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## IN SEARCH OF THE HOLY GRAIL: POLICY CONVERGENCE, EXPERIMENTATION AND ECONOMIC PERFORMANCE

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# ABSTRACT

## In Search of the Holy Grail: Policy Convergence, Experimentation and Economic Performance

We consider a model of policy choice in which appropriate policies depend on a country's own circumstances, but the presence of a successful leader generates an informational externality and results in too little 'policy experimentation'. Corrupt governments are reined in while honest governments are disciplined inefficiently. Our model yields distinct predictions about the patterns of policy imitation, corruption, and economic performance as a function of a country's location *vis-à-vis* successful leaders. In particular, it predicts a U-shaped pattern in economic performance as we move away from the leader in the relevant space of characteristics: close neighbours should do very well, distant countries moderately well on average with considerable variance, and intermediate countries worst of all. An empirical test with the experience of post-socialist countries provides supportive results.

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Sharun Mukand and Dani Rodrik

## I. Introduction

There has been a remarkable convergence of views over the last two decades among both scholars and policy makers on what constitutes desirable economic policies to promote growth and development. Yet economic performance is more heterogeneous across the world than it has ever been. Growth rates in the developing world have been lower on average in the past two decades than they were in the 1960s and 1970s. And the spread in growth rates across countries has been wider (see Table 1). Why this disappointing performance if we have apparently learned so much about what we need to do foster economic convergence?

One possible answer to this question is that the divergence in performance is due to the fact that not all governments around the world have adopted the requisite policies. Perhaps what is going on is that countries that have latched on to the consensus view have increased their growth rates, while others are lagging. There are reasons to view this explanation with great suspicion, however.

One bit of telling evidence comes from Latin America, where there has been greater enthusiasm for Washington Consensus-style reforms than in any other corner of the world. Morley et al. (1999) have put together an index of structural reform for Latin America that quantifies the policy changes in the areas of trade liberalization, tax reform, financial liberalization, privatization, and opening up to capital flows. The average value of this index for the continent rises from around 0.47 in the early 1970s (out of a maximum of 1) to around 0.55 in the early 1980s, and then jumps up to 0.82 by 1995. Yet economic performance in Latin

America has been quite disappointing during this period. Even if we leave aside the debt-crisis decade of the 1980s (and ignore the natural rebound from it subsequently), one can count on the fingers of one hand those countries that have done better in the 1990s than they did during 1950-80. And of those, only Chile is a genuine success.[1] Of course, the relationship between "reform" and growth is a complex one, and there is only a limited conclusion that one can draw from such a broad-brush look at the evidence. But the Latin American experience does suggest that the growth payoff reaped by the most ambitious reformers has been meager at best.

Another important strand of evidence comes from the last two decades' success cases. China and India stand out here. These two large countries have experienced significant increases in their growth rates—China since the late 1970s, and India since the early 1980s—in a period when most other developing countries have gone the opposite way.[2] Indeed, China's and India's performance overshadows the disappointing outcomes elsewhere, making the last two decades a developmental success on a population-weighted basis (see Table 1). The policies that have enabled this performance present a very awkward fit with the usual list that has been on the agenda of reformers in Washington and elsewhere. China's reforms have been marked by partial liberalization, two-track pricing, limited deregulation, financial restraint, an unorthodox legal regime, and the absence of clear private property rights. India's reforms have been less distinctive, but still marked by significant departures from the rulebook. Even after the trade reforms of the early 1990s, for example, India remained one of the world's most protected economies. One could argue that these economies would have grown even faster had they

[1] Argentina has since collapsed, and Uruguay and Bolivia (the other "successes") have anemic growth rates that look good only in relation to an even worse performance in the earlier period. Mexico, Brazil, and the other Latin American countries have yet to attain the growth rates they experienced during 1950-80.

[2] India was the world 10th fastest growing economy in the 1980s, and the 12th fastest in the 1990s. China was second (behind Korea) in the 1980s and the first in the 1990s.

embarked on a more orthodox reform agenda. But the difficulty with this argument is that those countries that adopted the orthodox policies—such as Latin American countries—for the most part did worse than China and India, not better.[3]

We entertain a different possibility in this paper. We consider a world in which appropriate policies and institutional arrangements have a large element of specificity, and experimentation is required to discover what works locally. Reforms that succeed in one setting may perform poorly or fail completely in other settings. Two-track reform may work well in Deng's China but not in Gorbachev's Soviet Union. Gradualism may be appropriate to India, but not Chile. Import-substitution may foster competitive industries in Brazil, but not in Argentina. Industrial policy may produce results in South Korea, but not in much of Africa. Export processing zones may work wonders in Mauritius, but not in most other countries that have created them. Privatization of utilities may be necessary in Latin America, but not Asia. Openness to capital flows may enhance efficiency and growth in rich countries but wreak havoc in poor countries. Centralized wage bargaining may be feasible and desirable in Europe but not in Latin America.

Such specificity could arise from differences in historical trajectories, geography, political economy, institutional settings, or other initial conditions. It could help explain why successful countries—China, India, South Korea, and Taiwan among others—have almost always combined unorthodox elements with orthodox policies. It could also account for why important institutional differences persist among the advanced countries of North America, Western Europe, and Japan—in the role of the public sector, the nature of the legal systems,

[3] One might also point to the growth miracles of earlier decades, such as South Korea and Taiwan—countries that also employed a mix of orthodox and unorthodox policies. On the orthodox side, these countries emphasized fiscal conservatism, exports, and human resources. On the unorthodox side, they protected their domestic markets and made extensive use of industrial policies.

corporate governance, financial markets, labor markets, and social insurance mechanisms, among others.

We do not mean to suggest that economic principles work differently in different places, or that economics itself needs to be tailored to local conditions. We make a distinction instead between economic principles and their institutional embodiment. Most first-order economic principles come institution-free. Incentives, competition, hard-budget constraints, sound money, fiscal sustainability, property rights are central to the way that economists think about policy and its reform. But these principles do not map directly into institutional solutions. Property rights can be implemented through common law, civil law, or, for that matter, Chinese-type socialism. Competition can be maintained through a combination of free entry and laissez-faire, or through a well-functioning regulatory authority. Macroeconomic stability can be achieved under a variety of fiscal institutions. Institutional solutions that perform well in one setting may be inappropriate in other setting without the supporting norms and complementary institutions. In the words of North:

> economies that adopt the formal rules of another economy will have very different performance characteristics than the first economy because of different informal norms and enforcement. The implication is that transferring the formal political and economic rules of successful Western economies to third-world and Eastern European economies is not a sufficient condition for good economic performance. (North 1994, 8)[4]

In addition, since policy makers always operate in second-best environments, optimal reform trajectories—even in apparently straightforward cases such as price reform—cannot be designed

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[4] See for example Khanna, Kogan, and Palepu (2001) on convergence in corporate governance practices around the world in the last two decades. These authors find some evidence of convergence in form, but no evidence of convergence in practice, indicating that implementation has been problematic in varying local conditions. Pistor (2000) provides a general treatment of the issue of legal transplantation, and shows how importation of laws can backfire. On the role of the WTO in policy convergence in the area of trade, see Morissey and Nelson (2001).

without due regard to prevailing conditions and without weighting the consequences for multiple distorted margins.

A paper that takes these issues seriously has a triple burden. It must explain why countries do converge on "consensus" policies even when their circumstances call for different arrangements. Second, to the extent that some countries choose to experiment rather than imitate, it must provide a reason why they do so. Finally, it must provide a plausible accounting of the pattern of economic performance that emerges when there is a tendency for countries to converge on similar policies. This paper contains some first steps in all three directions.

We consider a model in which policies (or equivalently, institutional arrangements) can vary on two dimensions. One, which we refer as "appropriateness," corresponds to the fit between policies and a country's circumstances. Policies that are well matched with circumstances produce higher output than policies that are not. The second dimension, which we refer to as "transparency," relates to the conduciveness of policies to skimming and corruption by politicians. Some policies are transparent, and therefore are relatively immune to manipulation for corrupt purposes, while others are not. We take transparency to be independent of a country's circumstances, in the sense that a policy that is transparent in one country is transparent in all other countries. We also assume that all appropriate policies are transparent, while all transparent policies need not be appropriate. The justification is easy to provide. It is hard to see why non-transparent policies, in the sense of policies that are easily corruptible, could ever really be appropriate. On the other side, one could always limit corruption by legislating a rule that prohibits <u>all</u> policy making; this would root out corruption by eliminating discretion, but it is hard to see how it could be appropriate in general.

Governments, in turn, can be of two types: honest and corrupt. They face electorates that are more likely to throw them out of office if they are perceived as being of the corrupt type. Governments receive a private signal about their country's underlying "state of the world" that is not observed by their electorates. We focus on the stage game where the governments and their electorates in a "follower" country have already observed a successful policy in a neighboring country (called the "leader"). We assume that the leader's policy is so successful that the electorate in the follower can deduce the policy is of the transparent type. The follower government then faces this dilemma. It can imitate the leader's policy, and thereby communicate that there will be no corruption, but at the cost of adopting a policy that may not be appropriate. Or it can choose a policy that targets as closely as possible its private signal, in which case it incurs the costs of "experimentation" (along with the cost of being perceived as corrupt).

Our model captures several elements that we believe are plausible. First, and key to our argument, is the idea that there is considerable context-specificity to desirable policies. Second, we also incorporate a universal element to policies, which we model with the notion of transparency. Third, we assume there is an element of uncertainty inherent in a country's search for the "ideal" policy. Governments either lack perfect knowledge on the right course of action, or face uncertainty in carrying out the actual implementation of a policy. We capture this aspect of policy making by assuming that there is uncertainty in implementing an untested policy. Fourth, our framework incorporates the obvious fact that some governments are more committed than others to searching for policies that are in the long-term interest of a country. The shadow of corrupt governments imposes a cost on honest governments. Finally, our framework captures an important aspect of policy choices in a globalizing world, namely the existence of informational externalities. In particular, countries observe the success or failure of alternative

"paths of development" and have the option of mimicking these policies in the hope of matching their success. Our framework is rich enough to capture all of these tensions inherent in policy making.

We show that the informational externality created by successful leaders results in both an upside and a downside. Countries whose underlying "state" is close to the leader—i.e., the leader's neighbors by the relevant metric—choose to mimic the leader's policies, even when their governments are of the corrupt type. This yields a double benefit to the neighbors: they can forego the costs of experimentation, while reaping the benefits of the discipline that is exercised on potentially corrupt governments. Countries in the far periphery are unaffected by the leader's example, as governments of both types choose to experiment. The cost is borne by honest governments in the near periphery—i.e., by countries that are too far from the leader for mimicking to be welfare improving, but close enough for the informational externality to generate an incentive for honest governments to mimic. The last case entails inefficient disciplining of government policies.

Therefore our model yields distinct predictions about the patterns of policy imitation, corruption, and economic performance as a function of a country's position vis-à-vis successful leaders. In particular, it predicts a U-shaped pattern in economic performance as we move away from the leader in the relevant space of characteristics: close neighbors should do very well, distant countries moderately well on average with considerable variance, and intermediate countries worst of all.

We believe this framework helps account for some of the salient features of the economic landscape of the last few decades. Countries in the vicinity of growth poles such as Japan and later the East Asian tigers have tended to do very well, in part by imitating many of the policies

followed by these leaders. Countries whose underlying characteristics or geographic distance place them very far from the leaders have experienced highly variable fortunes. Superstars like China and Mauritius, which have achieved success on the back of a great degree of policy experimentation, have occasionally emerged from this group. Some of these experimenters in turn have become examples for others to follow, such as China in the case of Vietnam. And we would claim that many countries in between have been "inefficiently disciplined," adopting policies that are surely less corrupt and more transparent than in the past, but also perhaps less appropriate to their circumstances. The Latin American economies of the 1990s may constitute the chief examples of this last group.

We also undertake a simple empirical test of our framework in this paper, by focusing on the experience of post-socialist countries. These countries were forced to search for alternative policies once they abandoned socialism, so they constitute a useful sample for our purposes. For most of them, the model to emulate, if any, was the Western European example. We hypothesize that the geographic distance between each of these countries and Western Europe is an adequate (inverse) proxy for the suitability of European-style institutions to their circumstances. We then demonstrate that there is a robust U-shaped relationship between these countries' distance from Brussels and their post-transition growth rates. Strikingly, the U-shaped relationship survives when we control for a variety of other determinants, including the extent of "structural reform" undertaken. While some previous studies have noted the negative gradient in performance in the vicinity of Western Europe, we are not aware of any that have picked up the upwards-sloping part of the relationship, nor of any theory (other than ours) that would account for the latter. Measures of corruption and policy imitation also behave broadly in the way the theory predicts.

While the sample of countries covered is necessarily small, we are greatly encouraged by the strength of these results.

There are many antecedents in the literature to this line of thought. Economic historians have long emphasized that the fragmentation and diversity of early modern Europe was a source of economic strength that allowed Europe to eventually overtake the centralized empires in China, the Middle East, and the Indian sub-continent. Central here is the idea that decentralization enabled competition, not only in the market for goods and services, but also in market for institutional arrangements. As David Landes puts it, "only societies with room for multiple initiatives, from below more than from above, could think in terms of a growing pie" (1998, 32). With reference to the failure of China and Islam, Douglass North points out:

> Centralized political control limits the options, the alternatives that will be pursued in the context of uncertainty about the long run consequences of political and economic decisions. … In [the] competitive decentralized environment [of Europe] lots of alternatives were pursued; some worked, as in the Netherlands and England; some failed, as in the case of Spain and Portugal; and some, such as France, fell in between these two extremes. But the key to the story is the variety of the options pursued and the increased likelihood (as compared to a single unified policy) that some would turn out to produce economic growth. (North 1993)

Jared Diamond (2001) has emphasized the geographic sources of these different historical trajectories.[5] Ironically, decentralized experimentation appears to have taken root in China in the last three decades, and is often pointed to as the source of that country's recent success (Naughton 1995; Jefferson and Rawski 1994).

[5] "China has a smooth coastline. Europe has an indented coastline, and each big indentation is a peninsula that became an independent country, independent ethnic group and independent experiment in building a society: the Greek peninsula, Italy, the Iberian peninsula…Europe is transected by mountain ranges that split up Europe into different principalities: the Alps, the Pyrenees, Carpathians – China does not have mountain ranges that transect China. In Europe big rivers flow radially….and they don't unify Europe. In China the two big rivers flow parallel to each other, are separated by low lying land, and were quickly connected by canals. For those geographic reasons, China was unified in 221 B.C. and stayed unified most of the time since then, whereas fore geographic reasons, Europe wasn't. Augustus couldn't do it, Charlemagne couldn't do it and Napolean and Hitler couldn't unify Europe" (Diamond, 2001).

In the recent literature on development strategies, Evans (2001) and Rodrik (2000) have argued for the importance of local deliberation in ensuring a good fit between institutions being adopted and local conditions. Evans dubs the 1990s convergence on Anglo American institutions the "institutional monocropping" approach. Besley (2000) has also emphasized the importance of policy experimentation, noting that "adopting a policy is analogous to adopting new technologies with uncertain benefits." Dewatripont and Roland (1995) and Roland (2000) underscore the importance of uncertainty and experimentation in the context of transition economies. Unger (1998) has forcefully argued that the institutional arrangements we observe presently among the successful advanced industrial countries constitute only a subset of the full range of institutional possibilities.

Perhaps most directly relevant to our research is a recent paper by Berkowitz, Pistor, and Richard (2001). This paper analyzes the historical process of legal evolution in forty-nine countries to ascertain why some legal systems are more effective than others. The authors' dependent variable is the quality of legal institutions and enforcement (which they call "legality"). The paper's central argument is that the manner in which the legal order develops makes a significant difference to legality. In particular, the authors make a distinction between two types of countries: those that developed their formal legal orders internally ("origins"), adapted imported codes to local conditions, or had familiarity with foreign codes ("receptive transplants"), and those that acquired their formal legal order from abroad without much adaptation and/or familiarity ("unreceptive transplants"). Their main finding is that the second group of countries has ended up with significantly lower levels of legality. Equally important, they find that the "unreceptive transplant" effect is a more important determinant of legality, and ultimately of economic growth, than the family from which the legal regime was drawn. What

seems to matter is not common versus civil law, but the suitability of the laws to local conditions.

Our paper is also related to Kremer, Onatski, and Stock (2001), who analyze the statistical properties of the distribution of per-capita incomes around the world and present a simple framework to account for it. They too consider the role of experimentation in driving the pattern of incomes around the world. In particular, in order to explain why some poor countries grow rich while rich countries hardly ever get poor, they develop a model in which countries search among policies until they reach a satisfactory income level, at which point they stop experimenting. Their framework is based on the assumption that the requisite policies are country-specific, but they also discuss informally the likelihood that countries may learn from each other. Our framework puts more structure on these issues, and also, more importantly, endogenizes the choice between experimentation and imitation.

The plan of the paper is as follows. Section II presents a stripped-down version of the model to drive home the central message of the paper as directly as possible. Section III describes the full model, providing political-economy underpinnings to the choice of policy by a "follower" government. Section IV presents an empirical test with the post-socialist sample of countries. Section V presents some concluding remarks.

## II. The Benchmark Model

We describe the complete model in two stages. We present in this section the essential features of a minimal benchmark model, in order to illustrate the dilemma at the heart of our argument in a transparent way. In the next section we further elaborate on this model and provide political underpinnings for the government's decision making.

We assume that the governments in all countries are divided into two cohorts—a "leader" and a "follower" cohort. A government in a follower country has one of two policy choices: it can choose to "imitate" or mimic the policy chosen by a leader country, or it may prefer to "experiment" with its choice of policy. This decision is a function of several factors, which we describe below.

*Countries: Location and Policy Specificity*

The world is made up of a large, discrete number of countries. Countries differ from each other in terms of their geography, historical trajectory, culture and other local conditions, which make any given policy more or less appropriate across countries. We capture these country specific local conditions by assuming that each country $i$ has a unique "state of the world" $z_i$. We assume that countries are distributed uniformly on a circle, whose circumference we normalize to two units. Therefore each country $i$ has a location $z_i$, on this circle (Figure 1). Reducing all differences in underlying characteristics across countries to a single dimension makes it easy to assess whether countries are proximate or distant from each other. In particular, if two countries are located at $z_i$ and $z_j$, then the "distance" between these countries is defined as $\Delta_{ij} = | z_i - z_j |$.

The government in any given country gets to choose a policy $a_j$ that affects national income. The important feature of a policy that we emphasize is its "specificity" or state-contingent nature, with the impact of a policy on national output depending on the country's location. If a country whose underlying location is $z_i$ chooses the policy $a_j$, then national income is given by $y_i = -\theta (a_j - z_i)^2$. As is clear from this formulation, the closer or more "appropriate" is a policy to a country's underlying state; the higher is national income. Therefore,

if two countries *j* and *k* are "neighbors" (i.e. $\Delta_{jk}$ is small), then it is less costly to adopt the policy of a neighbor.

*The Government, Information and Policy Choices*

We are interested in capturing the uncertainty inherent in the policy making process. There are two ways of modeling this: either we assume that the government is imperfectly informed or we can assume (as we do in this paper) that the government has imperfect control over the policy implementation process. For simplicity, we follow the latter route and assume that the government receives a perfectly reliable private signal, $\hat{z}_i = z_i$. This would seem to suggest that a government's "ideal policy" choice is a simple matter: match the policy to the appropriate state. However, even if government *i* knows the "ideal policy," it can determine the actual policy implemented only up to a random error term, $a_i' = z_i + \eta$, with $\eta$ distributed with mean zero and variance $\sigma^2$. This is a relatively simple way to represent the costs as well as the benefits of experimenting with a policy that no other country has successfully tried before. On the other hand, if country *i* imitates and picks up an off-the-shelf policy that has been tried and successfully tested in some other country, then we assume there is no uncertainty associated with its implementation.[6]

Given our assumptions so far, and assuming that the follower government maximizes (expected) national income, the choice of experimentation versus imitation is a simple function of two factors: the distance between the follower country and the successful leader and the

[6] We have made these assumptions in order to capture the gains and costs of experimentation in policy making in the simplest possible way. An alternative more intuitive (though more complicated to work with) assumption is that governments receive noisy signals about $z_i$. In this case in order to learn about the true $z_i$, the government will have to experiment and will gradually converge to the ideal policy $a_i = z_i$. The crucial aspect of the assumption is that the government has more reliable information about its true location, than the citizen does.

uncertainty associated with policy experimentation. If the distance is large relative to the uncertainty, then the government will prefer to experiment. We now introduce an additional complication, which drives a wedge between the government's utility function and overall social welfare. We assume that the government's preferences are given by $v_i = y_i - \lambda K$, where $K>0$ is a private (not social) fixed cost borne by the government and λ is a dummy variable that equals zero or one, depending on whether the government imitates (λ = 0) or experiments (λ = 1). Hence the government incurs this private cost only when it chooses to experiment. For the moment we simply take as given the existence of this private cost. In the next section we will provide microfoundations for this assumption, based on political-economy considerations.

*To Experiment or to Imitate: A Heuristic Analysis*

Suppose that country 1 from the first cohort becomes a successful leader by implementing policy $a_1$, such that $a_1 = z_1$ and $y_1 = 0$, thereby achieving the highest possible output. We now analyze the policy dilemma confronting a follower country that is located at $z_2$, The government of country 2 observes policy choices of the first cohort including those made by the successful leader. In addition the government receives a private signal about its country's location $\hat{z}_2 = z_2$. If the government imitates the successful leader's policy choice $a_1$, its payoff equals $v_2 (a_1=a_2) = y_2 = -\theta( a_1 - z_2)^2$. This payoff is solely a function of the distance between the leader and the follower country. In contrast, if it chooses to experiment and follow a policy in accordance with its own private signal, the payoff to the government is given by $v_2(a_2 = a_2^{'} = \hat{z}_2) = E(y) - K = E\{-\theta( z_2 + \eta - z_2)^2\} - K = -\theta\sigma^2 - K$. Here the government incurs both the cost of an uncertain technology as well as the private fixed cost of experimenting. Follower country 2 will prefer to imitate the successful leader rather than experiment if the

following inequality holds: $v_2(a_1 = a_2) \geq v_2(a_2 = a_2^{'} = \hat{z}_2)$. This implies that the follower government will choose to imitate if $z_2$ lies in the interval $[a_1 - (\sigma^2 + K/\theta)^{1/2},\ a_1 + (\sigma^2 + K/\theta)^{1/2}]$, and to experiment otherwise. In the absence of the private fixed cost, the interval of imitation would have been $[a_1 - \sigma,\ a_1 + \sigma]$ instead. Clearly, the larger the government's private fixed cost, the larger the zone of "inefficient imitation"—the zone within which a country ends up imitating even though it would have been better off experimenting.

Despite the very simple structure of our model, we are able to generate some fairly striking implications. The pattern of economic performance that results can be summarized with the help of Figure 3, which we will refer to again when we lay out the full model in the next section. In particular, our framework yields a U-shaped relationship between economic performance and "distance" from the leader. Specifically:

(i) In the immediate neighborhood of the successful leading country, countries prefer to imitate the leader's policies, and achieve high economic performance. There is a "growth pole" around the successful leader.

(ii) Countries that are very far from the leader—located in the zone we call the "far-periphery"—choose to experiment, rather than imitate. Their economic performance is <u>on average</u> worse than that of countries in the close neighborhood of the leader. But these also exhibit much greater variance in performance (due to the uncertainty in the policy implementation process). So some experimenters could achieve better performance than imitators in the neighborhood of the leader.

(iii) Countries located in the intermediate zone between these groups—countries in the "near-periphery"—are strictly worse off than both of those groups (compared to a situation

where there was no successful leader). These are countries whose governments choose to mimic, even though they are too distant from the leader to benefit.

(iv) Extending the model dynamically (if informally), we can see that growth poles are likely to develop sometime down the line in the far periphery, but not in the center or the near-periphery. That is because experimentation takes place only in the far periphery.

While the above analysis is somewhat heuristic, it has the merit of delineating most of the key results of the full model in a transparent manner. The key to the U-shaped pattern is the inefficiency that arises from the government's private cost, $K$. In the next section, we dispense with $K$, and extend the model to provide a direct explanation as to why governments may incur a private cost if they choose to experiment rather than imitate.

## III. Political Underpinnings of the Search for Prosperity: the Full Model

### *Transparency, Corruption and Policy Universality*

It is useful to keep in mind that in our analysis a "policy" has very broad connotations and is not necessarily just related to the economic policy choice per se. A policy may consist of any institutional arrangement that affects a country's national income and welfare. This broader interpretation of policies becomes particularly relevant in understanding the additional aspect of a policy that we now introduce. We assume that some policies or institutional choices are conducive to the inefficient siphoning away of national income (i.e. through corruption and wastage), while others encourage discipline. We call this element of policy "transparency," to distinguish it from the notion of "appropriateness" developed in the preceding section. We assume that all appropriate policies are transparent in that they encourage discipline and prevent wastage and corruption. Hence any transparent policy that disciplines one country is assumed to

discipline the government of any other country that adopts it. However, all transparent policies are not appropriate in that they need not be well matched with the underlying state of the country in question.[7]

Our framework therefore encapsulates in a relatively parsimonious form two aspects of policies. First, our formulation captures the notion of specificity—that policies need to be suited to country-specific local conditions. Second, we also capture aspects of policies that are universal, in that greater transparency, the rule of law and accountability are useful under all conditions regardless of local context.

*Government and the Citizen*

Everything else being the same, all governments would normally prefer to boost national income and enhance the well being of their citizens. However, governments have additional motives as well. They prefer remaining in power, and, furthermore, some are corrupt and beholden to special interests. We capture these additional motivations for a government of type $t_k$ from country $i$ by using the following utility function: $v_{ik} = y_i + \lambda R_k + \varepsilon$, where $\varepsilon > 0$ represents the "ego rents" from being in office, and where governments can be honest ($t_h$) with probability $p_h$ or corrupt ($t_c$) with probability $1\text{-}p_h$. The "economic rents" from having a non-transparent policy that allows corruption is given by $R_k$, where $R_c > R_h \geq 0$. For reasons that will become clear shortly, we shall assume that each period is made up two stages. The "economic" and "ego" rents both accrue to the government at the end of the second stage of the period.

[7] This assumption is much stronger than what is required for the analysis that follows. All that is required is that the citizens have the *perception* that (in expected terms), any 'appropriate' policy is more likely to be 'transparent'. For example, all that is required for is that the citizen in Hungary perceives that EU style institutional arrangements, if adopted by his country, will reduce corruption.

Similarly, the impact on national income of having a corrupt government becomes visible to the citizen only at the end of the second stage.[8]

Finally, each country *i* has a single representative citizen, who lives one two-stage period and has preferences given by $u_i = \sum_{t=1}^{2} \delta^{t-1}\left[y_{it} - R_{kt}\right]$, where δ is the discount factor and *t* is the stage. However, this representative citizen does more than just consume national income. He is in a position to organize a coup, a revolt or to force mid-term elections *at the end of the first stage*, if he is dissatisfied with the incumbent government. The probability that a citizen will successfully replace an incumbent is a linear function of his perception that resources will be siphoned away. We further elaborate on this subsequently.

*The Timing in the Complete Model*

The entire set of countries is divided into two cohorts, where countries that make policy choices at the beginning of the first period constitute the first period cohort. The governments in these countries receive private signals and choose policies. Once selected, policies remain in place during both stages of the period, regardless of whether a government remains in office throughout. At the end of the first stage, citizens in these countries observe the government's policy choice and choose whether to retain or attempt an ouster of the government. At the end of this second stage output is publicly observed and payoffs are realized to the government and the citizen.

Citizens and governments in the second "follower" cohort observe policy choices of the first cohort and their national income. The government receives a private signal about the state

[8] This assumption simplifies the analysis of the political game since it ensures that the citizen's attempt to replace the government is a function only of observed policy choice. The qualitative direction of the results will remain

and then makes its policy choice at the beginning of this second period. Once again citizens observe the policy choices and make a decision of whether to retain the incumbent or replace it at the end of the first stage of this second period. The preceding sequence is repeated. This timeline is illustrated in Figure 2.

We now examine the equilibrium policy choices of a government. As will soon be evident, the results are similar to the heuristic analysis in the last section.

*Discipline and Corruption in the Search for Prosperity: Equilibrium Analysis*

We analyze a government's choices in the following scenario. We consider a situation where at the end of the first period, there has emerged a sole successful leader that has successfully implemented policy $a_1$. This perfect match of the transparent policy $a_1$ to the appropriate state $z_1$, has resulted in the maximum possible national income of $y_1 = -\theta(a_1 - z_1)^2 = 0$, where we assume $a_1 = z_1 = 1$ (see Figure 1).[9]

We then focus on the dilemma faced by the follower government. Should it minimize uncertainty by picking an off-the-shelf policy $a_1$ or should it experiment in its choice of policy? In order to facilitate our analysis, we propose the following equilibrium to the sub-game involving the follower governments. All honest follower governments whose private signal $\hat{z}_i$ lies in the interval $[z_h, 2 - z_h]$ will be "disciplined" into imitating the policy chosen by the successful leader. Similarly, corrupt governments who receive private signals in the range

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unchanged even if we allow for observability of interim ouput by the citizen, so long as its realization(or its observability to the citizen) is sufficiently noisy.

[9] Allowing for the process of policy experimentation in the first period, to result in more than one successful leader, does not qualitatively alter any of the implications of the analysis that follows.

$[z_c, 2-z_c]$, will also be "disciplined" into mimicking the successful leader, where $z_h < z_c$.[10] All other countries with honest governments (e.g. those with $z_j \in [0,z_h)$), will pursue a policy in accordance with their private signal, while corrupt governments in the range $z_j \in [0, z_c)$ will pursue policies which though positively correlated with their private signal, do allow the siphoning away of resources. Citizens will keep in power those governments that are disciplined into pursuing incorruptible policies. Governments that pursue *any* other policy will, with positive probability, be successfully replaced at the end of the first stage by a randomly drawn challenger.

Given that we have a finite two-stage game, we analyze our proposed equilibrium backwards, from the beginning of the second stage of the second period. At this stage the citizen has to decide whether to attempt to replace or retain the government. Depending on the political structure specific to the country he may try to force a mid-term election or carry out a revolt. The citizen will attempt to replace the government if he believes that his second stage utility will be higher with a randomly drawn government than with the incumbent. Remember that, once implemented, a policy is in place for both stages of a period. Therefore, if the policy in place is *not* transparent, then in the second stage a corrupt government can siphon away resources and lower national income. In this case, if the incumbent is perceived to be corrupt, then the citizen may prefer to replace the incumbent with a randomly drawn challenger. On the other hand, if the policy in place is transparent and guarantees discipline, then the citizen is no better off by replacing the incumbent, who will therefore be retained.[11]

[10] Since in our proposed equilibrium, there are always a non-empty set of governments that prefer to *not* imitate the leader, we do not worry about out-of-equilibrium beliefs.

[11] This is always true since under the proposed equilibrium, the difference in the citizen's second stage payoff from having a government that pursues its own signal and replacing it with a randomly drawn incumbent equals: $[1-z_h p_h/(z_h p_h + z_c(1-p_h))]R_c - (1-p_h)R_c$, which is strictly negative for all $p_h>0$.

Consider the payoff from mimicking obtained by an honest follower government *j* that is on the margin of indifference between mimicking and pursuing its own private signal $\hat{z}_h$, where $\hat{z}_h = z_h$. This is given by $-\theta(z_h - a_1)^2 - R_h + P(t_h \mid a_j = a_1)\varepsilon$, where $P(t_h|a_j=a_1)$ is the probability that an honest government that imitates the leader will remain in power. Given that the countries are uniformly distributed on the circle,[12] the above simplifies to:

$$v_h(z_h, a_j = a_1) = -\theta(z_h - a_1)^2 - R_h + \varepsilon = -\theta(z_h - a_1)^2 + \varepsilon.$$

The first expression on the right hand side is the national income that results from the government's policy choice. Since we assume that $R_h$ equals zero, there is no loss of economic rents if the incumbent is honest. Furthermore, since the government has been disciplined into enacting a transparent policy (in place for both stages), the citizen-voter has no incentive to replace the incumbent with a randomly drawn challenger. Hence the incumbent retains power with probability one (i.e. $P(t_h|a_j=a_1) = 1$ ) and earns "ego rents" of $\varepsilon$.

Similarly, the (expected) payoff to an honest government from experimenting and pursuing a policy $a_j$, in accordance with its private signal $\hat{z}_j$ is given by:

$$v_h(z_h, a_j \neq a_1) = \left[-\theta \mathrm{E}(z_h' - z_h)^2\right] + P(t_h \mid a_j \neq a_1)\varepsilon = \left[-\theta\sigma^2\right] + \left[\frac{z_h p_h}{z_h p_h + z_c(1 - p_h)}\right]\varepsilon.$$

A government faces uncertainty when it pursues an untried policy. Therefore, if the technology of policy making is poorly understood, this uncertainty results (in expected terms) in a loss of output, which gives rise to the term in the first square bracket.[13] The second term is the expected

[12] Without loss of generality, the analysis that follows only considers the policy choices of countries uniformly distributed on half the diameter of the circle i.e. those located in the range [0,1]. By symmetry, including the complementary set of countries located on the other half, will not alter our results.

[13] Since policies are chosen from a continuum, we assume that even if a particular policy is incorruptible, there exists a policy that is arbitrarily 'close' which a corrupt government may prefer to take, since it allows diversion of resources. Therefore a government of type *k* does not have to lose economic rents, $R_k$ when it chooses to experiment.

payoff from remaining in power. As is evident, the probability of remaining in power is a linear function of the probability of being perceived honest. This implies that, given uniformity of the underlying distributions, the probability of being re-elected is given by the expression in the second square bracket. Therefore, the net payoff to an honest government that prefers to imitate rather than pursue its private signal $\hat{z}_h = z_h$ is given by:

$Z(t_h; a_1, a_h) = v_h(z_h,\ a_j = a_1) - v_h(z_h, a_j \neq a_1)$, which simplifies to:

$$Z\left(t_h; a_1, a_{jh}\right) = \left[-\theta\left(z_h - a_1\right)^2 - R_h + \varepsilon\right] - \left[-\theta\sigma^2 + \frac{z_h p_h \varepsilon}{z_h p_h + z_c\left(1-p_h\right)}\right] = 0. \qquad (1)$$

Similarly, the net payoff to a corrupt government from mimicking rather than pursuing a policy in accordance with its private signal $\hat{z}_c = z_c$ is given by,

$$Z\left(t_c; a_1, a_{jc}\right) = \left[-\theta\left(z_c - a_1\right)^2 - R_c + \varepsilon\right] - \left[-\theta\sigma^2 + \frac{z_h p_h \varepsilon}{z_h p_h + z_c\left(1-p_h\right)}\right] = 0. \qquad (2)$$

The above expressions capture the payoffs to a follower government from pursuing alternative courses of action. We can now summarize our basic results on policy choice.

**Proposition I.** *There exists an equilibrium $z_h^* < z_c^*$, such that the policy choices made by a follower country j are a function of its location $z_j$, and whether its government is corrupt or honest, such that if the successful leader is located at $z_1 = 1$, the following is true:*

*(a) all countries run by honest governments with $z_j \in [z_h^*, 1]$ are disciplined into imitating policy $a_1$, while those with $z_j \in [0, z_h^*)$ experiment and pursue policy $a_j$ in accordance with their private signal,*

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However, since voters perfectly observe the policy choice of the government, the government will be vulnerable to overthrow and losing ego rents, even if the policy choice of the government is arbitrarily close, but not equal to $a_1$.

*(b) all countries run by a corrupt government with* $z_j \in [z_c^*, 1]$*, are disciplined into imitating* $a_1$*, while those with* $z_j \in [0, z_c^*)$*, experiment and pursue a policy* $a_j$ *in accordance with their private signal and earn rents* $R_c$*.*

**Proof:** See Appendix.

This proposition establishes the existence of an equilibrium where some countries mimic and others pursue their own course of action. The mechanism is a simple one. While governments are interested in enacting policies that enhance national income, they would also like to remain in power. All governments would prefer to signal through their policy choice that they are relatively honest, and hence increase their chances of remaining in power. This gives rise to the possibility of governments deliberately choosing to imitate a successful leader, even though such a policy might result in lower national income.

It is important to keep in mind that the precise mechanism that generates this incentive to imitate is not important. In reality, alternative mechanisms may be at work so long as not imitating results in a private cost of some kind (as in the previous section). For instance, suppose international capital markets expect that policies that constitute the Washington consensus are more likely to work for developing countries. If a government has information that suggests an alternative independent course of action might be superior, it is likely to be punished in the form of low capital inflows. In turn these lower capital flows, by lowering employment, may have a negative impact on the political survival of the government. Therefore, fear of lower capital flows (and its adverse political and economic consequences) may prevent governments from pursuing policies they know are likely to work best.[14]

[14] See Mukand (1999) for an elaboration of this argument.

We are particularly interested in evaluating the welfare impact of this disciplining of nations. To facilitate our analysis, we first characterize as a benchmark the socially optimal policy choice, equivalent to the policy choice made by an *honest* government in the *absence* of any global informational externality. If the citizens of a country cannot observe the policy choices (or the economic outcomes) in the rest of the world, then they are not in a position to make any assessment of the honesty or corruptibility of the incumbent merely by looking at its policy choice. Therefore, in the absence of an informational externality, a honest government, which has received the private signal $\hat{z}_h = z_h$, will prefer to imitate the successful leader, if $Z(t_h) \geq 0$, which is true iff $-\theta(1-z_h)^2 \geq -\theta\sigma^2$. Therefore, the socially efficient policy choice implies that a government prefers to imitate the successful leader so long as:

$z_j \geq z_j^{eff} = a_1 - \sqrt{\sigma^2 - R_h/\theta} = 1-\sigma$, since $R_h$ equals zero and $a_1 = 1$. As is evident, the set of honest governments that will imitate the policy choice of a successful leader is increasing in the uncertainty associated with the implementation of the new policy. In what follows, we label all countries, with underlying states of the world $z_j \geq z_j^{eff}$, as being "neighbors" of the leader country. The country-specific socio-cultural or geographical conditions of such a "neighbor" are relatively similar to that of the leader. In contrast countries that are in the region $z_j < z_j^{eff}$, are labeled as being located in the "periphery" of the leader country. Therefore, in the absence of the global informational externality an honest government behaves in a socially efficient manner while a corrupt government engages in too little imitation.

In the next proposition, we demonstrate that the global informational externality exerts a disciplinary influence on all governments and results in the following: $z_h$ decreases for honest

governments, which get inefficiently disciplined, while $z_c$ also decreases for corrupt government, which get efficiently disciplined.

**Proposition II.** *The relationship between national income and a follower country's location is given by the following:*

*(i) all governments (whether corrupt or honest) in the range* $z_{cj}^{*} \in [z_j^{eff}, 1)$, *that are "neighbors" of the successful leader, get efficiently disciplined into imitating the successful leader and have average incomes that are higher than the other countries;*

*(ii) the set of honest governments located in the "near-periphery" i.e. the range* $z_h \in [z_{hj}^{*}, z_j^{eff})$, *are inefficiently disciplined into imitating the leader and enact policies that lower national income, while the set of corrupt governments in this range experiment;*

*(iii) all governments in the "far-periphery" i.e.* $z_j \in [0, z_h^{*})$, *experiment with their choice of policies and have higher average incomes than those in the near-periphery.*

**Proof:** See Appendix.

We examine facets of the above proposition by studying the associated Figures 3 and 4, where we observe the following:

**Region A.** *Neighbors: Location is* $z_j \in [z_j^{eff}, 1]$. There exists a growth pole in the close proximity of the successful leader. Governments in the close proximity of the leader, whether corrupt or honest, mimic its policies. Here, we should expect that national income gradually comes down with distance, as the ideal policy of a mimicking country moves further away from the leader's policy choice $a_1$. Moreover, in this group of follower countries, the variance in

national income should also be low, since both honest and most corrupt governments get disciplined. So in the immediate proximity of the leader, average corruption is also low.

**Region B**. *Near-Periphery: Location is* $z_j \in [z_h^*, z_j^{eff})$. Countries that are located at some intermediate distance from the successful leader display (on average), lower incomes than those that are neighbors. This is because of two reasons. First, the countries in this region are located further from their ideal points than the neighboring countries, resulting in lower income. Second, countries located in this region can find themselves saddled with either an undisciplined corrupt government, or with honest governments that have been inefficiently disciplined into enacting inappropriate but transparent policies. For both of these reasons, average national income is lower. Moreover, the variance in corruption is (moderately) higher than that of the countries in the immediate proximity of the leader, since a larger proportion of all governments are likely to be corrupt.

**Region C.** *Far-Periphery: Location is* $z_j \in [0, z_h^*)$. Countries that are sufficiently far from the successful leader have (on average) higher incomes than those located in the near periphery. This is because we now have a large set of governments (both corrupt and honest) that prefer to experiment with policies, adapting rather than merely transplanting them. Therefore, while some countries are likely to do very badly, others are also likely to perform very well. Countries that perform poorly do so in part because some of them are saddled with undisciplined corrupt governments or because they get unlucky and obtain a poor draw as they experiment. However, given that (unlike in region B) the honest governments experiment, we are likely to have some countries that achieve phenomenal success and a high income, as well as some that witness colossal failure. Therefore, conditional on being honest, countries in the far-periphery have an (expected) income equal to the expected income of the marginal efficient

government $z^{eff}$ --as displayed in Figure 3. Countries located in this region will display higher variance in both their incomes and the degree of corruption than countries in the near-periphery. (Outcomes for corrupt governments are shown in Figure 4.)

The above proposition argued that the global informational externality resulted in a disciplinary effect being exercised on all follower governments. On the margin, the honest government was inefficiently disciplined, while the corrupt government was efficiently disciplined.[15] However, our analysis did not suggest what kinds of countries (and associated political structures) are most likely to be prone these inefficiencies in policy choices. We would conjecture that the effects of the global informational externality are likely to be sharpest in new democracies. In countries that are just emerging from authoritarian rule, politicians and parties do not have a track record and they have not had the opportunity to accumulate a reputation for honesty. Governments may then have a strong incentive to signal their honesty through their policy choice, even if it implies choosing policies that are not adequately targeted on domestic conditions.

## IV. An Empirical Test

The model discussed in the previous two sections has clear testable empirical implications. Assume we can identify a "leader" country (indexed by 1) and a metric that measures—in terms of their respective "states of the world"—the distance between the leader and individual follower countries (indexed by $i$). Let this metric be denoted by $\Delta_i \equiv |z_i - z_1|$. Then the predictions of the model are the following:

[15] Under what conditions may we expect that the overall impact of this discipline exerted on aggregate world income is negative? Our analysis suggests that two factors play a role – the size of the rents earned by corrupt governments and the probability that the incumbent may be corrupt. In particular, if the rents earned by a corrupt

(a) Followers with low Δ should adopt policies that are very similar to those in the leader, while followers with high Δ should "experiment."

(b) Policy transparency should be very high in followers with low Δ and low (on average) in followers with high Δ.

(c) Economic performance should exhibit a U-shaped pattern when plotted against $\Delta_i$. The worst performing followers should be those with intermediate values of Δ. Low-Δ countries should do well, while high-Δ countries should (on average) do better than intermediate-Δ countries.

(d) Measures of policy similarity, transparency, and economic performance should all exhibit larger variance for high-Δ countries than for low-Δ countries.

Of these implications, the one that we think is the most interesting and the hardest to square with other possible explanations is (c). So, while we will provide evidence on all four implications, our empirical analysis will focus on testing whether there exists a U-shaped relationship in economic performance as we move "away" from the leader.

We choose as our testing ground the former socialist countries. The experience of these countries provides several advantages from our current perspective. First, there is no ambiguity about the fact that these countries were on a search for new policies. Once they abandoned socialism, they had to replace it with something else. We can date the beginning of this search process cleanly and measure performance since that break. Second, for most of these countries, particularly those in the proximity of the European Union, there was an obvious leader. Western Europe provided a clear model to emulate. Third, there is also a plausible metric for $\Delta_i$ in this case, which consists of the *geographic* distance between a follower country and Western Europe.

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government $R_c$ are not too large, and $p_h$ not too low, the negative impact on aggregate world income of inefficiently disciplining honest governments is likely to outweigh the beneficial impact of disciplining corrupt governments.

It is not too difficult to believe that geographic distance is a good proxy for the differences in historical trajectories, initial conditions, and institutional preconditions that determine whether a given "imported" policies are appropriate or not. Uzbekistan's distance from Western Europe is much greater than the Czech Republic's—and Moldova's intermediate between those two—not only geographically, but also in the economic sense we have been using throughout.

Our sample consists therefore of all countries that have formally renounced socialism in the last two decades. The universe of such countries is shown in Table 2, along with the basic data we shall use in the empirical analysis. The table contains all countries that were or have been socialist, as listed in Kornai (1992, Table 1.1). A few of these have not formally renounced socialism,[16] and we shall therefore exclude them from the analysis to be on the conservative side. Of those that are excluded on this ground, perhaps the most important are China and Vietnam. These two countries have experienced extremely high growth rates since embarking on their highly unorthodox version of market-oriented reforms within a predominantly socialist legal setting.[17] Since they are also among the most distant countries from Western Europe, their inclusion in the analysis would, as will become clearer later on, strengthen our results. Note also that in addition to the countries of Eastern Europe and the former Soviet Union (EESU), the sample of former socialist countries includes a few from Africa (such as Ethiopia, Mozambique, and Congo) and a single Latin American country (Nicaragua). Since these are all countries that have been transitioning from socialism, we think it is appropriate to include them in the

[16] These are indicated by "n.a." in column B, "year socialism abandoned."

[17] For a good analysis of China's experimentalism and adoption of "transitional institutions" that differ greatly from those in the West, see Qian (2001). We may in fact consider China the leader country, which Vietnam has chosen to emulate.

analysis.[18] However, to be on the safe side once again, we shall also present results with the sample restricted to EESU countries.[19] The resulting sample covers 32 countries (25 when restricted to EESU).

Table 2 shows the average annual growth rate experienced by each country since the onset of its transition, and its distance from Brussels, which we take to be the "center" of Western Europe. Distance is measured as the direct-line distance ("as the crow flies") between a country's capital and Brussels in miles. (Sources for all the data are listed at the bottom of the table.) In Figure 5 we plot the simple relationship between growth and distance from Brussels. The top panel shows the whole sample while the bottom panel is restricted to the EESU countries. In each case, we fitted an $n^{th}$-order polynomial to the relationship, which is also shown on the plots. We selected $n$ to maximize the adjusted $R^2$ obtained from regressing growth on the polynomial of the distance. The best fit is provided with $n$=3 for the whole sample and $n$=2 for the EESU sample. The estimated coefficients on the polynomials turn out to be highly significant and the fits quite tight: the adjusted $R^2$ is 0.42 and 0.53, respectively, for the two samples.

Most importantly, the Figure reveals a strong U-shaped pattern in both cases. The countries that have done the worst are those that are generally intermediate in their distance from Brussels. Moldova and Ukraine are particular standouts, while the experiences of Russia, Georgia, and Azerbaijan also seem illustrative. Countries close to Western Europe (the central

[18] It may be questioned however to what extent Western Europe, as opposed to the U.S., was the relevant "leader" for Nicaragua. Our results are robust to substituting distance from the U.S. for distance from Europe in the Nicaraguan case.

[19] The EESU sample is restricted to those countries where the entry in column (I) is 1. There is a question whether Mongolia belongs in the EESU sample. In many ways, Mongolia's position is no different than the former Soviet republics in Central Asia. Its inclusion makes the results reported with the EESU sample stronger, so we exclude it to be on the conservative side once again.

European and Baltic states) have done much better, as is well known. Less well recognized is that the average performance of the farther-out Central Asian republics has also been better than that of the intermediate countries. And if we travel even further away to look at non-EESU countries, we find some (like Ethiopia and Mozambique) whose performance has matched Poland's or Slovenia's. While standard gravity-type explanations might account for the negatively-sloped part of this relationship, we are not aware of any other theories that would account for the positively-sloped part. Moreover, had we included China and Vietnam in our sample, the upwards-sloping part of the U-curve would have been even more evident, as these two have done better than any of the others in our sample. We shall probe these results further below, but their conformity with implication (c) is quite striking.

We note also that there is greater dispersion in growth rates in the sample of countries with above-median distance than in those with below-median distance. The standard deviation of growth rates in the first group is 4.5 percentage points versus 4.1 in the second. However, this difference is not statistically significant, and therefore there is at best weak support for prediction (d) of the model.

Since our sample is necessarily small and the performance-distance relationship is open to diverse interpretations, we next undertake a number of robustness tests. Our basic strategy is to check in both of our samples whether the U-shaped relationship survives the inclusion of other control variables typically found to be important in this kind of exercise.[20] We consider initial income, number of years a country has been under socialism, a dummy for Sub-Saharan African

[20] For analyses of the growth performance of post-transition countries, see Berg et al. (1999), de Melo et al. (1997), Fischer and Sahay (2000), Falcetti et al. (2000), and de Menil (2001). Some of these studies have used distance from Europe as an explanatory variable, but we are not aware of any that have looked for non-monotonic effects in distance. Our interpretation of this literature is that it has not been very successful in identifying the deeper determinants of the cross-country variation in performance. The usual explanations offered in this literature—such as the degree of macroeconomic instability, adoption of structural reforms, and corruption—beg the question of why transition economies have differed so much along these dimensions.

countries, and an index of structural reform constructed by the EBRD. As the results in Table 3 show, the U-shaped pattern is robust to all these additions. The estimated coefficients on distance and distance squared remain negative and positive, respectively, in all cases and they are always statistically significant (typically at 95% or better).[21]

We briefly discuss some of the more important results that emerge from Table 3. First, we find that initial income has little explanatory power in either the full or the EESU samples. This is true even when we control for the extent of structural reform (not shown). So there is no evidence of convergence, conditional or unconditional, among this group of countries. Second, there is a significant negative relationship in the full sample between the number of years a country has been socialist and its post-transition growth rate. This relationship exists in the EESU sample only when we do not control for distance (not shown). Third, the estimated coefficient on the Africa dummy is positive—this is perhaps the only growth regression in which location in Africa appears to have been advantageous to growth!—but it is not significant. The reason that controlling for Africa may be appropriate this context is that it may be argued the African socialist countries applied a "softer" version of the socialism that prevailed in EESU, and therefore experienced fewer problems in the transition. While this may be true, our results indicate that this does not alter the U-shaped pattern of economic performance. A more direct way of confronting this criticism is to restrict the sample to the EESU countries. As Table 3 shows, the results with the EESU sample are in fact stronger econometrically: the fit is better, and the estimated coefficients and t-statistics are generally larger.

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[21] Another robustness check consists of checking whether the result survives the inclusion of data on the unofficial economy. Estimates of the increase in the unofficial economy are patchy and do not cover our whole sample, so it is difficult to do this systematically. But the available evidence (Kaufmann and Kaliberda 1996) does not indicate that our results would be seriously affected. In any case, official GDP data have increasingly incorporated such estimates, so that our growth data for the entire post-transition period should not be subject to systematic biases.

The results with the EBRD index of structural reform are particularly noteworthy. We have computed this index as a simple average of the 1999 values of four indices constructed by the EBRD (as reported in Raiser et al. 2001). The four components are governance and enterprise restructuring, competition policy, banking reform and interest rate liberalization, and reform of securities markets and non-bank financial institutions.[22] The EBRD gives each a country a rating between 1 and 4 on these dimensions (with some pluses and minuses, which we converted to a numerical scale by adding or subtracting 0.25 points). The index is available only for the EESU countries. We shall discuss later on how this index relates to our concepts of policy imitation and experimentation. For now, we draw attention to the results in columns (8) and (9) of Table 3. When growth is regressed only on the reform index, we get a very strong positive relationship (col. 9). However, when distance is included, the reform index becomes insignificant, while the distance terms are still highly significant (col. 8). We find it a remarkable result that economic performance has been driven by distance (in the non-linear manner predicted by our theory) rather than by the implementation of the reforms viewed as important by the EBRD.[23]

There is little that we can do about the small size of our sample—other than point out, in our defense, that we cover essentially the universe of the relevant countries, i.e., countries that were once socialist and made a decisive break from it.[24] Adding other possibly relevant cases, most notably China and Vietnam, would strengthen our findings, as we argued above. So under

[22] A fifth component, overall legal effectiveness and extensiveness is not used, because it is not available for all EESU countries in 1999.

[23] A further indication of the presence of non-linearity in distance is this: when we regress growth on the EBRD index and just distance (dropping the distance-squared term), the index is significant, while distance is not.

[24] The only countries not included, as can be seen from Table 1, are Somalia and Bosnia and Herzegovina, in both cases due to the unavailability of data.

the circumstances we find our results quite supportive of the central implication of our framework (point (c) above). We now turn to the issues of policy choice and transparency.

With regard to policy choice, our theory's implications are as follows: close neighbors should imitate, distant countries should experiment, and in between there should be a mix. Ideally we would like to have a measure of how closely transition countries have tried to follow "best-practice" institutional arrangements in Western Europe. The EBRD index we have already used gives us a plausible measure: the EBRD ratings are presumably based on the degree of correspondence of each country's reforms with a uniform, idealized set of rules and regulations, closely approximated by the prevailing institutional setting in Europe. However, there are two important sources of slippage between this index and our desired measure $|a_i - a_1|$.

First, there is an obvious bias due to the fact that the individuals who do the ratings are not oblivious to the economic performance of the country being evaluated. So countries that are doing well even without copying will be rated higher than they would otherwise merit, while countries that are doing poorly despite significant imitation will be rated lower. This will impart a positive correlation to the relation between the index and performance, even where the true correlation is zero. Second, there is a more subtle bias. Countries that attempt to emulate European-style arrangements, but ultimately fail to <u>implement</u> them because they turn out to be inappropriate to local conditions (political or otherwise), will be rated low even though they are by our standard "imitators." The EBRD index captures implementation, not good-faith effort. This relates to an ongoing controversy in the literature on whether countries like Russia have done poorly because they have attempted to implement inappropriate policies (as in the so-called shock therapy program of 1992), or because they have not adequately implemented what otherwise would have been perfectly appropriate policies. From our standpoint, this distinction

is not that important. The fact that "off-the-shelf" reforms could not be implemented is prima facie evidence that they were inappropriate. For both reasons, we would expect the relationship between the EBRD index and distance to take a U-shaped form, even when the underlying relationship may be a step function.

With these caveats in mind, Figure 6 presents a scatter plot of the EBRD reform index against distance from Brussels. As expected, the index has a clear negative gradient in the vicinity of Western Europe, and the relationship eventually flattens out as we get farther away. We take this to be consistent with implication (a). Recall also from Table 3 that the reform index has no explanatory power over performance once a quadratic in distance is included in the regression. Countries that are very distant from Brussels have performed better than would have been expected on the basis of their lack of adoption of European-style reforms, while countries that are neither too far nor too close have performed badly even though their record of adoption of such reforms is no worse.

We can point to the respective experiences of Russia and the Central Asian republics to illustrate this point. Russia's attempted shock therapy in macroeconomic policy in early 1992 and its rapid implementation of mass privatization are perhaps good illustrations of inappropriate imitation. Shock therapy ended in failure because of domestic political opposition, while privatization is widely judged to have produced undesirable outcomes—massive appropriation by insiders of state assets—due to the absence of a supportive legal and institutional environment. Central Asian states, by contrast, felt much less constrained by conventional orthodoxies on reform. They may not have been self-conscious experimenters in the mold of China, but they were generally much more cautious in their adoption of mass privatization

procedures, more hesitant in their moves towards price and trade liberalization, and less rushed in making their currencies convertible.

Finally, we turn to the question of transparency and corruption. Our model predicts strong "disciplining" effects in the neighborhood of the leader country. Figures 7 and 8, which plot two indices taken from Kaufmann et al. (1999a and 1999b) against distance, show this to be the case. The two indices are measures of "voice and accountability" and "control of corruption." When we compare these to Figure 5, the main thing that stands out is that countries in the far periphery have had (on average) more corruption and less accountability than countries in the neighborhood of Europe despite comparable growth rates. Moreover, EESU countries with an intermediate distance have (on average) had higher accountability and lower corruption than those EESU countries further out. The figures reveal clearly that the "discipline" effect diminishes as a function of distance from Europe.

These indices of accountability and corruption are subject to the same subjective bias noted for the EBRD reform index. In particular, countries that are performing better are more likely to be rated high. So one needs to take the indices with a considerable grain of salt, and not read too much into it.

## V. Concluding Remarks

Countries do not select policies at random. Historically economic policymaking has been often subject to fads and fashions. Prior to the free-trade revolution of the 19$^{th}$ century, mercantilist policies were the norm in Europe. Once Britain went the way of free trade, most European countries eventually followed suit. Few countries avoided the retreat to protectionist policies in the interwar period. Import-substitution and planning were the rage for most

developing countries that became independent in the postwar period. Following the success of the East Asian tigers, outward orientation became the rallying cry of reformers everywhere. The Washington Consensus of the late 1980s and 1990s eventually got morphed into "second generation reforms."[25]

The principal innovation of this paper is a richer conception of policy making which allows for country-specificity of policies as well the possibility of learning from successful leaders. In our framework experimentation and imitation both have a useful role to play, but they also each have a downside. Experimentation allows countries to discover policies closer to their "ideal," but it necessarily involves taking risks. Imitation avoids those risks, but creates the possibility that imported policies will prove inappropriate. By endogenizing policy choice, we have shown that the informational externality generated by successful leaders benefit those countries that have a "close" degree of similarity to the leaders in their underlying circumstances, while it hurts countries that have an "intermediate" degree of similarity.

In our framework, the informational externality generates a sub-optimal level of experimentation. The reason is that the shadow of corrupt governments restricts the options available to honest governments. But by making the distinction between transparent and corrupt policies clearer to observe, it also reduces the scope for corruption. We end by emphasizing that countries may be able to escape this tradeoff in the longer run by establishing political systems with a better track record of accountability and honesty.

[25] For an entertaining account of recent fads and fashions, see Naim (1999).

**Appendix**

Proof of Proposition I. Observe that both the implicit functions $Z(t_h)$, $Z(t_c)$ are continuous. We are interested in finding out whether there exist cut-offs to the solutions to this pair of simultaneous equations. Consider first the equation $Z(t_c;.)=0$. Totally differentiating the above gives us $dz_h/dz_c = (-)Z_c/Z_h$, where $Z_j$ is the partial with respect to $z_j$. Observe that $Z_c(z_h, z_c) > 0$ and $Z_h(z_h, z_c) < 0$. This implies that since $dz_h/dz_c > 0$, we have a positive slope to the function $Z(t_c.;.)=0$. Similarly, take the other equation for the honest government, $Z(t_h; z_h, z_c) = 0$. Notice that $Z_c > 0$. However, $Z_h > 0$ if $2\theta(1-z_h) > [p_h(1-p_h)z_c\varepsilon]/[(z_h p_h + z_c(1-p_h)]^2$. Therefore, for $\theta$ large enough, this second function is monotonically decreasing and together with $Z_c > 0$ implies that $dz_h/dz_c < 0$. Therefore, the two equations are continuous and monotonic with opposite slopes. However, we also need to check whether they intersect over the relevant *[ 0, 1]* range of the ($z_h$, $z_c$) axis. To check this observe that $Z(t_h; z_h \to 1, z_c \to 0) > Z(t_c; z_h \to 0, z_c \to 0)$, so long as $R_c > 0$. Further, also notice that $Z(t_h; z_h \to 0, z_c \to 1) < Z(t_c; z_h \to 1, z_c \to 1)$. Therefore, given the continuity of the underlying functions and the fact that the two functions have opposite slopes, we have a cut-off in the relevant parameter space of the ($z_h$, $z_c$) axis, such that there exist cut-offs $(z_h^*, z_c^*)$ which solves both $Z(t_h,.)$ and $Z(t_c,.)$.

While we have demonstrated the existence of a cut-off, to complete the argument we need to further demonstrate that $z_h^* < z_c^*$. The argument is by contradiction and we begin by assuming that the opposite is true, i.e. $z_h^* > z_c^*$. First, consider the payoff of an honest government which is located at $z$, such that $z = z_h^* - \delta$, where $\delta \to 0$. Since $z < z_h^*$, such a government prefers to follow its own signal, which implies that $-\theta(1-z)^2 + \varepsilon < -\theta\sigma^2 + p(t_h \mid a_j \neq 1)\varepsilon$. In contrast consider the payoff of a corrupt government which is also located at $z$, where $z > z_c^*$. Since such a government prefers to imitate, the following inequality must be true: $-\theta(1-z)^2 + \varepsilon > -\theta\sigma^2 + R_c + p(t_c \mid a_j \neq 1)\varepsilon$. Since $p(t_c|.)=p(t_h|.)$, so long as $R_c > 0$, the two preceding inequalities cannot simultaneously both be true and hence we have a contradiction. Using a similar argument we can prove that $z_h^* \neq z_c^*$.

We now just need to check whether the citizen's political retention rule is optimal and he will attempt to overthrow a government that is perceived to lower his utility. The citizen of country *j* will retain the incumbent for the second stage if $u_{j2}(a_1 = a_j = 1) > u_{j2}(a_j \neq 1)$. This is straightforward, since once enacted, policies are fixed for the entire two stages, the only incentive to replace an incumbent is if the policy is conducive to corruption. Under the proposed equilibrium and under the difference in the expected second stage payoff from a government that experiments and the payoff from replacing the incumbent with a random government is *: [1-* $z_h p_h/(z_h p_h + z_c(1-p_h))$ *]*$R_c$ *-* $(1-p_h)R_c$, which is negative $\forall p_h < 1$, which implies that the voter will find it optimal to attempt to replace the incumbent who experiments.□

Proof of Proposition II. Consider the behavior of the marginal corrupt government in the absence of the global informational externality. Observe that such a government will prefer to imitate if $z_j > \hat{z}_{cj} = a_1 - \sqrt{\sigma^2 - R_c/\theta}$. However, it is socially efficient for the government to imitate only if $z_j > a_1 - \sigma = 1 - \sigma$. Therefore, in the *absence* of any `discipline' imposed by the global informational externality, we have the inefficiency of `too little' imitation i.e. $\hat{z}_{cj} > z_j^{eff}$, so long as $R_c > 0$. We are interested in assessing whether the governments that have been `disciplined' into enacting policy $a_1$, have done so at the cost of national welfare. In order to evaluate this consider once again equations (1) and (2). Now observe that for both these equations the following is true, i.e. : $[1-z_h p_h/(z_h p_h + z_c(1-p_h))]\varepsilon > 0$, i.e. the net electoral payoff from imitating rather than experimenting is positive. Since in each of the above equations, the equality with zero has to be maintained, it immediately follows that the net income payoff from imitating rather than pursuing its private signal is strictly lower, in the presence of political imperatives. This can only be true if both $z_h$ and $z_c$ decrease. The above argument suggests that national income (in expected terms) for the marginal honest government that imitates and chooses $a_1$ is lower than what it would have been for in the absence of the global information externality and implies that $z_h^* < \hat{z}_{jh} = z^{eff}$. Therefore, there exists a set of governments that have been `disciplined' into enacting policies that *lower* national welfare. Similarly, since $z_c$ comes down, this implies that inefficient corrupt governments are disciplined into enacting policies that *increase* national welfare, so long as $z^{eff} < \hat{z}_{jc}$ where $\hat{z}_{cj} = a_1 - \sqrt{\sigma^2 - R_c/\theta}$. However, this is only true so long as the parameters are such that the following inequality does *not* hold: *[1-*

$z_h p_h/(z_h p_h + z_c(1-p_h)\,)\,]\varepsilon > R_c > 0$. If the preceding inequalities are satisfied, then even corrupt governments get inefficiently disciplined and $z_c < z^{eff}$. Finally, observe that countries located with $z_j \in [0, z_h^*)$ experiment and achieve expected income $Ey(t_h)=-\theta(1-z^{eff})^2$, if incumbent is honest and $Ey(t_c)=-\theta(1-z^{eff})^2-R_c$ if corrupt. Therefore, if government type is not known, expected income equals $-p_h\theta(1-z^{eff})^2-(1-p_h)\theta(1-z^{eff})^2-R_c$. This can be seen to be strictly greater(compare Figures 3 and 4) than the expected income of countries located in the 'near-periphery' i.e. $z_j \in [z_h^*, z_j^{eff})$, since $Ey(t_h)=-\theta(1-z^{eff})^2 < Ey(t_h)=-\theta(1-z_j)^2$ since $z_j<z^{eff}$., while $Ey(t_c)$ is identical. □

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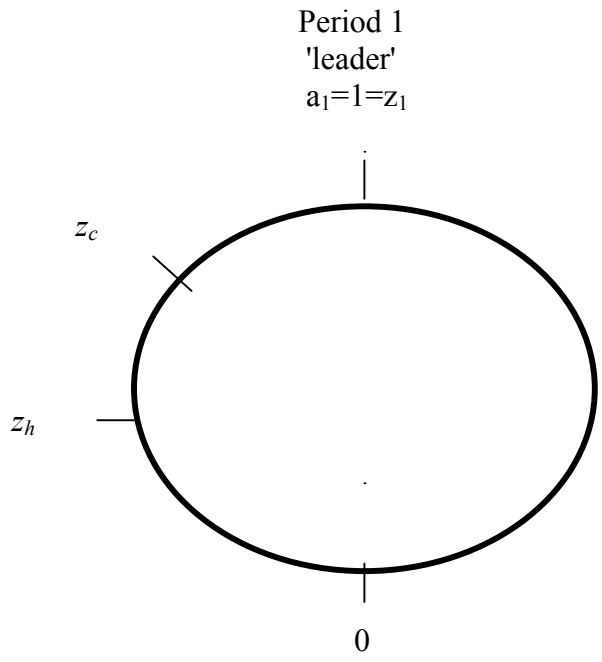



Figure I

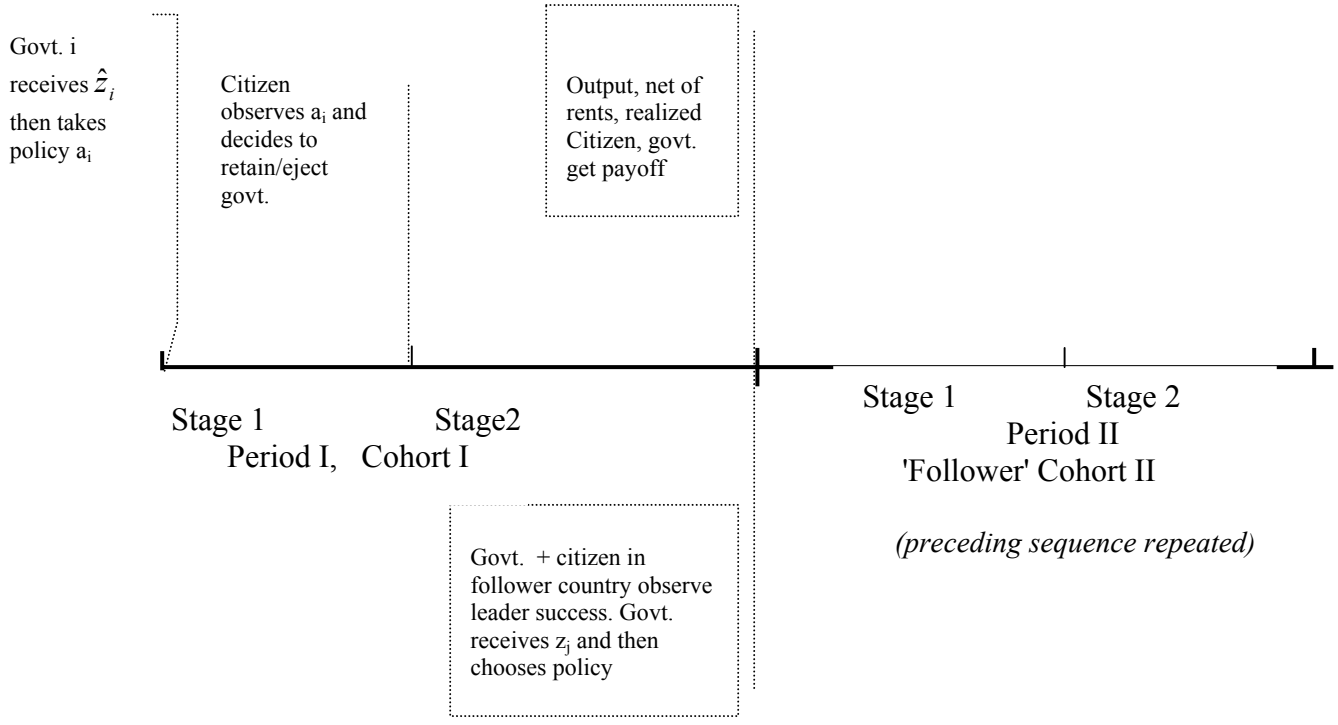
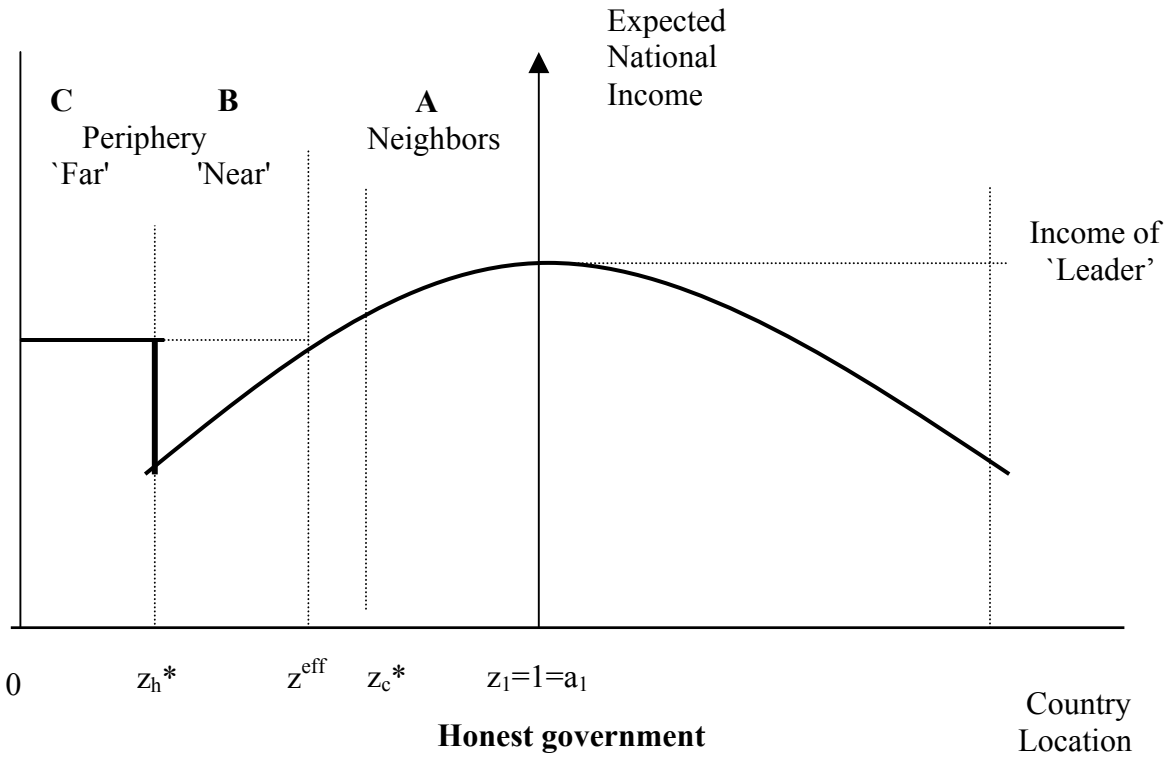
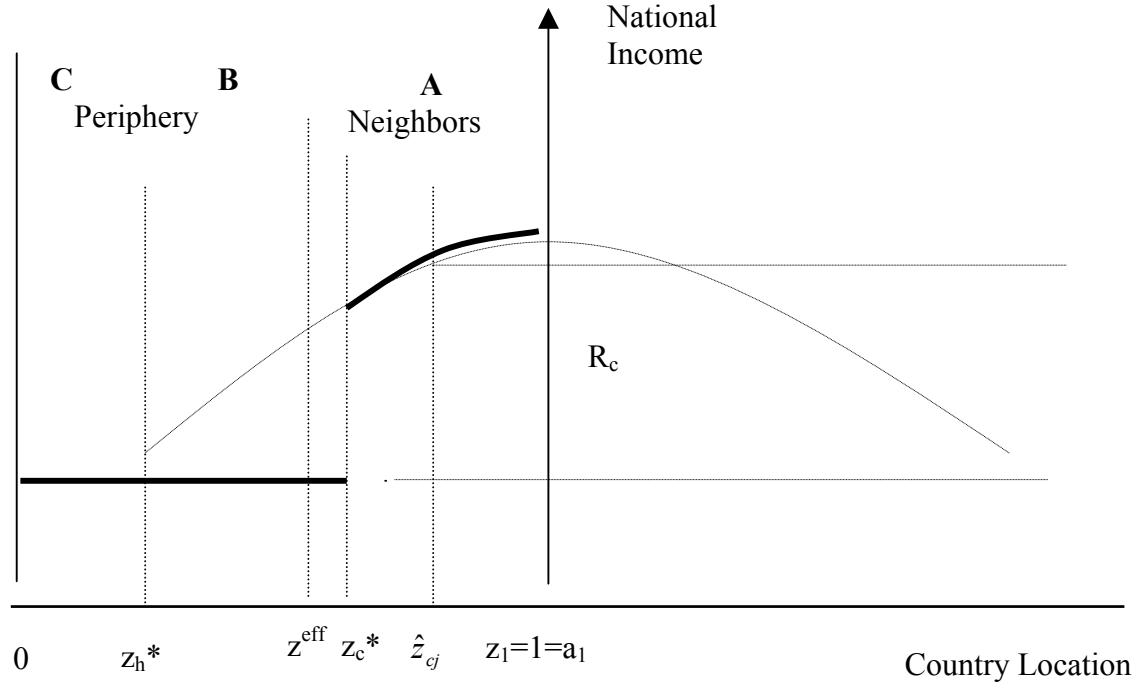



Figure 2: The Timeline




**Honest government**

Figure 3




**Corrupt government**

Figure 4

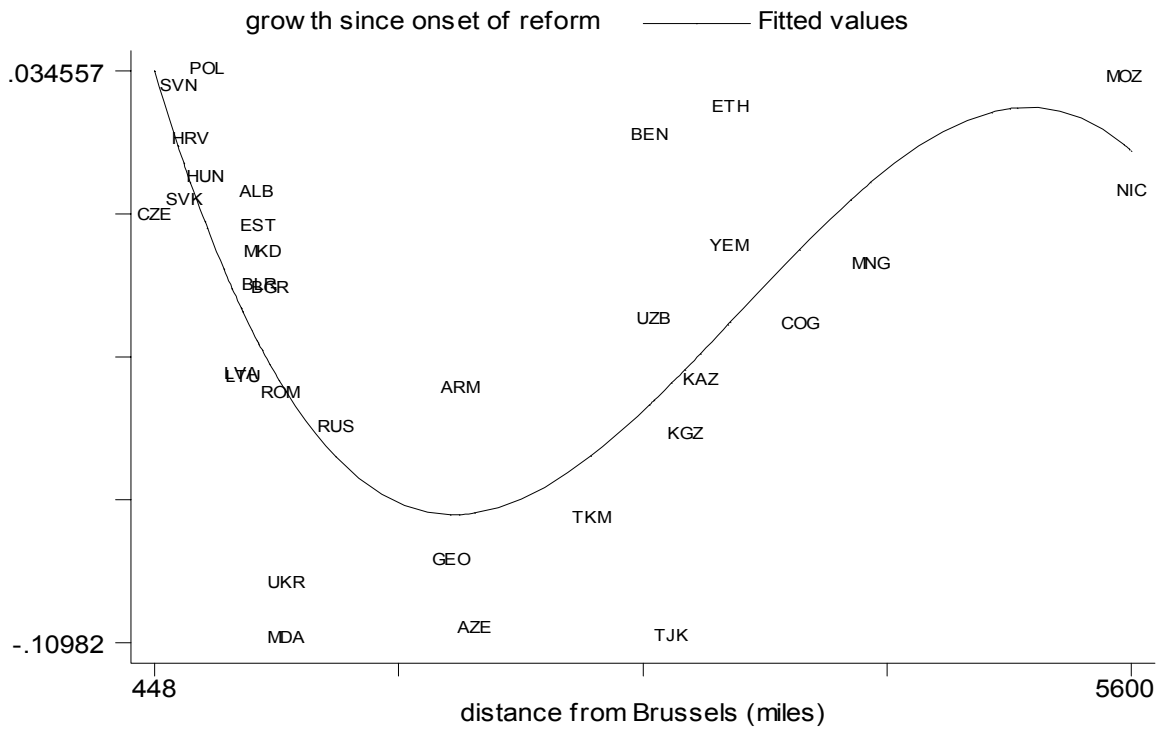



Figure 5.A: Relationship between growth and distance from Europe (whole sample)

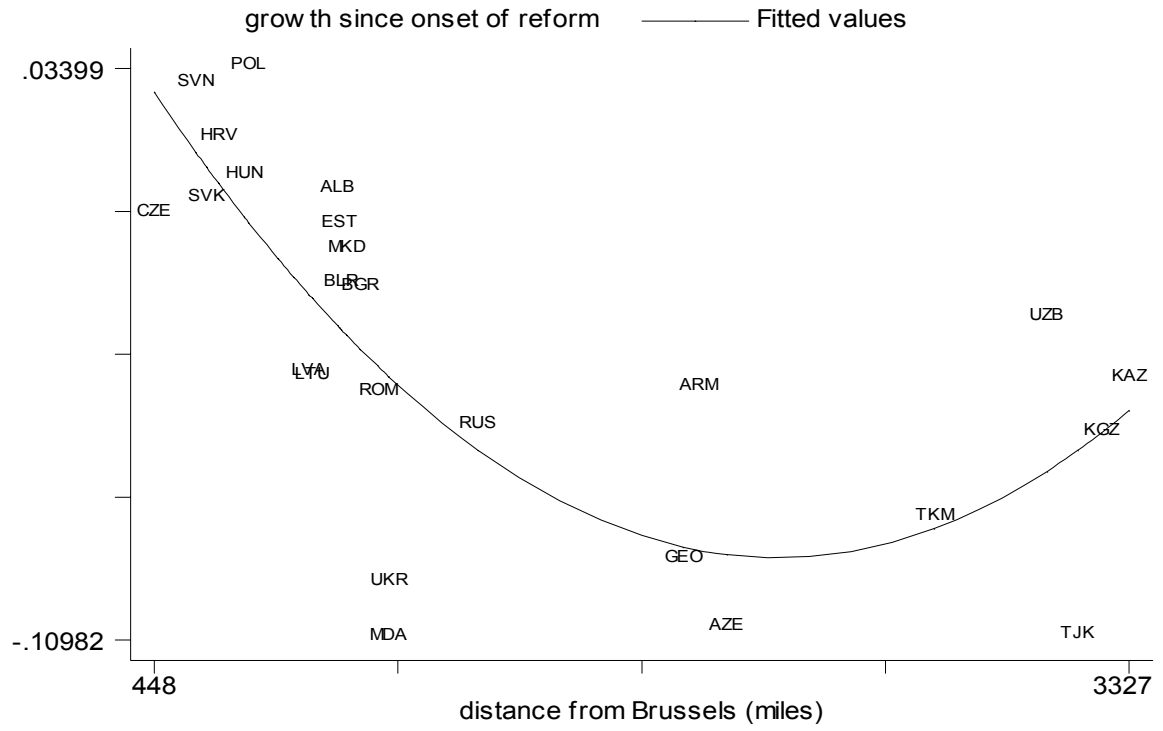



Figure 5.B: Relationship between growth and distance from Europe (EESU only)

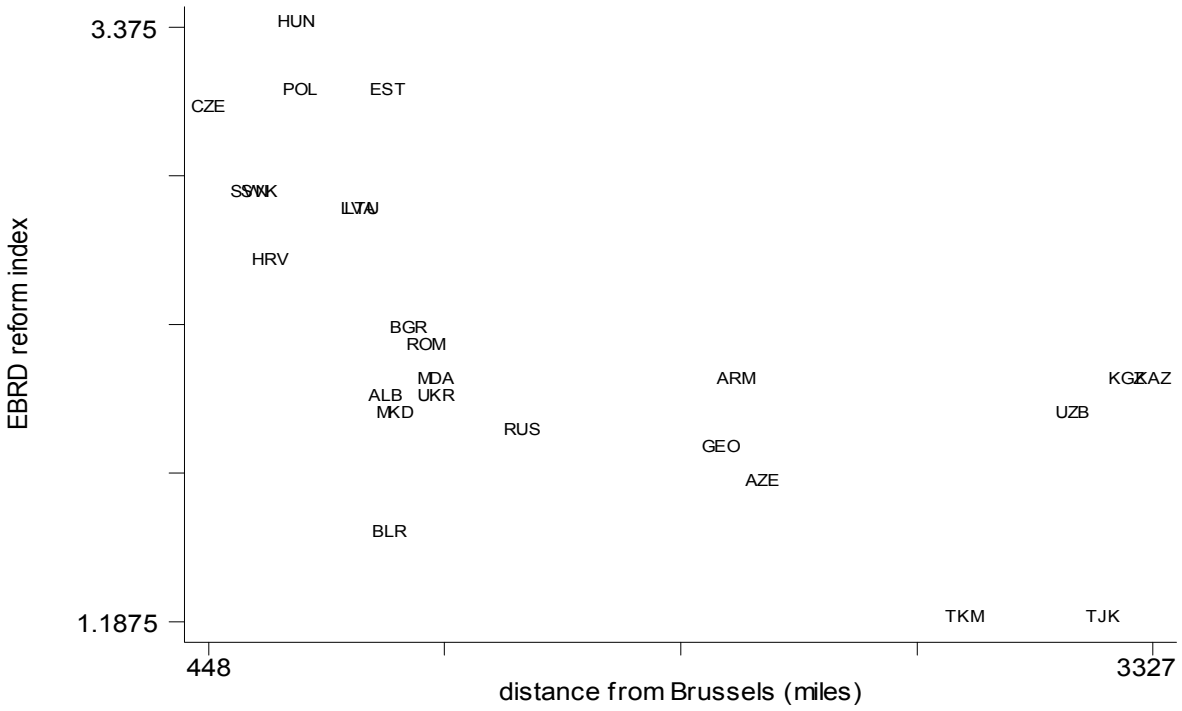



Figure 6: Relationship between "reform" and distance

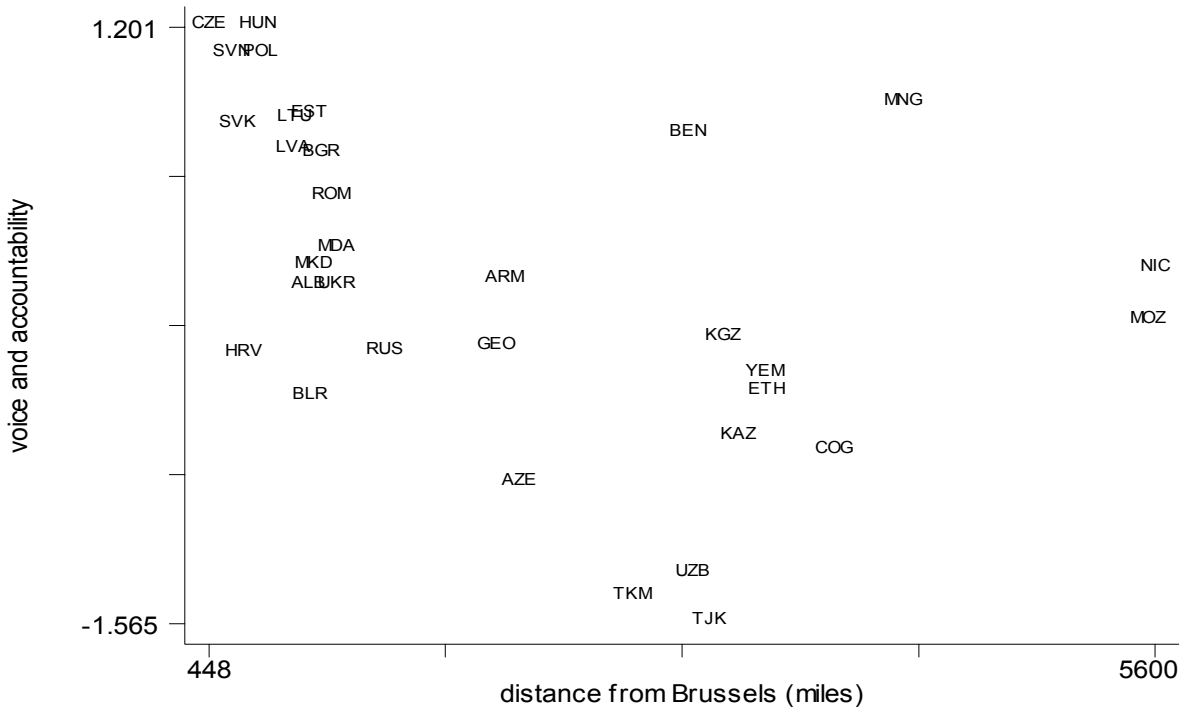



Figure 7: Relationship between voice and accountability and distance

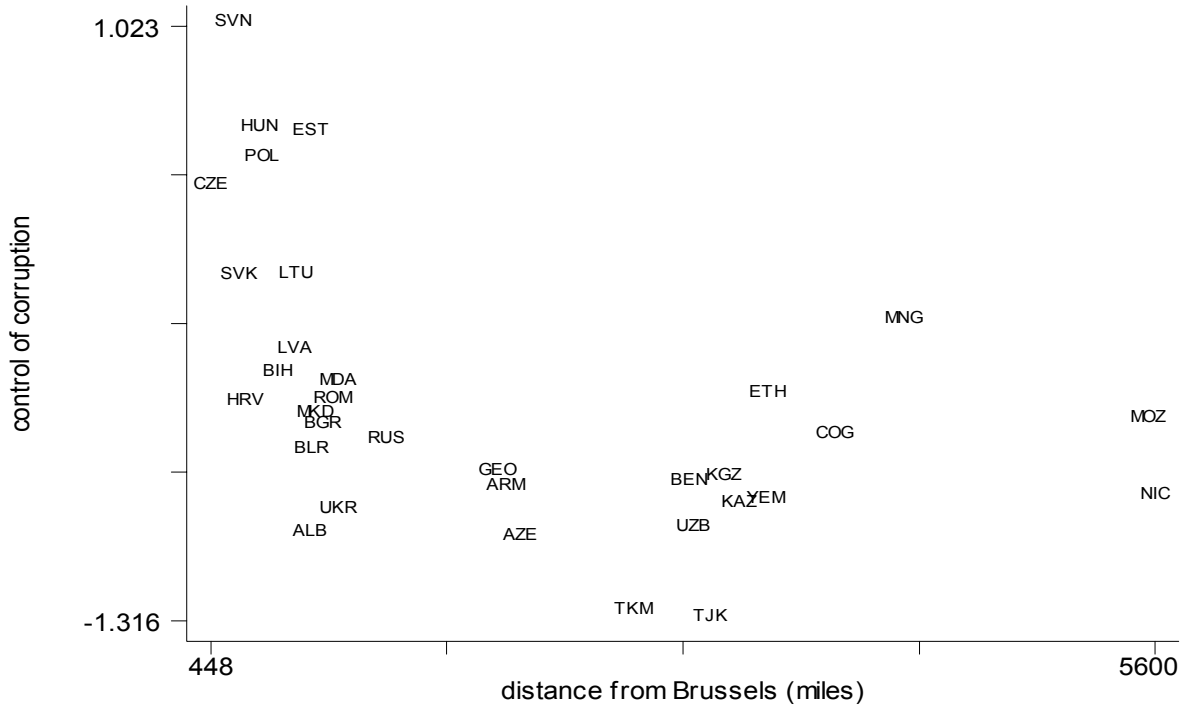



Figure 8: Relationship between control of corruption and distance

Table 1

**Summary indicators for per-capita GDP growth, by decade**

| | 1960s | 1970s | 1980s | 1990s |
|---|---|---|---|---|
| | All available countries | | | |
| mean (unweighted) | 2.96% | 2.16% | 0.73% | 0.38% |
| standard deviation | 2.45% | 2.58% | 2.46% | 3.13% |
| coefficient of variation | 0.83 | 1.20 | 3.35 | 8.33 |
| no. of countries | 90 | 100 | 109 | 130 |
| | Constant sample of countries | | | |
| mean (unweighted) | 2.82% | 2.30% | 0.81% | 1.20% |
| mean (population-weighted) | 2.10% | 2.45% | 3.45% | 3.84% |
| standard deviation | 2.08% | 2.43% | 2.47% | 2.26% |
| coefficient of variation | 0.74 | 1.06 | 3.05 | 1.88 |
| no. of countries | 87 | 87 | 87 | 87 |

Source: Calculated from World Development Indicators CD-ROM, World Bank.

**Table 1: Basic Data on Socialist Countries**

| Code | Country | (A) year became socialist | (B) year socialism abandoned | (C) number of years under socialism | (D) per-capita GDP, 1990 | (E) growth rate since socialism abandoned | (F) distance from Brussels (miles) | (G) control of corruption | (H) EBRD reform index | (I) Eastern Europe or former USSR |
|---|---|---|---|---|---|---|---|---|---|---|
| ALB | Albania | 1944 | 1990 | 46 | 841 | 0.29% | 990 | -0.985 | 2.0 | 1 |
| ARM | Armenia | 1920 | 1991 | 71 | 1541 | -4.70% | 2054 | -0.803 | 2.1 | 1 |
| AZE | Azerbaijan | 1917 | 1991 | 74 | 1107 | -10.72% | 2138 | -0.998 | 1.7 | 1 |
| BLR | Belarus | 1917 | 1991 | 74 | 3045 | -2.08% | 1000 | -0.654 | 1.5 | 1 |
| BEN | Benin | 1972 | 1990 | 18 | 345 | 1.72% | 3058 | -0.781 | | 0 |
| BIH | Bosnia and Herzegovina | 1945 | 1992 | 47 | .. | .. | 814 | -0.353 | | 1 |
| BGR | Bulgaria | 1946 | 1990 | 44 | 1716 | -2.15% | 1057 | -0.557 | 2.3 | 1 |
| CHN | China | 1949 | n.a. | .. | 349 | .. | 4959 | -0.289 | | 0 |
| COG | Congo, Rep. of | 1963 | 1990 | 27 | 1106 | -3.06% | 3849 | -0.596 | | 0 |
| HRV | Croatia | 1945 | 1991 | 46 | 4575 | 1.61% | 638 | -0.464 | 2.5 | 1 |
| CUB | Cuba | 1959 | n.a. | .. | | .. | 4862 | 0.274 | | 0 |
| CZE | Czech Republic | 1945 | 1990 | 45 | 5270 | -0.31% | 448 | 0.384 | 3.1 | 1 |
| EST | Estonia | 1940 | 1991 | 51 | 4487 | -0.58% | 996 | 0.593 | 3.1 | 1 |
| ETH | Ethiopia | 1974 | 1991 | 17 | 100 | 2.43% | 3485 | -0.436 | | 0 |
| GEO | Georgia | 1921 | 1991 | 70 | .. | -9.02% | 2009 | -0.744 | 1.8 | 1 |
| HUN | Hungary | 1945 | 1990 | 45 | 4857 | 0.65% | 714 | 0.614 | 3.4 | 1 |
| KAZ | Kazakhstan | 1917 | 1991 | 74 | 2083 | -4.46% | 3327 | -0.869 | 2.1 | 1 |
| KGZ | Kyrgyz Republic | 1917 | 1991 | 74 | 1492 | -5.82% | 3245 | -0.763 | 2.1 | 1 |
| LVA | Latvia | 1940 | 1991 | 51 | 3703 | -4.33% | 906 | -0.264 | 2.7 | 1 |
| LTU | Lithuania | 1940 | 1991 | 51 | 2986 | -4.40% | 915 | 0.034 | 2.7 | 1 |
| MKD | Macedonia, FYR | 1945 | 1991 | 46 | 1537 | -1.23% | 1016 | -0.517 | 1.9 | 1 |
| MDA | Moldova | 1945 | 1991 | 46 | 1769 | -10.98% | 1140 | -0.387 | 2.1 | 1 |
| MNG | Mongolia | 1924 | 1990 | 66 | 524 | -1.53% | 4225 | -0.145 | | 0 |
| MOZ | Mozambique | 1975 | 1989 | 14 | 144 | 3.19% | 5561 | -0.535 | | 0 |
| NIC | Nicaragua | 1979 | 1990 | 11 | 460 | 0.29% | 5600 | -0.836 | | 0 |
| POL | Poland | 1945 | 1990 | 45 | 2604 | 3.40% | 727 | 0.492 | 3.1 | 1 |
| ROM | Romania | 1945 | 1996 | 51 | 1531 | -4.80% | 1107 | -0.457 | 2.2 | 1 |
| RUS | Russian Federation | 1917 | 1991 | 74 | 3668 | -5.65% | 1404 | -0.616 | 1.9 | 1 |
| SVK | Slovak Republic | 1945 | 1990 | 45 | 4048 | 0.07% | 603 | 0.030 | 2.8 | 1 |
| SVN | Slovenia | 1945 | 1991 | 46 | 9659 | 2.96% | 572 | 1.023 | 2.8 | 1 |
| SOM | Somalia | 1969 | 1991 | .. | .. | .. | 4121 | -1.051 | | 0 |
| TJK | Tajikistan | 1917 | 1991 | 74 | .. | -10.93% | 3176 | -1.316 | 1.2 | 1 |
| TKM | Turkmenistan | 1917 | 1991 | 74 | 1970 | -7.96% | 2750 | -1.289 | 1.2 | 1 |
| UKR | Ukraine | 1920 | 1991 | 71 | 1979 | -9.59% | 1141 | -0.892 | 2.0 | 1 |
| UZB | Uzbekistan | 1917 | 1991 | 74 | 984 | -2.92% | 3084 | -0.963 | 1.9 | 1 |
| VNM | Vietnam | 1954 | n.a. | .. | 206 | | 5588 | -0.332 | | 0 |
| YEM | Yemen | 1969 | 1990 | 21 | 315 | -1.07% | 3472 | -0.854 | | 0 |
| YUG | Yugoslavia | 1945 | n.a. | .. | .. | .. | 859 | -0.995 | | 1 |
| ZWE | Zimbabwe | 1980 | n.a. | .. | 686 | .. | 4998 | -0.319 | | 0 |

Sources: The selection of countries and col. (A) are based on Kornai (1992, Table 1.1). Col. (B) is based on information from the CIA World Fact Book online. (http://www.cia.gov/cia/publications/factbook/). Col. (D) and (E) come from the World Bank, World Development Indicators 2001, except for Georgia and Tajikistan for which data come from EBRD, Annual Report 2000. Growth rate is calculated as [ln(y99) - ln(yinit)]/n, where y99 and yinit are per-capita GDP in 1999 and the initial year of the transition, respectively, and n is the number of years since the transition. Col. (F) is calculated from latitude and longitude data in the World Bank's Global Development Network database and the CIA World Fact Book online. It is stated in units of latitude-equivalents (see text). Col. (G) is from Kaufmann, Kraay and Zoido-Lobaton (1999a and 1999b) (http://www.worldbank.org/wbi/governance/datasets.htm#dataset). Column (H) is calculated from Raiser et al. (2001) (see text).

Table 3

**Economic performance and distance from Europe, robustness tests**

| sample | dependent variable: average annual per-capita GDP growth rate since transition | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | | | | EESU | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| distance ($x10^{-4}$) | -0.56* | -0.58* | -0.29** | -0.36* | -1.58* | -1.72* | -1.42** | -1.20** | |
| | (-3.34) | (-4.66) | (-2.32) | (-2.97) | (-4.71) | (-3.59) | (-2.66) | (-2.85) | |
| distance squared ($x10^{-8}$) | 1.06* | 0.97* | 0.47*** | 0.58** | 3.46* | 3.91* | 3.16** | 2.67** | |
| | (3.73) | (4.29) | (1.95) | (2.66) | (3.89) | (3.38) | (2.69) | (2.66) | |
| log initial income | | -0.014 | | | | -0.004 | | | |
| | | (-1.56) | | | | (-0.26) | | | |
| years socialist ($x10^{-3}$) | | | -1.22* | -1.00** | | | -0.49 | | |
| | | | (-3.88) | (-2.67) | | | (-0.47) | | |
| sub-Saharan Africa ($x10^{-2}$) | | | | 1.93 | | | | | |
| | | | | (1.07) | | | | | |
| EBRD structural reform index (1-4 scale) ($x10^{-2}$) | | | | | | | | 2.05 | 5.06* |
| | | | | | | | | (1.40) | (5.55) |
| n | 32 | 30 | 32 | 32 | 25 | 23 | 25 | 25 | 25 |
| R-squared | 0.28 | 0.30 | 0.50 | 0.51 | 0.57 | 0.55 | 0.58 | 0.60 | 0.47 |

Note: Numbers in parentheses are robust t-statistics. Constant tems are not reported.
Levels of statistical significance are denoted by asterisks:
* 99% confidence
** 95% confidence
*** 90% confidence