) = q_2(¡S ¡ ° ¡ B(½ + ±) + (1 ¡ ±)¿_1AK(1 ¡ ®_1))AK \qquad (10)$$

There is a unique solution $B^¤(¿_1; ®_1)$ to equation 10, when it exists, (with $\frac{dB^¤}{d¿_1} > 0$) because $B(1+½)$ is upward sloping in B and $q_2(¡S ¡ ° ¡ B(½+±) + (1 ¡ ±)¿_1AK(1 ¡ ®_1))AK$ is downward sloping in B. Inversely, the solution to 10 in terms of $¿_1$ is:

$$¿_1(B; ®_1) = \frac{q_2^{¡1}\left(\frac{B(1+½)}{AK}\right) + B(½ + ±) + S + °}{(1 ¡ ±)AK(1 ¡ ®_1)}$$

with $\frac{d¿_1}{dB^¤} > 0$. On the other hand, B must be su¢ciently large so as to induce agents to become producers in period 1. Indeed, taking (9) , following the reasoning of the proof of proposition 3, the choice of being a producer rather than a predator in period 1 implies that the following condition must be satis…ed:

$$[q_2(¡S ¡ ®_1° + G_2) + q_1(¡S ¡ ®_1° + B + ¿_1AK(1 ¡ ®_1)] > ¿_1 + ¿_2 \qquad (11)$$

for all $®_1 < 1$ and $®_2 \quad 1$: Consider then the following policy schedule $(¿_1; ¿_2)$ given by $¿_2 = \frac{B(1+½)}{AK}$ and $¿_1 = ¿_1(B; 0)$. Then (11) is is satis…ed when B satis…es the following constraint:

$$[q_2(¡S ¡ ° + G_2) + q_1(¡S ¡ ° + B)] > ¿_1(B; 0) + \frac{B(1 + ½)}{AK}$$

with $G_2 = ¿_2 AK(1 ¡ ®_1)(1 ¡ ®_2) + (1 ¡ ±)(B + ¿_1 AK(1 ¡ ®_1)) ¡ B(1 + ½)$ evaluated at $®_1 = 1$ which gives $G_2 < 0$ and $q_2 = 0$. The constraint becomes then:

$$q_1(¡S ¡ ° + B) > ¿_1(B; 0) + \frac{B(1 + ½)}{AK}$$

It is easy to see that the RHS is an increasing convex function of B and the LHS is an increasing concave function of B. Therefore this sets, at best, an interval $[B_{min}; B_{max}]$ in which B needs to belong in order to eliminate the coordination problem of law enforcement. This interval may not even exist when the function of the RHS $¿_1(B; 0) + \frac{B(1+½)}{AK}$ is always above the function of the LHS $q_1(¡S ¡ ° + B)$: Once a B is chosen , this in turn determines $¿_1 = ¿_1(B; 0)$ and $¿_2 = \frac{B(1+½)}{AK}$. Note …nally that whenever it exists B_{min} has to be strictly larger than $S + °$:¥

The intuition for the result is the following. B must be high enough so as to convince agents in period 1 to become producers rather than predators. The higher B, the higher the amount that must be reimbursed in period 2. This has two e¤ects: …rst it increases $¿_2$ because of the reimbursement constraint but second, it increases $¿_1$ required to invest in repression technology in period 1 so as to maintain incentives not to become predators in period 2. Since B increases both $¿_1$ and $¿_2$, the necessary amount of foreign borrowing necessary to deter predators in period 1 may make it impossible to raise enough taxes that period to deter predators in period 2 also. This will be the case if AK is small enough or if ± is close enough to 1, conditions which are likely to hold in transition economies, as well as in many other economies. Another way of putting it is that even if external borrowing can solve the coordination problem in the …rst period to eliminate the bad equilibrium, it may then not be in a position to do so in the second period because of the con‡icting objectives of reimbursing the foreign debt and of investing enough in repression technology.

6 Borrowing and accession.

We now take the same model as above and assume that the transition country borrowing in the …rst period has the possibility of accession to the European Union in the second period. This case mirrors closely that of Central European countries like Poland, the Czech republic, Hungary, Slovenia and Estonia who are the "…rst round " accession countries.

It is assumed that, after accession, the repression technology is jointly …nanced by the Union. Even though this does not re‡ect the current institutional reality of public …nances in the European Union, it is not unlikely that such repression technology will, at least partly, be …nanced in common. Moreover, public …nances are fungible and accession to the European Union is likely to give those countries access to structural funds from the European Union which can contribute to a substantial part of those countries' budget.

We also want to analyze the e¤ects of conditionality of accession. It is assumed that under conditionality, accession can only take place afer the observation of $®_1 = 0$ in period 1.

Denote by K^{-} the capital per capita in the Union after accession. Call $\mu = \frac{1}{=}$ the share of the initial transition country and call G_0 the initial repression budget in the European Union. In order to keep things simple, we also assume that all relevant variables are expressed in per capita terms. We assume no redistribution so that the per capita income of accession country members remains AK.

The second period constraint to induce $®_2 = 0$, which will also be the constraint for the Union will be

$$\begin{aligned} q_2(¡S ¡ ° + G_2) &, ¿_2 \\ G_2 &= ¿_2 AK^{-}(1 ¡ ®_2)(1 ¡ ®_1) + \\ &\quad (1 ¡ ±)\ (B + ¿_1 AK(1 ¡ ®_1))\frac{1}{=} + G_0\frac{^{-} ¡ 1}{=} \end{aligned} \tag{12}$$

As we can see, reimbursement of the debt is cancelled out since repression technology is …nanced out of a common budget. Also, if G_0 and $^{-}$ are high enough, the equilibrium with $®_2 = 0$ can easily be sustained. In other words, if the accession country is small relative to the Union and if the Union had already invested e¢ciently in repression technology, the law enforcement equilibrium can be enforced as a unique stable equilibrium after accession. A simple implication of this reasoning is that accession of a large country like Russia may upset law enforcement in the European Union whereas accession of a small country like the Czech republic may not.

On the other hand, with conditionality, when looking at period 1 choices, we must look at the consequences of not meeting conditionality. We use the superscripts a for accession ($®_1 = 0$) and na to indicate no accession ($®_1 > 0$).[9]

[9] Again we suppose here that the domestic government precommits to a certain policy

Conditional on $\alpha_1 = 0$; a producer who chooses to be a producer in period 2 gets $AK(1 - \theta_1) + (1 - \alpha_2^a)AK(1 - \theta_2^a)$ whereas if he chooses to be a predator in period 2, he gets $AK(1 - \theta_1) + (1 - \alpha_2^a)AK(1 - q_2^a)$. When condition 12 is met, the payo¤ of the former is higher than of the latter. However, if $\alpha_1 > 0$, conditionality implies that accession will not take place. In that case, a producer in period 1 gets $(1 - \alpha_1)[AK(1 - \theta_1) + (1 - \alpha_2^{na})AK(1 - \theta_2^{na})]$ if he chooses to be a producer in period 2 and gets $(1 - \alpha_1)[AK(1 - \theta_1) + (1 - \alpha_2^{na})AK(1 - q_2^{na})]$ if he chooses to be a predator in period 2. In order to compute the equilibrium, we need to know what happens outside equilibrium, i.e. outside accession. Since there are multiple equilibria in period 2, we will assume a probability π of the bad equilibrium with $\alpha_2^{na} = 1$ and a probability $(1 - \pi)$ of the good equilibrium with $\alpha_2^{na} = 0$. Another possibility would be to assume that privatization is undone but that does not seem to be a very realistic assumption.

We then get the following proposition:

Proposition 5 With accession, the law enforcement equilibrium is sustainable as unique stable equilibrium with a positive but lower amount of borrowing $B(\pi)$ (with $\frac{dB}{d\pi} < 0$) than without accession (whenever this is possible), whereas without conditionality, it is sustainable with $B = 0$ and $\theta_1 = 0$.

Proof of proposition 5: Let us look at individual choices in period 1 given $\alpha_2 = 0$.

Conditional on $\alpha_2^a = 0$ if $\alpha_1 = 0$, and the multiplicity of equilibria if $\alpha_1 > 0$, somebody who chooses to be a producer in period 1 gets

$$AK(1 - \theta_1) + AK(1 - \theta_2^a)$$

if $\alpha_1 = 0$ and

$$(1 - \alpha_1)[AK(1 - \theta_1) + (1 - \pi)AK(1 - \theta_2^{na})]$$

if $\alpha_1 > 0$.

Individuals who decide to become a predator in period 1 get

$$(1 - \alpha_1)[AK(1 - q_1) + (1 - \pi)AK(1 - q_2^{na})]$$

schedule $(B; \theta_1; \theta_2^{na}; \theta_2^a)$ before agents choose to be predators or producers in periods 1 and 2.

with

$$q_2^{na} = q_2[-S - \tau\theta_1 + \varepsilon_2^{na}AK(1-\theta_1) - B(1+\rho) + (1-\delta)(B + \varepsilon_1 AK(1-\theta_1))]$$

and

$$\varepsilon_2^{na}AK \geq B(1+\rho)$$

Recall that in the case where there is no accession, the country has to satisfy its debt repaiements whenever it can (ie. in the good equilibrium)

The choice of being a producer rather than a predator in period 1 implies that the following condition must be satis...ed:

$$\begin{aligned}(1-\theta_1)[AK(1-\varepsilon_1) + (1-\phi)AK(1-\varepsilon_2^{na})] \\ > \quad (1-\theta_1)[AK(1-q_1) + (1-\phi)AK(1-q_2^{na})]\end{aligned}$$

for all $\theta_1 < 1$. This is satis...ed when:

$$q_1 > \varepsilon_1 - (1-\phi)(q_2^{na} - \varepsilon_2^{na}): \text{ for all } \theta_1 < 1$$

with

$$q_1 = q_1(-S - \theta_1\tau + B + \varepsilon_1 AK(1-\theta_1)]$$

Evaluating these expressions at $\theta_1 = 1$; one gets $q_2^{na} = 0$, and the condition

$$q_1(-S - \tau + B] > \varepsilon_1 + (1-\phi)\varepsilon_2^{na} \tag{13}$$

The condition for a good equilibrium in period 2 with no accession is similarly written as

$$q_2[-S - \tau\theta_1 + \varepsilon_2^{na}AK(1-\theta_1) - B(1+\rho) + (1-\delta)(B + \varepsilon_1 AK(1-\theta_1))] \geq \varepsilon_2^{na} \tag{14}$$

and the borrowing reimbursement constraint:

$$\varepsilon_2^{na}AK \geq B(1+\rho) \tag{15}$$

Now clearly, $B > 0$ in order to satisfy 13.

Two strategies are possible to keep B as low as possible. One involves setting $\varepsilon_1 = 0$ and thus $q_1(-S - \tau + B] > (1-\phi)\varepsilon_2^{na}$ with the right hand side, and thus the required B; decreasing with ϕ.

Calling $¿_2^{¤na}(B;®_1)$ the level of $¿_2^{na}$ satisfying $q_2[¡S ¡ °®_1 + ¿_2^{¤na}AK(1 ¡ ®_1) ¡ B(½ + ±))] = ¿_2^{¤na}$ when it exists, Consider

$$¿_2^{na} = \max\{\frac{B(1+½)}{AK}; ¿_2^{¤na}(B;0)\}$$

If $¿_2^{na} = \frac{B(1+½)}{AK}$, the constraint $q_1(¡S ¡ ° + B] > (1 ¡ º)¿_2^{na}$ is easier to satisfy for any v than the equivalent constraint in the case of foreign borrowing : $q_1(¡S ¡ ° + B) > ¿_1(B;0) + \frac{B(1+½)}{AK}$. It is less obvious if $¿_2^{¤na}(B;0)$ is very big.

Another strategy involves setting $¿_2^{na} = \frac{B(1+½)}{AK}$ and setting $¿_1$ in a way as to satisfy 14, using the same logic as in the model with foreign borrowing.Using 15 and 14 as an equality and substituting in 13, one gets that B should …nally satisfy:

$$q_1(¡S ¡ ° + B) > \tilde{e}_1(B;0) + (1 ¡ º)\frac{B(1+½)}{AK} \tag{16}$$

with

$$\tilde{e}_1(B;®_1) = \frac{q_2^{¡1}\left[\frac{B(1+½)}{AK} ¡ B(1 ¡ ±) + S + °®_1 + B(1+½)®_1\right]}{(1 ¡ ±)AK(1 ¡ ®_1)}$$

and

$$\tilde{e}_1(B;0) = \frac{q_2^{¡1}\left[\frac{B(1+½)}{AK} ¡ B(1 ¡ ±) + S\right]}{(1 ¡ ±)AK}$$

When º increases, the required B to satisfy 16 also decreases. Note the di¤erence between 16 and what we had with foreign borrowing

$$q_1(¡S ¡ ° + B) > ¿_1(B;0) + \frac{B(1+½)}{AK}$$

with

$$¿_1(B;0) = \frac{q_2^{¡1}\left[\frac{B(1+½)}{AK} + B(½ + ±) + S + °\right]}{(1 ¡ ±)AK}$$

One sees easily that $\tilde{e}_1(B;0) < ¿_1(B;0)$ and since $º < 1$ the right hand side of 16 is smaller than in the case of foreign borrowing, and thus the required B to satisfy the …rst period constraint is also smaller. Choosing the strategy minimizing B thus always leads to an amount of borrowing

that is smaller than in the case of foreign borrowing. In both cases, when º decreases, the required B also decreases.

Let us now look at what happens without conditionality. In this case, the choice in period 1 of being a producer rather than a predator implies that the following condition must be met:

$$\begin{aligned} & (1 - \theta_1)[AK(1 - \gamma_1) + AK(1 - \gamma_2^a)] \\ > \; & (1 - \theta_1)[AK(1 - q_1) + AK(1 - q_2^a)] \end{aligned}$$

Thus, to have $\theta_1 = 0$, one must have $q_1 > \gamma_1 - (q_2^a - \gamma_2^a)$. Since in equilibrium, $q_2^a > \gamma_2^a$; stability of the enforcement equilibrium can be achieved with $B = 0$ and thus $q_1 = 0$ with $\gamma_1 = 0$.¥

The result that borrowing is smaller with accession was expected but the reasons for the equilibrium amount of borrowing are somewhat surprising, and in particular the result that without conditionality, no borrowing is required in equilibrium to sustain law enforcement in the …rst period. So let us dwell on the intuition for prop 5.

Borrowing is needed not only in order to deter from predation in period 1, but also to deter from becoming a predator in both periods given the irreversibility of that choice. Under conditionality, this is done against the out of equilibrium path where agents deviate and accession does not happen. In other words, giving an incentive to an agent not to become a predator, and thus eliminating the bad equilibrium, must be seen in a context where other agents would be deviating, and thus accession not be reached. The amount of borrowing is smaller than in the case of foreign borrowing because we must allow for the possibility of multiple equilibria without accession in period 2. In fact, the lower the probability of the good equilibrium the lower the equilibrium amount of borrowing necessary, the smallest amount being $B = S + \delta$, the quantity needed to sustain the static enforcement equilibrium.[10] It is interesting that with conditionality, the …rst period choice of agents is no longer based on the prospect of accession but on the non-accession o¤-equilibrium path.

Conditionality is thus not e¢cient here since the accessing economy must,

[10] If one could commit to eliminate the good equilibrium in period 2 through a strategic move in the …rst period, then it would be possible to set $B = S + \delta$. However, it is not obvious how such a commitment may be enforced given that γ_2 can be chosen in a way as to make the second period good equilibrium feasible (and pareto-superior to the bad equilibrium).

in order to have access to a superior repression technology in period 2, prove that it is able in period 1 to achieve the law enforcement equilibrium.

By contrast without conditionality, zero borrowing can achieve the law enforcement equilibrium in the …rst period. With unconditional accession, one can a¤ord to have $¿_1 = 0$ and thus not borrow at all to sustain the good equilibrium since in equilibrium $q_2 > ¿_2$, with or without conditionality. Therefore, as long as $¿_1 = 0$, $q_1 = 0$ is su¢cient as an incentive for all agents to become producers. In other words, the better prospects for producers than for predators after accession are su¢cient to deter would-be predators. The absence of conditionality maintains this incentive, even if some agents considered deviating.

With conditionality, accession is conditional on what others do. Without conditionality, this is no more the case. The prospect of accession itself is what gives incentives. In a way, conditionality reduces the expected bene…t from accession because of the coordination problem individuals are facing in the light of accession. Conditionality creates a coordination problem that is absent without conditionality. We think that this insight is interesting because it shows that conditionality can be counterproductive when coordination is necessary to achieve the conditions for accession.

7 Conclusion

In conclusion, we want to emphasize both the policy implications and the theoretical insights derived in this paper.

In terms of policy implications, we have shown two di¤erent institutional responses to the coordination problem in law enforcement. The …rst one is dualism, illustrated by the Chinese transition experience with the coexistence of, on one hand, the maintain of direct state control over economic resources, and on the other hand, a very liberalized non state sector. This allows for credible law enforcement while giving incentives for productive activity. The second mechanism is accession to the European Union where we have shown that the prospect of accession can in itself be su¢cient to lead private agents to coordinate on the law enforcement equilibrium before transition.We think the accession e¤ects may explain part of the di¤erence between the di¤erent trajectories in Russia and in Central European countries like Poland. More generally, the accession e¤ects on the success of reforms in Central

European countries has been neglected in the transition literature where reform trajectories are analyzed independently of their international context. As argued by Roland (1997) and Csaba (1997), the geopolitical aspects of transition with Central Europe breaking away from Russian domination to join the Western European club, has strongly a¤ected the perception of the costs and bene…ts of reform in Central Europe compared to Russia. An implication of this idea is that the comparison between Polish and Russian transition cannot be done solely in terms of the strategies chosen. Another implication is that Russia which lacks anything like the prospect of accession should be compared to other countries that must …nd alone their path to success in transition. This points to the relevance of the Chinese transition experience for Russia and to the relevance of dualism in transition.

In terms of theoretical insights of the model that go beyond transition, we want to emphasize both the dynamics of coordination under the enforcement externality and the result that conditionality of accession can be counterproductive. The interesting aspect about the dynamics of coordination is related to the fact that the last period repression expenditures necessary to obtain a unique equilibrium create a positive intertemporal incentive to become a producer rather than a predator. It is this incentive that allows to reduce the amount of state control over resources in the dynamic as compared to the static model. It is also this incentive that allows to eliminate the need for borrowing in the accession case without conditionality. More interesting from the positive point of view is the result that conditionality can be counterproductive because it creates a coordination problem of its own. This result is quite new. Standard thinking on conditionality is based on traditional principal-agent and moral hazard models where the country receiving the loan is viewed as a single agent. Whereas in many cases this approximation may be valid, in other cases, it may be missing the important dimension of coordination. This may be the case for example if sovereign debt renegotiation is undertaken jointly with various indebted countries. Our results suggest that conditionality is not likely to work well in such a context.

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Appendix: An evolutionary version of the producer-predator game

Given that one major problem of transition and law enforcement is a co-ordination issue giving rise to multiple equilibria, it may be useful to consider a version of our model in which agents' coordination towards one equilibrium is modelled explicitly as a dynamic evolutionary process.

For this, we may consider that agents live just one period, and that through learning or imitation, each new generation chooses to be predator or producer according to some simple replicator dynamics based on the relative payo¤s of the two strategies. Namely consider the following replicator dynamics :

$$\mathbb{R}(t+1) = \mathbb{R}(t)\frac{\mathbb{C}\left(U^R(\mathbb{R}(t))\right)^{\mathbb{c}}}{\mathbb{R}(t)\mathbb{C}(U^R(\mathbb{R}(t))) + (1-\mathbb{R}(t))\mathbb{C}(U^P(\mathbb{R}(t)))}$$

with $U^R(\mathbb{R}(t)) = (1-\mathbb{R}(t))AK_p(1-q(t))$ and $U^P = (1-\mathbb{R}(t))AK_p(1-\mathbb{i})$ and $\mathbb{C}(:)$ an increasing "…tness" function

Then we consider the following time continuous version by considering that each period is of length $\mathbb{c} > 0$ and that (following Cabrales and Sobel (1992)) in each period of length $\mathbb{c}$; only a fraction $\mathbb{c}$ of the population is replaced by a new individual. When the fraction of the population which reproduces, in each period, is an unbiased representation of of the whole population, the resulting law of motion can be written, by analogy, as:

$$\mathbb{R}(t+\mathbb{c}) = \frac{\mathbb{c}\mathbb{R}(t)\mathbb{C}\left(U^R(\mathbb{R}(t))\right)^{\mathbb{c}} + (1-\mathbb{c})\mathbb{R}(t)}{[\mathbb{c}\mathbb{R}(t)\mathbb{C}(U^R(\mathbb{R}(t))) + (1-\mathbb{c})\mathbb{R}(t)] + [(1-\mathbb{R}(t))\mathbb{c}\mathbb{C}(U^P(\mathbb{R}(t))) + (1-\mathbb{R}(t))(1-\mathbb{c})]}$$

Hence

$$\frac{\mathbb{R}(t+\mathbb{c})-\mathbb{R}(t)}{\mathbb{c}} = \frac{\mathbb{R}(t)(1-\mathbb{R}(t))\left[\mathbb{C}\left(U^R(\mathbb{R}(t))\right)^{\mathbb{c}} - \mathbb{C}\left(U^P(\mathbb{R}(t))\right)^{\mathbb{c}}\right]}{\mathbb{c}\mathbb{R}(t)\mathbb{C}(U^R(\mathbb{R}(t))) + (1-\mathbb{R}(t))\mathbb{c}\mathbb{C}(U^P(\mathbb{R}(t))) + (1-\mathbb{c})}$$

or taking $\mathbb{c} \to 0$

$$\dot{\mathbb{R}}(t) = \mathbb{R}(t)(1-\mathbb{R}(t))\left[\mathbb{C}\left(U^R(\mathbb{R}(t))\right)^{\mathbb{c}} - \mathbb{C}\left(U^P(\mathbb{R}(t))\right)^{\mathbb{c}}\right]$$

From this we see that $\dot{\mathbb{R}}(t) > 0$ if and only if $U^R(\mathbb{R}(t) > U^P(\mathbb{R}(t))$: Hence $\dot{\mathbb{R}}(t) > 0$ if and only if

$$\mathbb{i} < q([-S - \mathbb{°}\mathbb{R}(t) + AK\mathbb{i}(1-\mathbb{R}(t))]$$

which gives that $\dot{\alpha}(t) > 0$ when $\alpha(t) > \alpha^{\natural} \in (0;1)$. Thus $[0;\alpha^{\natural})$ (resp.$(\alpha^{\natural};1]$) is the basin of attraction of the stable corner equilibrium $\alpha = 0$ (resp. $\alpha = 1$).

Government controls

Consider now government control on assets $K - K_p > 0$ In that case $\dot{\alpha}(t) > 0$ if and only if

$$\gamma < q([-S - \theta]\alpha(t) + (K - K_p) + AK_p\gamma(1 - \alpha(t))]$$

which means that the threshold level $\alpha^{\natural}$ is given by

$$\gamma = q([-S - \theta]\alpha^{\natural} + (K - K_p) + AK_p\gamma(1 - \alpha^{\natural})]$$

: Hence $\alpha^{\natural}$is an increasing function $\alpha^{\natural}(K - S;\theta;\gamma;K_p)$ of $K - S$, with $\alpha^{\natural} < 1$ for $K = K_p$ (when $\gamma > \underset{i}{\gamma}$) and $\alpha^{\natural} = 1$ when $K = K_p + S + \theta$. Hence for each initial condition $\alpha(0)$ of predators, there is always a stock of public assets $K - K_p \in [0;S + \theta]$ such that $\alpha(0) < \alpha^{\natural}(K - S;\theta;\gamma;K_p)$ and therefore such that $\alpha(t)$ converges towards the good "law enforcement" equilibrium $\alpha = 0$.

Persistence in the technology of repression

Consider now that there is an investment aspect of the repression technology:

$$\dot{G} = (K - K_p) + \gamma AK_p(1 - \alpha(t)) - \delta G$$

$\alpha(t)$ is the number of predators, given again through the simple replicator dynamics (agents are not forward looking) and $K_p;\gamma$ policy instruments supposed to be, for simplicity, time invariant. Then the dynamics of the system is given by

$$\begin{aligned}\dot{\alpha} &= \alpha(1 - \alpha)\left[\Phi\left(U^R(\alpha)\right) - \Phi\left(U^P(\alpha)\right)\right]\\ \dot{G} &= (K - K_p) + \gamma AK_p(1 - \alpha) - \delta G\end{aligned}$$

and $q(t) = q[-S - \theta\alpha(t) + G(t)]$:

In the space $(\alpha;G)$; the locus of points such that $\dot{\alpha} = 0$ is given by $q[-S - \theta\alpha + G] = \gamma$ and the locus $\dot{G} = 0$ is characterized by $(K - K_p) + \gamma AK_p(1 - \alpha) = \delta G$. The interior steady state (whenever it exists) is given

by

$$\dot{\theta} = \frac{(K - K_p) + \gamma A K_p - \delta(q^{-1}(\gamma) + S)}{\alpha\delta + \gamma A K_p}$$

$$\dot{G} = \frac{\alpha(K - K_p + \gamma A K_p) + \gamma A K_p (q^{-1}(\gamma) + S)}{\alpha\delta + \gamma A K_p}$$

Looking at the phase diagram, it can be shown to be a saddle point.

Also there the two locally stable corner solutions: the good equilibrium: $\theta = 0$ and $G = \frac{(K - K_p) + \gamma A K_p}{\delta}$ and the bad equilibrium: $\theta = 1$ and $G = \frac{(K - K_p)}{\delta}$: Depending on the initial values $(\theta(0); G(0))$, the system may converge towards one solution or the other. Again playing with the policy instruments $K_p; \gamma$ one may enlarge the basin of attraction of the good equilibrium such that :$(\theta(0); G(0))$ belongs to that basin.and that the system converges towards $\theta = 0$ and $G = \frac{(K - K_p) + \gamma A K_p}{\delta}$: