Abstract. We develop and implement a method for measuring the frequency of changes in power among distinct leaders and ideologically distinct parties that is comparable across political systems. We find that more frequent alternation in power is associated with the emergence of better governance in post-communist countries. The results are consistent with the hypothesis that with more frequent political change, returns to firms seeking to buy political influence are less, and they thus tend to engage in the activity less regularly.

Key words: Governance, communist transition, political alternation, turnover, corruption
JEL Classification: P3; P37
Number of words: about 9,600 (with appendices)

We are indebted for helpful comments and discussions to John Bonin, Olivier Cadot, Bruce Kogut, Priyanka Pandey, Juan Zalduendo, and participants in seminars and conferences at Brighton Business School, the Carnegie Endowment for International Peace, CERGE (Prague), Columbia University, London Business School, the UN Economic Commission for Europe, University of Oxford, and the World Bank. We thank the MacArthur Research Network on Inequality and Economic Performance and World Bank for financial support. The findings and interpretations expressed in this paper are those of the authors and do not necessarily represent the views of the World Bank.

I. INTRODUCTION

It is often held in political science and democracy studies that several alternations in the seat of power between genuinely different political groups are needed before democracy is institutionalized
(Przeworski, 1988; Huntington, 1991). In this paper we examine whether, after initial
democratization, political alternation also fosters the establishment of the rule of law. Whereas
much recent empirical work on the quality of governance emphasizes the effects of geography and
history and thus does not identify a path towards improving governance,\(^1\) in this paper we examine
the effect of current political processes on the emergence of the rule of law.

In order to investigate this question empirically, we develop, for the first time, a
methodology for measuring the frequency of changes in power among distinct leaders and among
ideologically distinct groups (parties) that is comparable across political systems. We do this by
identifying the locus of power for a range of political regimes, defining what constitutes a change in
the person or parties that hold power, and finally defining when there is also ideological change in
persons or parties that hold power. We use the methodology to investigate the effect of political
alternation on the quality of governance across 27 post-communist countries.

The post-communist countries are an interesting setting in which to explore the role of
political alternation. In going from a command economy to a market economy, an entirely new set
of rules is required. Does political alternation hurt or help in establishing those rules? Intuition
provides little guidance. Frequent political alternation would be an impediment to reform if
alternation increased the discount rate of politicians or if electoral competition created greater
motivation or opportunities for corruption. Many countries in Latin America and elsewhere
(including Nicaragua, Ecuador, Guatemala, Panama, Honduras, and Bolivia) have been
characterized by “alternation of power between genuinely different political groupings …[which]
seem only to trade the country’s problems back and forth from one hapless side to the other”
(Carothers, 2002, p. 11). It is not uncommon to hear that frequent changes in political leadership

\(^1\) Dixit (2005) in his survey of the literature on institutions and growth, wryly concludes: “Interpreted literally
as recipes or policy recommendations [for improving governance, the literature would] require a less-
developed country to use plate tectonics to move itself to a more favorable location, or to turn the clock back
and invite British colonizers, of course cleaning up the local disease environment and getting rid of mineral
resources and resources suitable for plantation agriculture beforehand. As a practical matter, these findings
are merely telling countries to accept their fate” (pp. 4-5).
are a binding constraint to sustaining reform momentum, and to hear China mentioned as a model of political stability and credible government commitment—commitment that facilitated reforms in institutions of economic governance (see Lau, Qian and Roland, 2000 and Kolodko, 2003).

On the other hand, Anders Aslund (2002, p. 120) writes that,

The long tenure of the infirm president Yeltsin…provided Russia with a ‘stability’ that favored the corrupt elite. Poland, the three Baltic countries, and Bulgaria have changed governments on average every year for the last decade, and they are among the most successful reformers (p. 121).

Consistent with this view, Grzymala-Busse (2003) identifies sharp contrasts in the quality of governance and in the institutions that developed between two groups of post-communist states: Poland and Hungary, which had frequent political alternation, and the Czech Republic and Slovakia, where the tenure of governing parties was much longer (see Table 1, p. 1134). Poland and Hungary established a civil service and judicial and enforcement bodies that were insulated from interference by the governing political party; they regulated political party funding and required that it be public. Russia, the Czech Republic, and Slovakia undertook none of these reforms, and in those states, ownership rights were more closely linked to political patronage. In particular, patronage in Russia made it common for laws to provide special treatment to a single, named firm (Slinko, Yakovlev, and Zhuravskaya (2004); and corruption has had a profound and pervasive effect in undermining reform efforts. If a regulatory institution is created, it may not be funded; if a bankruptcy law is enacted to shore up property rights, it may become a tool by which the courts can wrest property away from owners (see, e.g. Black, Kraakman, and Tarassova, 2002; Black and Tarassova, 2003, Braguinsky 2009)).

In this paper, we present a simple model of firm behavior that highlights the link between expected political alternation and the emergence of the rule of law. Our key theoretical assumption is that firms seek durable protection or favors from the state. Influential firms can obtain durable protection (as private goods) from the governing party or leader when political alternation is low and, by doing so, undermine the credibility of the state as an impartial protector of rights (the rule
of law). However, when expected political alternation is high, clientelistic relationships provide little security. The model predicts that when firms believe that political alternation is more likely, they will invest less in influence.2

We test this prediction for the 27 post-communist states in Eastern Europe and the former Soviet Union by constructing a measure of the frequency of change in power among distinct leaders and among ideologically distinct groups (parties) that is comparable across political systems. We use lagged cumulative political alternation as a measure of expected future political alternation.3

To measure the quality of governance in the post-communist countries, we use the indicator for the rule of law constructed by the World Bank (Kaufmann, Kraay and Mastruzzi 2007; hereafter, KKM). A higher score corresponds to better governance, and the world mean and median are normalized at zero and the standard deviation at one. Figure 1 shows that there is great diversity of governance outcomes for the post-communist countries relative to the diversity of outcomes in the world. Post-communist countries with the highest rule of law scores in 2006 (Estonia and Slovenia) are in the 75th percentile of all countries in the world, whereas those with the lowest scores (Kyrgyzstan and Turkmenistan) are in the bottom 10th percentile.

This paper is an exercise in positive political economy,4 which is playing an increasing role in the study of economic development. We test a simple positive model of investment in patronage relationships to ask a normative question about policy (should policy try to expand or contract the likelihood of political alternation), which we treat as something that exogenous factors can influence.5 In emphasizing in our model demand side rather than supply side factors in the rule of

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2 Dixit, Grossman and Gull (2002) study a different channel through which political alternation can improve the quality of governance. In their model, two parties expect to alternate in power indefinitely, and that prospect makes it in the self-interest of each party to share wealth broadly rather than privileging its own constituents.

3 In principle, how alternations are spaced in time should also be taken into account, but in our sample, we did not have examples of quick successions in power followed by a long reign of a single person or party (or the reverse), so that relatively little information is lost by considering only the cumulative number of alternations.

4 A useful definition is in Rodrik (1999).

5 Earlier work examines other policies that influence the demand for a rule of law, including privatization, macroeconomic policy, and controls on international capital flows. See Black, Traakman, and Tarassova
law, we are guided by a widely held view among scholars. As the political philosopher Stephen Holmes (2002, p. 87) writes, “Putin may sincerely want to introduce the rule of law. He may repeatedly announce that he is going to create it...These subjective intentions are irrelevant, however. The rule of law is going to emerge only if there are strong constituencies supporting it” (see also Symposium 1999). Power-sharing compromises in the period immediately following political liberalization affect policies—including electoral rules, public funding of political parties, media access, and requirements of supermajorities in parliament—which in turn influence political alternation (Przeworski, 1988; Grzymala-Busse 2003, pp. 1135-36). As long as one believes that exogenous factors can influence the choice of such policies, our empirical results provide suggestive evidence that one way to improve governance after an initial period of democratization is to adopt measures that increase the uncertainty of election outcomes and the likelihood that alternation occurs.

In Section II, we present a simple model. In Section III, we describe our measures of political alternation. In Section IV, we discuss the estimation strategy and economic identification. Section V contains the empirical results, and Section VI concludes the paper.

II. THE MODEL

We begin with a discussion of the logic of our model. Particularly at the early stages of an opening to democracy, the political process is easily corrupted. When civil society, the media, and representative institutions are weak and the legal boundaries on corruption are neither well-defined nor enforced, special interests have few constraints on their ability to buy politicians. In the immediate aftermath of the collapse of communism, the weakness of legal institutions to define and protect property rights creates insecurity that pushes firms to look for alternatives. Firms in a highly uncertain and fluid environment may shift some of their resources in money and time into “investing in influence” to obtain state protection à la carte. By investing in influence, we mean an
activity that is broader than bribery or corruption and in which the corrupter may try to influence the state itself, rather than one of its agents, to induce partiality in state rulings and enforcement. The activity includes deals that cannot be strictly ruled illegal, in which a political official uses the power of his office to obtain private gain for himself and his clients.6

The most direct way to break the vicious circle of weak institutions and strong particular interests is through alternations in power. When alternation occurs, the set of political players in power changes. While these players may, in their turn, be beholden to some interest groups, it is unlikely that these would be the same interest groups that supported the previous government. Thus the rate of return to buying influence for the previous group drops sharply. But this is not merely a replacement of one group of influence-buyers by another. A more fundamental change occurs. The newly powerful influence-buying groups realize that the same fate may await them too.

The expected return on influence-buying falls if power changes hands and individuals revise downward their expectations that any given party will long retain its hold on power—that is, if democracy and political alternation become routinized. Political alternation plays a “signaling” function. If the alternation occurs as a result of an election, then alternation conveys information that the rules of the game have changed compared to the old system and that hold on power is time-bound and obeys precise formal rules. “Sweet deals” may be rapidly undone—not by the caprice of the rulers but by the popular vote. In a stable authoritarian system, an investor in influence also has to worry about not offending the ruler and making sure that the ruler lives up to his (possibly implicit) bargain. But in a stable democracy, the bargain is not enforceable even if there is good

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6A few examples are illustrative: (1) In Slovakia, contributions from private or state-owned firms to political parties were entirely unregulated under the Mečiar government (Grzymala-Busse 2003, p. 1139). (2) In the Czech Republic and Slovakia, political parties could obtain government loans, which were then frequently paid off by business interests (Grzymala-Busse (2003, pp. 1137-8). (3) In Russia, the most egregious case of partiality by the Russian state was the loans-for-shares program in 1996. On a much smaller scale, Slinko, Yakovlev, and Zhuravaskaya (2004) document the common occurrence of legislation providing benefits to only a single named firm. See also Varese (2001, chapters 1-2).
will on both sides, for it could happen that the rulers are thrown out of office. With political alternation, one set of beliefs and institutions would thus be created; without it, an “old” set of beliefs and institutions is much more likely to be held and validated. Until political alternation is routinized, actors may even doubt whether the incumbent party or leader will accept defeat in a popular vote and play according to the formal rules of the post-communist regime.7

If the idea of alternation becomes accepted, firms seeking stable treatment from the state will face the following choice: either to try to influence the entire political spectrum of parties, or to forsake clientelistic relationships with political parties. Some, of course, may pursue the first strategy. Yet this may be a very costly option: it means paying for preferential treatment more than once. Further, unless the differences among the political parties are slight, ideological divides may make some clientelistic relationships infeasible (e.g., an avowedly free trade party will be more difficult to bribe for protectionist legislation; a nationalist party is less likely to accept bribes from a minority ethnic group that seeks preferential access to state contracts). Thus, we would expect that more frequent alternations in power among political groups would weaken the market for influence and increase the demand for the rule of law. By weakening the corrosive power of bribery on fledgling institutions, more frequent alternations in power should help the slow, legal process whereby a rule-of-law state is created, with generalized provision of clear property rights and state protection.

To capture this intuition, it suffices to use a two-period model that incorporates two general features of investing in influence. First, the payoff is obtained in a lengthy (more than one-period) process. Our focus is on “grand corruption,” situations in which firms purchase rules of the game that privilege their own interests: protection from competitors, domestic or foreign; favorable

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7 Uncertainty regarding the stability of democracy characterized, for example, the transitions in Spain (recall Tejero’s attempted coup), Portugal, and Greece. An overview of all countries that experienced a movement away from authoritarianism in the past thirty years concludes, “By far the majority…have not achieved relatively well-functioning democracy or do not seem to be deepening or advancing whatever democratic progress they have made” (Carothers, 2002, p. 9).
judicial decisions; favorable tax policy; the right to make privatization bids; to obtain “sweet deal”
public work contracts and so on. Such privileged protection or access normally entails government
actions that occur over time (protection is not limited in time; public works generally go on for
several years); they are not one-off deals. In our model, investors in influence seek to obtain a
durable good from influential politicians.8

The second feature is that corruption contracts are enforced only as long as the political
patron remains in power. If there is a change in the seat of power, the investor will lose his
privileges and incur an additional loss, which might take the form of a loss on sunk investments or
a punishment imposed by a successor government. Russia’s experience illustrates the vulnerability
to political risk of business empires based on politically protected property rights. Braguinsky
(2009, Figure 1) finds that among the 300 oligarchs judged by experts to be most influential in
Russia in 1995, the peak period of separation of owners from the assets that they controlled
occurred in the three-year period (1998-2001) that included the transfer of power from Yeltsin to
Putin; 43 percent of the oligarchs expropriated when Putin was in power faced punitive actions,
including criminal investigations, jail and forced emigration, in 2000-2005.

If there is no change in the seat of power, then we assume that the contract is fulfilled. We
do not model how the contract is enforced. It could be self-enforcing in a scenario of repeated
interactions,9 or it could be enforced by the threat of sanctions from a network of firms.10 The

8Thus, we assume that politicians also have a two-period time horizon. This assumption might not hold in
highly politically unstable countries: Bates (2004) writes that in Angola and Liberia, the time horizon of
politicians was so short that they did not generally sell property rights protection. But in the transition
countries, the sale of property rights as private goods is well documented; see, e.g., Hellman, Jones, and
Kaufmann (2003).
9An example is in Freeland (2000, ch. 12). She reports that in 1997, one of the individuals who had helped
ensure President Yeltsin’s reelection in exchange for the “loans-for-shares” arrangement believed that the
government had not given him a fair share of state assets. He threatened to block—and did block—actions
that Yeltsin wished to take by exposing corruption. The revelations were a factor in delegitimizing Yeltsin’s
administration. An additional class of enforcement devices, which is important in practice but cannot be
captured in a two-period model, are reputational concerns: parties who expect to stay in power or return to
power have an interest in being able to enter into clientelistic arrangements in the future.
10Haber et al. (2003) argue that, in Mexico, networks of manufacturing firms control labor unions, which play
the role of third-party enforcer of promises. If the party violates a promise with a member of the network, the
network can call a general strike and create political instability.
specific assumptions of the model are described below.

*Set-up of the model*

Consider an economy with a large number (a continuum of mass one) of firms that differ in their ability to invest in influence with the governing political party. $\theta$ denotes a firm's ability to invest in influence. $\theta$ is distributed according to the continuous, differentiable cumulative distribution function $H(\cdot)$, with $H(\cdot) > 0$ for $\theta > 0$. In the real world, many factors would give rise to differences across firms in the ability to earn “influence-rents”: political or personal closeness to the powerful officials, wealth, talent, the size of the enterprise (larger firms have more bargaining power and control more resources), and membership in a network of firms that can enforce bargains between the firm and the party.

Each firm has an opportunity to make one bargain (a “corruption contract”) with the political party in power. In the bargain, the governing party uses its de facto authority to create and distribute rents, e.g., by enforcing property rights selectively as a private good, by selectively denying to others their property rights (legalizing theft), and by creating entitlements for specific firms. The firm must decide whether or not to act on this opportunity by investing in influence. If the firm does not invest in influence, the firm receives a return that we normalize to zero. If, alternatively, the firm invests in influence, then the return on the investment is linked to the party’s fortunes. If the party remains in power in the second period, the firm receives a net return $R > 0$ in this period and the next. But if the party does not remain in power, the firm will receive the return $R$ only in the first period and in the second period will suffer a loss $\ell$. $R$ is the return that shares the rents from the “corruption contract” between the party in power and the firm according to the Nash or some other bargaining solution. $R$ depends on the firm’s type (firms with a higher value of $\theta$ earn a higher net return to investing in influence) and also on the institutional constraints on rent-seeking from the state, denoted $\rho$.

Thus, the expected payoff $v$ to investing in influence is
where $R_\theta > 0$, $R_\rho < 0$ and $\delta$ denotes the time discount factor. The first term on the right hand side is the first period’s return, which is riskless. The second term is the discounted second period expected return, which depends on the probability $\pi$ of a change at the end of the first period in the party that holds effective power in the government.\(^{11}\)

In Figure 2, we illustrate the firm’s payoff to investing in influence as a function of its type, $\theta$. For given values of $\pi$ and $\rho$, there is a critical value $\hat{\theta}$ such that a firm invests in influence if and only if $\theta \geq \hat{\theta}$. The value of $\theta$ at which expected payoffs are zero satisfies

$$v(\hat{\theta}, \pi, \rho) = 0.$$ 

The fraction $x$ of firms that invest in influence is thus

$$x = 1 - H(\hat{\theta}(\pi, \rho)).$$

It is straightforward to see the effect of a change in beliefs about the probability of political alternation. An increase in $\pi$ lowers the expected return to investing in influence, which increases the switch point, so fewer firms invest in influence. Figure 3 provides the basic insight—the switch point increases with an increase in $\pi$, as we show next:

$$\frac{\partial \hat{\theta}}{\partial \pi} = -\frac{v_x}{v_\theta} = \frac{\delta [R(\hat{\theta}, \rho) + \ell]}{[1 + \delta - \delta \pi] R_\theta(\hat{\theta}, \rho)} > 0.$$ 

The resulting reduction in the proportion of firms that invest in influence is

\(^{11}\) Preferential treatment obtained by some firms may impose a cost on other firms through unfair competition, theft, and poorer public-goods provision, as Slinko, Yakovlev, and Zhuravskaya (2004) show has occurred in Russia. As a result, the relative return to each firm to investing influence (relative to not doing so) may be an increasing function of the number of others who invest in influence. Our model abstracts from this possible effect, but taking it into account would strengthen our results because of a social multiplier effect.
\[
\frac{\partial x}{\partial \pi} = -H'(\hat{\theta}) \frac{\partial \hat{\theta}}{\partial \pi} < 0.
\]

Our model of investing in influence is a short-run model in which weak institutions shape the terrain in which firms adapt as a function of the expected probability of alternation in the seat of power. In the long run, firms’ choices whether or not to seek protection from the state as a private good will shape the institutions.

**III. DEFINING AND MEASURING ALTERNATION IN POWER**

Testing the theory calls for relating measures of expectations about the probability of political alternation, to indicators of the quality of governance. We do not observe expectations, but certain events that occur during political liberalization, particularly at the early stages, may have a large effect in shaping expectations and thus proxy for them. We assume that the greater the number of alternations in power since the onset of political liberalization, the greater the expectation of political alternation in the current period. We have constructed measures of political alternation for all 27 post–communist countries for which data are available. The measures represent hypothetical answers to the question, What kinds of political turnover are likely to render investment in influence unenforceable?

To define political alternation in a meaningful way, we need to decide three things: Where is the seat of power in the national government? What constitutes a change in the occupant of the seat of power? When can this change be said to constitute a change in ideology, e.g., a left-wing coalition replacing a right-wing coalition? This question is interesting because ideological change (whether from right to left or the reverse) may create a cleaner break in the prevailing corruption contracts between firms and the state if it is more difficult for the same businessmen to “buy” ideologically different politicians. Returns to influence may thus likely suffer more when there is ideological alternation in power. We consider each of these questions, in turn.
In identifying the seat of power, we distinguish authoritarian, presidential democratic and parliamentary democratic systems. At a given point in time, authoritarian countries are countries whose democracy scores are less than or equal to -4 according to the Polity2 variable from the PolityIV data base. The Polity2 score ranges from -10 (full autocracy) to +10 (full democracy). This score is obtained by subtracting a scale of autocracy (0 to 10) from a scale of democracy (0 to 10). (Democracy and autocracy are distinct indicators; they do not have common components; see Marshall and Jaggers, 2000, p. 14.)

The remaining (non-authoritarian) countries are divided into two groups—presidential democracies and parliamentary democracies—based on whether there is a presidency that possesses significant law-making power. Presidential democracies have “strong presidents,” who are defined as having either decree powers or veto power that can be overridden only by legislative supermajorities. Parliamentary democracies are non-authoritarian states without strong presidents.

Once the locus (or seat) of power is identified, we have to define what constitutes a change in the actor that holds power. We count personal changes in the locus of power. In authoritarian states, this is a change in the ruler. In democracies, a change is counted when control of all veto-wielding legislative houses changes. What happens if there is a broad change in the governing coalition in a legislative house, but one or more small parties remain from the old governing coalition? We count a change only if at least two-thirds of the seats of the new governing coalition are held by parties that were not part of the old governing coalition. In presidential democratic systems, the president, too, must change. A change of control of some, but not all, of the veto-wielding institutions is not counted.

For example, if control of a unicameral legislature shifts and the presidency is not strong, this counts as a political alternation. If control of a unicameral legislature shifts but the holder of a strong presidency does not, this does not count as a change. If a new president is elected but control of the legislature does not change, then again this does not count as a change. On the other hand, if a change in all the law-making institutions of the state is completed over more than one
electoral cycle, the change is coded as having occurred in the year that the change in control becomes complete. Thus, if control of the presidency changed in an earlier election and has not changed since and if, in the current election, control of the legislature shifts to parties supportive of the president, then one change is counted as having occurred in the current election.

As shown in Table 1, no alternation in the seat of power occurred in Kazakhstan, Turkmenistan, and Uzbekistan (up to and including 2006). How are scores of zero possible? Why doesn’t the collapse of the USSR automatically count in our measure of alternation for all the Soviet successor states? Our coding principle is that the first successor state government must be a new ruler in its republic to be counted as a change. If such a new institutional ruler did come to power, the change is coded as occurring in the year that he began to wield effective authority in the republic—either 1990 or 1991. The collapse of the Soviet Union did not involve a change in the holder of the seat of power in Azerbaijan, Belarus, Kazakhstan, Tajikistan, Turkmenistan, and Uzbekistan. For the same reason, no alternation is counted as having occurred in 1991 in Macedonia, Montenegro, and Serbia with the break-up of Yugoslavia. In Appendix Table A-1, we list the 27 post-communist countries in our data, along with their cumulative alternation scores by year 2006.

An obvious refinement, which we call ideological alternation, is to count only those political alternations in which the shift of power also entails a shift of ideology. In the latter case, alternation may be more likely than in the former case to entail an end to the privileged government treatment that select groups of businesses enjoyed under the predecessor regime. In order to define what constitutes an ideological alternation, we use a new database on political institutions, the Post-Communist Party Ideology database developed by Horowitz and Browne (2005). Ideologies of governments are here understood in terms of the positions of ruling individuals, groups, or parties on the most salient policy issues. Following the tradition of much applied work in comparative politics, we use a two-dimensional policy space, where one dimension captures left-right differences in economic ideology-cum-policy, and the other dimension captures differences in
“national identity” policies. In economic policy, the main issue that faced the post-communist world in its first dozen years was whether, and how, to make the transition from planning or market socialism to capitalism. In debates over national identity, the main policy issues concerned the status and treatment of internal ethnic minorities and of ethnic groups in neighboring countries. To code leaders and parties, we use criteria described in Horowitz, Hoff and Milanovic (2009) to distinguish four intervals along each of the two ideology-cum-policy dimensions; see Table 2. The number in each cell represents total country/years that ideologically different parties or coalitions were in power over the period 1989-2006. For example, center-left parties were in power for 188 country/years or almost 39 percent of country/time.

Table 3 illustrates the construction of alternation indices for Hungary and Russia. Hungary is a parliamentary democracy with a unicameral legislature and a weak presidency, and so only changes in control of the legislature are relevant for measuring political alternation. Through the end of 2006, parliamentary elections brought new ruling parties or party coalitions to power in March 1990 (center-right), May 1994 (center-left), May 1998 (center-right), and April 2002 (center-left). All of these political alternations brought ideologically different parties or coalitions to power, so that there is no difference between the value of our measures of political and ideological alternation.

Russia has had a Polity2 score above -4 throughout the period of our analysis (Polity2 score = 4 until 1999, and 7 beginning 2000). We characterize it as a strong presidency, and so changes must occur in both the presidency and the legislature to be counted as an alternation in the seat of power. The first political alternation occurred in August 1991, when the failure of the hard-line communist coup attempt against Mikhail Gorbachev transferred effective power to Boris Yeltsin and the Russian legislature and led to the break-up of the Soviet Union. President Yeltsin remained in power until December 1999, when he resigned in favor of Vladimir Putin. As prime minister, Putin had led his United Russia Party to success in the December 1999 lower house elections. Thus, in December 1999, a full political alternation was completed as a new president and a
supporting lower house coalition came to power. The regionally selected upper house, founded in 1996, had its selection principles amended to guarantee support for Putin. Through 2006, this late 1999 political alternation was the only one since August 1991. Putin and his supporting parliamentary coalition are not classified as having a different ideology from Yeltsin and his supporting coalition, so there is no ideological alternation in 1999.

IV. EMPIRICAL STRATEGY

Figure 4 shows the scatter plot of cumulative political alternations in an early period 1989-95 and the rule of law score ten years later in post-communist countries. The figure shows that large differences in the rule of law score are associated with each additional political alternation; the simple correlation between rule of law in 2006 and cumulative political alternation up to (and including 1995) is 0.71. Every country that had at least three political alternations by 1996 (inclusive of 1996) has a rule of law score in 2006 above the world average.

Figure 5 presents the same data in a different way. We divide the post-communist countries into two groups, those with at most one political alternation by the end of 1996 and those with two or more. For each group, the figure plots the distribution of the rule of law score in 2006. The first group had an average score of -0.83, while the second had an average score around 0, and the two distributions do not overlap very much at all.

We measure cumulative political alternation between 1989 and year \( t \), where \( t \in \{1996, 1998, 2000, 2002, 2003, 2004, 2005, 2006\} \) and use that measure as a proxy for expectations as of time \( t \) of political alternation in the future. We treat the period 1996-2006 as one “slice of time.” Our hypothesis is that the cumulative number of political alternations is positively related to governance indicators. We estimate the reduced form equation,

\[
GOV_u = \beta_0 + \beta_1 ALT_u + \Gamma^\prime X_u + \epsilon_u
\]

12 The use of an alternative governance measure (control of corruption) and an alternative alternation measure (ideological alternation) yields virtually identical results to those shown in the figure.
where the subscripts $i$ and $t$ index, respectively, countries and years. $X_{it}$ is a vector of covariates, $ALT_{it}$ is cumulative political or ideological alternation (“alternation,” for short).

The dependent variable is the KKM rule of law measure. It is defined as the extent to which agents have confidence in, and abide by, the rules. The measure focuses on the quality of contract enforcement and property rights. Among the available governance measures, we believe that this measure captures most closely the phenomenon with which we are concerned—the quality of governance affected by the exercise of political power. The KKM data are composite indicators based on pre-existing sources, which include expert surveys and estimates by government, NGOs, and credit rating agencies. Since, as discussed above, the indicator is scaled so that the average and median value for the world is 0, a country’s score gives its relative position in the world. However, among those pre-existing data sources that are measured in absolute terms, there is no clear time trend for the world as a whole between 1996 and 2006. Thus, KKM conclude that the measures for each country over time can be read as absolute changes. There is a slight upward time trend in the mean rule of law indicator for the post-communist countries: the mean is -0.44 in 1996, -0.42 in 2000, and about -0.35 in 2004-2006, where a unit is a standard deviation for the world.

On the right-hand side of (10), we have $ALT$ and a number of other variables that previous work has found to influence the quality of governance: level of income (we use GDP per capita at in 1990 so that we do not capture the effect of what we are trying to predict—governance—on the predictor variable—income), the extent of democracy (proxied by the Polity2 variable running from -10 to +10), cumulative years of war, share of fuel exports in GDP, and the number of years of

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13 The $t$-test rejects equality of the means.
14 This set is all years for which KKM measures of governance are available.
15 Later we also use another KKM measure, control of corruption.
16 We use the earliest year available for fuel exports (1996 or 1997) in order to abstract to the extent possible from endogeneity between (bad) governance and dependence on fuel exports.
communist rule.\textsuperscript{17} Table 4 presents summary descriptive statistics, and Appendix A gives the sources and exact definitions of the variables.

We investigate whether alternation has an influence on the quality of governance controlling for democracy and number of years of Communist rule. Therefore we use all three variables in our empirical analysis. These variables measure distinct aspects of the political process: Democracy can coexist with infrequent alternation in power, as long rules of Social Democrats in Sweden (1936-76) and Liberal Democrats in Japan (1955-93) attest. However, in our sample, in which political liberalization is recent, the correlation between cumulative alternation and the level of democracy is +0.68 to +0.69 (see Table 5). The correlation between cumulative alternation by year 2006 and the number of years of communist rule experienced by a country (in the past) is strongly negative, between -0.77 and -0.78.

It is important to underline that the years of communist rule is practically the same variable (although slightly more finely-grained) as two other variables that have often been used in empirical studies of post-communist countries, namely Soviet (or CIS)/non-Soviet (non-CIS) and EU eligible/non-EU eligible dichotomies. All countries that were formerly part of the USSR, with the exception of the Baltics and Moldova, have between 68 and 72 years of communist rule. All remaining countries have between 42 and 45 years of communist rule. The cleavage is the same between EU eligible and non-EU eligible countries. All countries with fewer than 45 years of Communist rule (Eastern Europe and the Baltics) are eligible for EU accession (and, of course, at the time of writing, many are members). None of the others—at the time of this writing—is.\textsuperscript{18} Therefore, the number of years of communist rule variable can be interpreted as capturing not only the effect of the duration of communist rule but also the effect of the historic cleavage between

\textsuperscript{17} Regarding democracy, see \textit{e.g.} Treisman (2002) for transition economies and Goldsmith (1999) and Lipset and Linz (1999) for a general treatment. For the impact of the political system, including communist rule, on governance, see \textit{e.g} Lederman, Loayza and Soares (2005).

\textsuperscript{18} The only exception is Moldova, which is not EU-eligible although it belongs to a group of countries with a history of 45 years of communist rule.
Eastern Europe and more Russian-dominated Euroasian heartland, and the effect of the prospect of EU membership.

A central difficulty in our analysis is that alternation is itself an endogenous variable. There may be two-way causation between alternation and the rule of law. It may be that better governance in any given year expands political competition, which increases political alternation and also has persistent effects on the quality of governance. Then the measured influence of alternation would reflect a simultaneous influence between alternation and governance. The influence of governance on alternation could also go the other way, if more corrupt governments are more likely to lose power. To abstract from simultaneity, we use as instruments for alternation two variables: the level of literacy in the country prior to Communist rule and the level of urbanization around the time of regime change, in 1989-91. The logic is as follows. A higher level of literacy implies greater sophistication of the public, and greater ability to judge the programs and accomplishments of different parties. Once political liberalization occurs, a more literate population produces more informed voters, as contrasted with “machine-politics,” who are likely to produce greater number of turnovers in government. On the other hand, higher literacy is no guarantee of greater probity, either in government or in ordinary life. Thus we do not predict a direct influence from greater literacy in the pre-communist period to better governance today. However, the literacy level in the pre-communist period itself reflects aspects of pre-communist period that might persist and might influence the quality of governance today in ways not mediated by political alternation. Thus our instrument is imperfect and we view our study as exploratory. We use the level of urbanization in 1989-1990 as an additional instrument on the assumption that political mobilization is more easily achieved in urban areas. More urbanized countries can be expected to have a politically more engaged populace, which could also be a factor in more frequent alternation of government. Since we control for income per capita (which is strongly correlated with urbanization), we do not expect any direct link between greater urbanization and better (or worse) governance.
V. **EMPIRICAL RESULTS**

The first three columns of Table 6 present regressions with the KKM rule of law score as the dependent variable. So as not to understate the standard errors, the $p$-values are based on standard errors corrected to take into account correlation in the error term across years in a given country (as well as heteroskedasticity). We find that no important differences arise when we replace political alternation with ideological alternation. Therefore we report only the effect of political alternation.

Column 1 reports the results of pooled cross-sectional and time series regressions. One additional alternation is associated with a significant improvement in the rule of law score ($p$-value = 0.002). The estimated coefficient of 0.22 means that in our sample, an increase of one political alternation is associated with an increase of more than one-fifth of a global standard deviation in the rule of law score. The only other predictor of rule of law in column 1 that is significant at 5 percent is the pre-transition income level. Each 10 percent increase in 1990 per capita GDP is associated with an increase in the rule of law score of almost 0.06 standard deviation units.

There is little variation in rule of law scores within countries for the period 1996-2006, for which data are available. The time variation of rule of law scores accounts for only 1 percent of the variation in the total pooled cross-section/time series data. Given that, we cannot test the hypothesis that within a country over time alternation improves the quality of governance; in particular, we cannot test a fixed effects model. Instead, our test is a cross-sectional one.

To demonstrate the predictive power in cross-section of alternation in the early years following political liberalization, we report in column 2 the estimates of the regression when we use cumulative alternation up through 1995 only, and the rule of law in 2006 (column 2 in Table 6). Our hypothesis predicts that alternation in 1990-95, by conveying a signal about the observance of political rules of the game early on, should reduce the returns to investing in influence. The results

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19 When we regress residuals from the pooled regression against time, they display no time trend. This provides justification for treating the time-ordered cross section observations for 1996-2006 as independent.
are almost unchanged from column 1. We find that one additional alternation, *ten or more years prior* to our assessment of rule of law in 2006, is associated with an improvement of 0.28 points in the rule of law score. This finding is consistent with the hypothesis that early expectation formation plays a key role in the behavior of actors who face a choice between seeking state protection as a private good or as a public good (the rule of law).

Because of the problem of two-way causation between governance and political alternation, we instrument for political alternation in the regression reported in column 3, Table 6. As discussed above, our instruments are (a) the literacy rate prior to the communist takeover and (b) the rate of urbanization around 1990. Table A-2 in the Appendix shows the first-stage IV regressions. As expected, the level of pre-communist literacy is a strong predictor of cumulative political alternation, but the rate of urbanization in 1989-90 is not significant. The *F* statistic regression is 11.5, which is significant, and Anderson’s identification test for the irrelevance of instruments is strongly rejected. Based on Hansen’s *J* statistic, reported in Table 6, column 3, the null hypothesis that instruments are correctly excluded from the second stage regression is easily accepted.

Column 3 of Table 6 shows the second-stage regression. Instrumented political alternation is a significant predictor of rule of law score (*p*=0.00) and the effect is very large. One additional alternation is associated with an improvement of 0.71 standard deviations in the rule of law score.

Earlier literature has used the number of years of communist rule as an explanatory variable (see *e.g.*, Treisman, 2002) and shown that this variable is associated with a large change in the quality of governance in the post-communist period. Countries with longer years of rule have on average worse governance outcomes. However, all our tests, which include alternation as a predictor in the regression, find no significant effect of the duration of communist rule (this is true for all models; see row 7 of Table 6). Recall also the ambivalent meaning of this variable: duration of communist rule above 45 years corresponds very closely to non-EU eligibility. A tentative conclusion from our results is that the mechanism through which the communist duration
variable matters is the influence on political alternation. It is also consistent with this interpretation that when we exclude years of communism from the second stage regression (results not shown here), the value of the estimated coefficient for alternation increases.

The coefficient for democracy is near zero and is statistically insignificant in the two formulations reported in columns 1 and 2, which is consistent with Treisman’s (2002) work using a different measure (political rights as estimated by Freedom House) of democracy. The coefficient for democracy is significant but negative in the IV regression. Political alternation seems to crowd out the putatively positive effect of democracy.

Not surprisingly, cumulative duration of war is associated with lower rule of law scores: the war variable enters negatively in all regressions. In the IV regression, each additional year of war reduces the rule of law indicator by 0.12 points.\(^{20}\)

Our model predicts that any factor that lowers potential rents in the control of the state will be associated with lower investment in influence. This prediction is consistent with that of a large literature on the natural resource curse.\(^{21}\) For our sample, we find that a higher share of fuel exports in GDP worsens governance. The effect is particularly large in the IV formulation, in which each 1 percent increase in fuel exports’ share in GDP reduces the predicted rule of law score by 0.14 points.

As a robustness check, we present in columns 4-6 of Table 6 regressions with another measure of governance, “control of corruption,” also from the KKM database.\(^{22}\) This measure is defined as “the exercise of public power for private gain.” This measure is also scaled so that the average and median for the world are zero and the standard deviation is one, with a higher score

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\(^{20}\) War has a more pronounced effect when the regressions are run up to 2002 or 2003. As wars in the territories of transition countries have ceased, the impact of the variable on governance has somewhat faded.

\(^{21}\) A large literature on the “natural resource curse” points to a variety of reasons why a high share of GDP from natural resource exports, such as oil and natural gas, which require little or no processing, would lead to worse governance—see, e.g., Robinson et al. (2002) and Murshed (2004). An alternative view, however, is Haber and Menaldo (2008).

\(^{22}\) “Control of corruption” is the only other indicator, among six KKM measures, that captures the phenomena with which we are concerned here.
denoting better governance. Because it includes petty corruption, we consider the control of corruption index a noisier measure of those aspects of the quality of governance affected by clientelism between firms and the government. To curtail petty corruption, much more than political change at the top is required. However, the results, reported in columns 4 to 6 of Table 6 for the same three specifications as before (OLS pooled data, cross-section using only 2006 outcomes, and IV) are practically the same as when we use the rule of law indicator as our dependent variable.

VI. CONCLUSION

If investing in influence to obtain privileged treatment from the state is regarded like any other economic activity, then it is clear that businesses will engage in it more when the returns are higher. There are many examples, in many countries, where it is a common knowledge that paying off influential politicians to buy property rights à la carte, and paying off judges to obtain favorable rulings, are more lucrative than seeking profits through strictly economic—not political—investments. The weak link in the chain from those who buy influence to those who dispense favors is that the latter cannot always “deliver”: they may have lost political power. And when this happens frequently enough, the returns to investing in influence decline and eventually fewer people engage in it. Democracy and political alternation thus play a key role in creating a situation in which the implicit contract cannot be executed although there is good will on both sides—politicians and investors in influence. We have explored this hypothesis for the post-communist countries during the early period of political liberalization, when political alternation was not routinized. Under our hypothesis, the fact that alternation did, or did not, occur sent a powerful signal both to those who might invest in influence and to politicians, and changed their incentives.

We find that more frequent political alternation is associated with better governance. This result holds when we control for a number of other plausible influences on governance—income, war, democracy, dependence on fuel exports, and duration of communist rule (a proxy also for EU-eligibility)—as well as when we instrument for political alternation.
A further question concerns the generality of our results across regions and periods. The case of the post-communist countries of Eastern Europe and the former Soviet Union is special in at least two important respects. First, the transition entailed a liberalization in political and economic spheres simultaneously. Second, before the liberalizations, the set of private economic interest groups was very small. In many post-communist countries, there was a wholesale movement of the former *nomenklatura* into business. These new entrepreneurs were well-placed to establish a ‘special’ relationship with government as long as their former colleagues remained in government. Thus, it might be that political alternation, and in particular, the first political alternation, is more important in the post-communist countries than it would be in others following an initial democraticization. We show that the number of political alternations that occurred prior to 1996 had a significant and positive effect on rule of law observed in 2006. On the other hand, it is a very general point that powerful firms will not have an incentive to subject protection of their property rights to a general apparatus (the rule of law) as long as they feel confident that they can obtain privileged protection from the state through their special relationship to the party in power.

Our results suggest clearly that in a setting in which alternation in power has not been routinized, there may be a trade-off between the ability of a strong unified government and friendly legislature to push through painful economic reforms, and the corrosion of reforms that results when persistence in power of the reforming party widens corruption and lowers the quality of governance. The long-term effects on governance may turn out to be more important than the short-term effects on reform. One could argue that the best outcome for a newly democratizing country is that the government that has jump-started the reforms is thrown out of office, so long as its reforms survive. Political alternation may sever the clientelistic links that have been created between the reformers and influential business circles. Then the reform process continues on a more level playing field.

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23 A remarkable case study is Varese (2001, Appendix B).
Appendix A. Data Sources

The following data sources provided variables used in the paper:


**Democracy:** Democracy is proxied by the variable *Polity2*, from the Polity IV database available at [http://www.cidcm.umd.edu/inscr/polity/](http://www.cidcm.umd.edu/inscr/polity/) (updated in May 2008).

**Income per capita.** We use GDP per capita from the World Development Indicators data base (accessed in May 2008); values expressed in 2006 PPP dollars.

**Political system and alternation.** These data are constructed by the authors, based on Horowitz and Browne (2005), as explained in Section II and Horowitz, Hoff and Milanovic (forthcoming).

**Cumulative involvement in war.** Our measure is the proportion of time the country was involved in large-scale military conflict since 1989 or, for the former Soviet Republics, since their independence in August 1991. The data are created by the authors.

**Share of fuel exports.** Our measure is the share in GDP of exports of oil, natural gas, and gold in the first year that World Bank data are available (1996 or 1997). The source is the World Bank Development Data Platform (DDP) database.

**Literacy in the 1930s.** Percentage of adult population that is literate. Data from Darden and Grzymala-Busse (2006, p.113), Plestina (1992, p.181), and Rothschild (1974, pp. 37, 44, 92, 166-7, 285, 327, 332, 359, 369).

**Urbanization rates in 1989-90:** Percentage of population living in urban areas. Data from World Bank (1996, p.175).
<table>
<thead>
<tr>
<th>Number of political alternations</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Uzbekistan, Turkmenistan, Kazakhstan</td>
</tr>
<tr>
<td>1</td>
<td>Belarus, Tajikistan</td>
</tr>
<tr>
<td>2</td>
<td>Russia, Serbia, Kyrghyzstan, Armenia</td>
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<tr>
<td>3</td>
<td>Albania, Slovenia, Ukraine, Azerbaijan, Georgia, Bosnia, Latvia, Croatia, Macedonia</td>
</tr>
<tr>
<td>4</td>
<td>Bulgaria, Poland, Romania, Estonia, Czech republic, Hungary, Moldova</td>
</tr>
<tr>
<td>5</td>
<td>Slovakia, Lithuania</td>
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<tr>
<td></td>
<td>Coefficient (p levels)</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>GDP per Capita in 1990 a</td>
<td>-1.966*** (0.000)</td>
</tr>
<tr>
<td>War (cumulative)</td>
<td>-0.061 (0.238)</td>
</tr>
<tr>
<td>Fuel/GDP in 1996-97</td>
<td>30.50*** (0.000)</td>
</tr>
<tr>
<td>Democracy (Polity2)</td>
<td>0.172*** (0.000)</td>
</tr>
<tr>
<td>Duration of communist rule</td>
<td>-0.351** (0.017)</td>
</tr>
<tr>
<td>Literacy rate</td>
<td>0.039*** (0.001)</td>
</tr>
<tr>
<td>Urbanization rate</td>
<td>-0.015 (0.37)</td>
</tr>
<tr>
<td>Constant</td>
<td>18.66*** (0.000)</td>
</tr>
<tr>
<td>F test of excluded instruments</td>
<td>11.50*** (0.0004)</td>
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<td>Anderson canonical correlation test</td>
<td>62.36*** (0.000)</td>
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<td>R²</td>
<td>0.75</td>
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Note: The results are the first-stage estimates for the regressions reported in Table 6, columns (3) and (6), respectively. Coefficients with three, two and one asterisks are statistically significant at respectively 1, 5 and 10 percent. p values shown between brackets. a. In natural logs.
REFERENCES


FIGURE 1. DISTRIBUTION OF KKM RULE OF LAW SCORE FOR THE WORLD AND POST-COMMUNIST COUNTRIES

1996

2006
Figure 2. Firms differ in the ability to invest in influence, and the payoff is positive for types $\theta > \hat{\theta}$. 
FIGURE 3. AN INCREASE IN PROBABILITY OF ALTERNATION ($\pi$) LOWERS THE RETURN ON INVESTING IN INFLUENCE AND RAISES THE SWITCH POINT ($\hat{\theta}$).
Figure 4. Cumulative political alternation before 1996 and rule of law score in 2006 in post-communist countries.
Figure 5. Kernel Density Functions of 2006 Rule of Law Score

Note: The means are shown by the two vertical lines.
**Table 1. Summary Statistics for Two Measures of Alternation in the Transition Economies, up to and Including Year 2006**

<table>
<thead>
<tr>
<th></th>
<th>Cumulative political alternation</th>
<th>Cumulative ideological alternation</th>
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<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>2.71</td>
<td>1.93</td>
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<tr>
<td><strong>Median</strong></td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>0(^a)</td>
<td>0(^b)</td>
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<tr>
<td><strong>Maximum</strong></td>
<td>5</td>
<td>4</td>
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<tr>
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<td>Lithuania, Slovakia, Bulgaria, Hungary, Macedonia</td>
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<td><strong>Correlation with cumulative political alternation</strong></td>
<td>1</td>
<td>0.84 (0.00)</td>
</tr>
</tbody>
</table>

*Note:*

a. Countries are Kazakhstan, Turkmenistan, and Uzbekistan.
b. Countries are those listed in the preceding note, plus Belarus and Tajikistan.
c. Correlation is calculated across all years. *p*-value is in parentheses.
TABLE 2. Ideological classification scheme for parties contesting elections in post-communist countries, and number of country/years ruled by different regimes

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<thead>
<tr>
<th>Economic ideology</th>
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<th>Center-Left</th>
<th>Center-Right</th>
<th>Far Right</th>
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<td>Extreme Nationalist</td>
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<td>0</td>
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<td>Moderate Nationalist</td>
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<tr>
<td>Secessionist</td>
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Note. Total number of country/years is 18 years times 27 countries = 486.
### Table 3. Construction of the Cumulative Alternation Measures for Hungary and Russia

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*Notes:* Ideologies are *F* = far left, *L* = center-left, *R* = center-right. Political systems are 1=parliamentary, 2=presidential, 3=authoritarian.
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<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard deviation</th>
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</thead>
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<tr>
<td>Rule of lawa</td>
<td>-0.390</td>
<td>0.669</td>
</tr>
<tr>
<td>Control of corruptiona</td>
<td>-0.400</td>
<td>0.650</td>
</tr>
<tr>
<td>GDP per capita in 1990 in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>natural logs, $PPP</td>
<td>8.87</td>
<td>0.59</td>
</tr>
<tr>
<td>Fuel exports as share of GDP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in 1996-97</td>
<td>0.047</td>
<td>0.103</td>
</tr>
<tr>
<td>Democracy (Polity2 score)a</td>
<td>3.68</td>
<td>6.63</td>
</tr>
<tr>
<td>Duration of communist rule</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(years)</td>
<td>55.2</td>
<td>13.3</td>
</tr>
<tr>
<td>Pre-communist literacy (% of adult population)</td>
<td>55.2</td>
<td>30.2</td>
</tr>
<tr>
<td>Urbanization rate in 1989-90 (in percent)</td>
<td>56.2</td>
<td>12.3</td>
</tr>
</tbody>
</table>

aFor the period 1996-2006.
<table>
<thead>
<tr>
<th></th>
<th>Cumulative political alternation</th>
<th>Cumulative ideological alternation</th>
<th>Number of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Democracy&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.68 (0.00)</td>
<td>0.69 (0.00)</td>
<td>475</td>
</tr>
<tr>
<td>Duration of Communist rule&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-0.77 (0.00)</td>
<td>-0.78 (0.00)</td>
<td>27</td>
</tr>
</tbody>
</table>

*Notes.* $p$-values are in parentheses. Each observation is a country/year.

<sup>a</sup> Calculated across all years.

<sup>b</sup> Calculated for the year 2006 only.
**Table 6. OLS and IV Estimates of the Relationship between Quality of Governance and Political Alternation**

<table>
<thead>
<tr>
<th></th>
<th>Rule of law</th>
<th>Control of corruption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pooled OLS (1)</td>
<td>Cross-section 2006 (2)</td>
</tr>
<tr>
<td>Alternation</td>
<td>0.222*** (0.002)</td>
<td>0.714*** (0)</td>
</tr>
<tr>
<td>Alternation 89-95</td>
<td></td>
<td>0.280*** (0.001)</td>
</tr>
<tr>
<td>GDP per capita in 1990a</td>
<td>0.591** (0.007)</td>
<td>0.758*** (0)</td>
</tr>
<tr>
<td>GDP per capita</td>
<td></td>
<td></td>
</tr>
<tr>
<td>War (cumulative)</td>
<td>-0.111* (0.071)</td>
<td>-0.028 (0.46)</td>
</tr>
<tr>
<td>Fuel/GDP in 1996-97</td>
<td>-5.00* (0.055)</td>
<td>-4.88** (0.045)</td>
</tr>
<tr>
<td>Duration of communist rule</td>
<td>-0.011 (0.247)</td>
<td>-0.011 (0.21)</td>
</tr>
<tr>
<td>Democracy (Polity2)</td>
<td>-0.030 (0.159)</td>
<td>-0.025 (0.16)</td>
</tr>
<tr>
<td>Constant</td>
<td>-5.112** (0.011)</td>
<td>-6.40*** (0)</td>
</tr>
<tr>
<td>R² adjusted F</td>
<td>0.733</td>
<td>0.90</td>
</tr>
<tr>
<td>Number of observations</td>
<td>183</td>
<td>22</td>
</tr>
<tr>
<td>F test of excluded instruments</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Hansen J statistic</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

Note: *** Significant at 1 percent. ** Significant at 5 percent. * Significant at 10 percent. 

p values shown between parentheses. “0” indicates p=0.000. 

a. In natural logs.