Political Corruption and Institutional Stability*

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Abstract

This article is the first to examine statistically the reciprocal relationship between political institutions and corruption. While it is generally accepted that political institutions can constrain the use of political power by government officials for illegitimate private gain, the cross-national research on political corruption has not fully considered how networks of corrupt exchange itself provide incentives and constraints on political actors, and thus shape institutional outcomes. This article argues that non-democratic leaders who convert public resources into private privileges as a means to build informal political support are able to substitute for concessions in the formal institutions, alleviate pressure for further liberalization, and thereby extend the longevity of their regimes. Only in regimes that are consistently democratic is the public able to curb corruption effectively. We demonstrate that these expectations hold by estimating a dynamic multinomial regression model on data for 128 countries for the 1985–2004 period. Our results identify a vicious equilibria wherein high levels of political corruption stabilizes non-democratic and semi-democratic regimes and make them more resistant both to further democratization and to reductions in the level of corruption. At the same time, the results indicate that consistent democracies are able to curb corruption, and become more stable as a result.

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1 Introduction

The world is steadily becoming more democratic. In 1984, near half of the world's countries were autocratic, and about a quarter democratic.[1] In 2004, this picture was reversed, as half of the world was democratic, and only 15% autocratic. These figures reflect obvious improvements in governance in many parts of the world, but some aspects of the empirical pattern underlying the 'third wave of democratization' (Huntington 1991) are puzzling. The proportion of countries that are semi-democratic has increased from 24% to 37%, despite the fact that this regime type is inherently unstable (Gates et al. 2006; Sanhueza 1999; Epstein et al. 2006). Semi-democracies also seem to have become more stable over the period.[2] This democratization wave did not produce the anticipated reduction in corruption levels that much of the cross-country literature on governance would lead us to expect. The black line in Figure 1 shows the increase in average democracy levels following the end of the Cold War. The gray line shows that corruption levels were slowly decreasing up to the mid-90s, but then swiftly increased.[3] Political corruption is hence not simply acts of malfeasance that disappear with liberalization and increased competition in the political sphere.

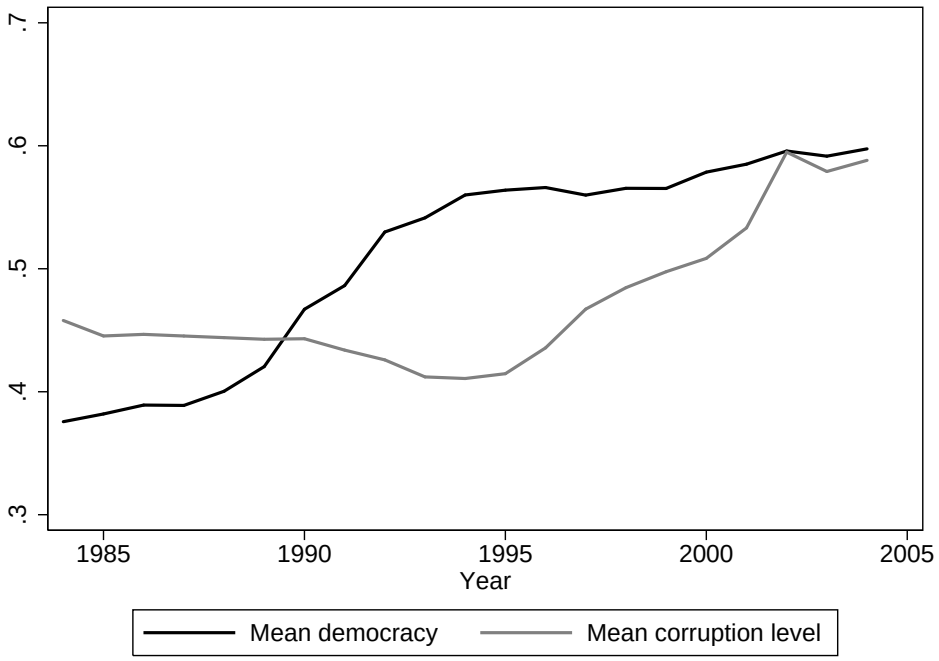
The above empirical trends challenge both our conventional knowledge about regime stability and our conventional knowledge about the determinants of political corruption. In this article we argue that these trends – the observed stability of semi-democratic regimes and the stickiness of corruption – cannot be understood in isolation from each other. Rather, political corruption should be understood as an informal institution that works to substitute for the monopolization of political power in the formal political institutions. When external pressures on elites lead to democratization in the formal political institutions of the state, elites rely on political corruption to compensate for their loss in *de-jure* power. By increasing the *de-facto* power of elites, political

[1] Our definitions of democracy, autocracy, and semi-democracy are given below. The Polity project shows the same trends (see http://www.systemicpeace.org/polity/polity4.htm).

[2] Up to 1994, our data indicate that 6.8% of all semi-democracies changed into democracy or autocracy every year. After 1995, the average annual rate of transition was reduced to 4.5%.

[3] Both democracy and corruption are normalized to range from 0 to 1. We use the SIP measure of democracy and the ICRG measure of corruption. Details are given below. Some of this increase in perceived corruption may reflect that the ICRG now set higher standards for how public affairs are to be conducted than in the 1980s, but the figure still indicates no corruption-reducing effect of democracy at the global level.

Figure 1: Average global levels of democracy and corruption, 1984–2004



corruption serves to reinforce the stability of non-democratic regime types.

The idea that formal and informal institutions work together is not novel. Both the qualitatively oriented comparative politics and area studies literature ascribe a critical role to political corruption in explaining political outcomes (Rose-Ackerman 1999; Johnston 2005). Scholars working on Africa, for example, use the term neo-patrimonialism to refer to a system of governance where leaders ability to maintain elite cohesion and placate opposition rests on the illegitimate disbursement of regime patronage (e.g. Bratton and de Walle. 1994). The qualitative literature points to cases such as Haiti, the Philippines and Côte d'Ivoire to show how the award of personal privilege to attract political support can serve to foster powerful coalitions against democratization. In places where authoritarian regimes have moved towards more open institutions, for example Nigeria and Kenya, the incumbent regime's efforts to bribe institutions for electoral oversight and control has served to strengthen the power of the incumbent and stifled further liberalization.

This article builds on these insights to advance the quantitative literature on this topic, and simultaneously study corruption levels and patterns of institutional stability. We thereby contribute to the cross-country literature on political corruption, which up until know primarily has focused on how formal institutions – often *within* the sample of democratic countries – determine corruption levels.[4] We also contribute to the cross-country literature on institutional stability by paying attention to how informal institutions such corruption influence political behavior and in turn trajectories of change in formal institutions (Helmke and Levitsky 2004; Acemoglu and Robinson 2006*a*,*b*). Our novel empirical strategy takes as its point of departure a model of institutional instability proposed by Gates et al. (2006), which shows that only autocracies and democracies have institutional characteristics that are mutually reinforcing and stabilizing. We model the reciprocal relationship between political corruption and institutions using dynamic multinomial logistic regression models. We show that political corruption strengthens the autocratic equilibrium, and that semi-democracies also are stabilized with corruption. Leaders who convert public resources into private privileges to build informal political support substitute for concessions in the formal institutions and extend the longevity of their regimes. Only completely open democracies are more stable without than with corruption. Corruption, then, is part of a vicious circle that hinders democratization in many countries.

2 Political Corruption and Political Transition

2.1 Political Corruption as an Informal Institution

The standard definition of political corruption is the abuse of public office for illegitimate private gain (e.g. Shleifer and Vishny 1993). Since the concept is not used uniformly, we elaborate on our understanding of it below.

Political corruption involves self-dealing by public officials who extract resources through graft and embezzlement (c.f. Persson, Tabellini and Trebbi. 2003). Through corrupt transactions, political elites capture private benefits from the public offices they hold. The most extreme form of

[4]See Gerring and Thacker (2004) and Treisman (2007) for excellent reviews.

political corruption is kleptocracy, where maximizing opportunities for illegitimate rent extraction is the primary motive of government officials. Yet, political corruption also involves a second, related process: the illegitimate use of state resources to retain and expand political power by those holding political office (Rose-Ackerman 1999; Manzetti and Wilson 2007). This happens when public officials use the illegitimate dispersion of private perks and privileges, such as selective tax exemptions, public positions, land allocations, lucrative government contracts, discriminatory enforcements of the law, or vote purchase to buy support from segments of society. Furthermore, office-holders can use bribes to manipulate public institutions for accountability and control, for example through buying off electoral commissions or high courts. Nyblade and Reed (2008) refer to these two forms of political corruption as 'looting' and 'cheating', respectively.

When corrupt politicians reward their political base by means of illegitimate appropriation of public resources, it generates networks of exchange that are closely associated with the term patronage politics (Johnston 1986; Acemoglu, Robinson and Verdier 2004). In patronage based politics, leaders hold on to their positions through the distribution rents and other personal privileges, and clients offer their political support in order to gain access to rewards that cannot easily be attained elsewhere in the economy (Arriola 2009).[5] In a similar approach as ours, Bueno de Mesquita et al. (2003, p. 203-04) treat pervasive corruption as indicative of a distributive regime wherein leaders buy their continuation in office through the provision of private rather than public goods.[6] These two processes of political corruption – one for enrichment, the other for survival – reinforce each other, since the politician who is adept at expropriating rents and collecting bribes also has more resources available to buy political support (Rose-Ackerman 1999).

[5]The related term clientelism, is sometimes discussed as distinct from the phenomenon of political corruption by being explicitly confined to the electoral arena and involving a broader distribution of rents. Many researchers, however, see political corruption and rent seeking as an integral part of the concept of clientelism (See for example Kitschelt 2000; Keefer 2007). Patron-client ties may or may not be corrupt, but when the patron has a public position or obtain rents from one in a public position the two phenomena overlaps (Hutchcroft 2002)

[6]Bueno de Mesquita et al. (2003) examines the association between private goods and leadership survival. Our focus is on the durability of regime types. The difference is illustrated in the frequent leadership turnover in many consolidated democracies.

2.2 Institutional Stability and Political Corruption

To discuss the relationship between regime type and political corruption we start with a simple conceptual model. We conceive of the political system as composed of three groups: 1) the incumbent 2) the constituency of the incumbent, whose support is necessary to keep the incumbent in power, and 3) the citizenry, comprising the rest of the population of the country.

We assume that the incumbent's institutional preference is autocracy, which is characterized by the monopolization of power in the hands of the executive with few or no institutional constraints on his power (c.f. Acemoglu and Robinson 2006*b*; Bueno de Mesquita et al. 2003). The citizenry prefers democracy, which is characterized by diffuse authority and institutionalized channels of popular influence that allows actors to alternate in power and keep the incumbent accountable to the citizenry. The semi-democratic regimes combine autocratic and democratic traits. The incumbent typically derives formal authority from elections and faces constraints on his power from competing branches of government, but the formal authority of the parliament is often limited, when compared with consistent democracies. The bargaining over the allocation of power is accordingly particularly intense in semi-democratic political systems, and previous research has found these polities to be prone to institutional change (Huntington 1968; Gurr 1974; Sanhueza 1999; Gates et al. 2006).

Institutional outcomes is a reflection of the balance of power between the three groups, a balance conditioned both by the allocation of *de jure* power in the formal institutions (i.e. type of regime), and the *de facto* power allocated by political corruption. We may then formulate how institutional stability is determined both by political corruption and the existing, formal institutions. We start off by discussing the probability of institutional transition towards democracy in the two non-democratic regime categories, autocratic and semi-democratic regimes. Next, we discuss whether political corruption can subvert democratic stability.

Autocratic Regimes

Political corruption reinforces the monopolization of power in autocratic regimes by benefiting the

incumbent. Autocratic rulers need not win support from a majority of voters, but some rent-sharing is necessary to retain political support from critical segments of society. A narrow distribution of private goods leaves more surplus for the incumbent's own discretionary use than investment in public goods that enhance the welfare of all members of society. This makes rent-seeking behavior, combined with a clientelist-based distribution, particularly appealing to the incumbent.[7] Moreover, political corruption consolidates the incumbency advantage vis-à-vis political opponents (Bueno de Mesquita et al. 2003). All politicians can solicit support through promises of public goods that benefit all members of society, but only the incumbent can deliver on up-front promises of private rewards where the realization of these gains hinges on being included in the incumbent's political base. Where authoritarian institutions are already in place, they provide few institutional constraints on the incumbent's ability to capture private benefits from his public office, and to use parts of these to buy the necessary political support to retain office. While completely non-constrained autocrats may write their own laws such transfers do not necessarily have to be illegitimate. In practice, transfers that are sanctioned by the ruler's laws co-exist with transfers that do not and are therefore regarded as clearly corrupt. Moreover, the state patronage available for targeted spending in authoritarian regimes tends to be sustained through illegitimate rent creation mechanisms that are highly corrupt, such as accepting bribes from firms in exchange for lucrative government contracts.

Equally important when political corruption strengthens the autocratic equilibrium is the complicity of the incumbent's political base. Those who enjoy irregular opportunities for personal enrichment in the corrupt system's illegitimate distribution of government positions, construction contracts, or access to scarce foreign exchange. According to Wintrobe (1990, p. 854), the patronage they receive 'act[s] as a premium to compensate the interest group for its support or loyalty to the party and serve as a deterrent to the shifting of loyalty'. Because these are private goods, people must make a bid to obtain them from the incumbent, and they can hence be appointed and

[7]For a given total expenditure on private goods for the patron, a large political base dilutes the value of the tangible reward for each client, and in turn reduces the recipient's obligations to support the leader. Bueno de Mesquita et al. (2003) argue that in systems where political support must be secured by winning a majority vote in elections, economies of scale lead incumbents to switch from a selective accommodation of private interest to public policies that enhance the welfare of all citizens in society.

withheld in a manner that promotes personal loyalty to the leader (Bates 1981; Rose-Ackerman 1999). This elite base can be narrow. In Haiti, the corrupt regime of President Duvalier is said to have misappropriated 63% of government revenue during the late 1970's for the benefit of 'just a few thousand people connected by marriage, family ties and friendship to those in power' (Grafton and Rowlands 1996).

Those who are privileged by ample private perks become stakeholders in the current regime. The incumbent use corrupt exchanges to co-opt pivotal groups that could otherwise threaten regime stability. By being allowed to pursue illegitimate opportunities for rent seeking or allotted other privileges, these groups are compensated for their exclusion from formal sources of political influence. Political corruption thus facilitates intra-elite accommodation, and this reciprocal assimilation of elites – to use the phrasing of Bayart (1993) – is likely to reduce the pressure for change in formal political institutions stemming from pivotal groups in society (Arriola 2009). In the Philippines, President Marcos created a system of crony capitalism where the state provided monopolies for private accumulation within different spheres in the economy. Since the continued rule by Marcos was the guarantee of continued privilege, this sub-contracting of corruption created a vested interest in regime survival among this economic elite (Thompson and Kuntz 2006). Political corruption thus opens up for the possibility that the incumbent can co-opt threats stemming from influential groups within (or outside) their own political order. This group, willing to substitute political concessions in the direction of more openness for tangible rewards, is pivotal for autocratic regime stability.

Against this coalition stand the interests of the remaining population, not included in the patron-client networks. They prefer to check the capture of private benefits by public officials. Illegitimate rent-seeking and clientelist exchange divert resources away from investment in public welfare and obstructs an efficient provision of public services. Corrupt transactions that convert public goods into private payoffs thus imply a redistribution of resources away from the median voter. In spite of these powerful incentives, the citizenry in autocratic regimes lack the institutional means to discipline the leadership. In addition to exclusions from formal power, political corruption further reduces the *de facto* power of the potential electorate in autocratic regimes by undermining the foundations for an alliance with a strong middle class of economic and political

elites. Targeted and excludable benefits to selected elite groups can be used for a strategy of 'divide and rule', and block the pursuit of a collective interest that could otherwise threaten the regime (Acemoglu, Robinson and Verdier 2004). In an autocratic system, where the population is deprived of institutional channels to voice their preferences, the problem of coordinating groups for collective action might be the most critical barrier to change in political institutions (Acemoglu and Robinson 2006*a*).

Gurr (1974) and Gates et al. (2006) show how all aspects of the formal political institutions in closed autocratic systems reinforce each other – there is no open participation in the political system and no competing institutions from where an opposition can challenge the power base of a non-elected leader. Political corruption reinforces this monopolization of power in the hands of the incumbent since it serves to co-opt pivotal elite groups into his political support base, and thus enhances the persistence of the autocratic institutions. High levels of political corruption can be sustained, since the citizenry who are hurt by corruption do not have the institutional powers to check it.

Semi-democratic Regimes

The incumbent in semi-democratic regimes has large pay-offs from political corruption. In these regimes we often see a tension between the incumbent and the institutions for popular influence (elections and parliament). The increase in the incumbent's *de facto* power attained through 'cheating', i.e. using corrupt exchanges to manipulate his political influence, might therefore be particularly important for the incumbent's ability to retain his position. Even though the incumbent is more constrained in the ability to set politics unilaterally than an autocratic leadership, he might still exercise disproportionate influence in politics by invoking patronage-based relationships outside the formal political channels.

Through formal channels of political influence, such as elections and the parliament, the citizenry in semi-democracies has a stronger platform for reforming institutions in the direction of democracy than in authoritarian regimes. Political corruption, however, often undermines reformists' attempts to institutionalize popular influence. First, political corruption creates venues

for levying influence and gaining privilege, which are not subject to popular accountability. Rather than taking place in the context of organized competition among groups, political corruption is characterized by the representation of narrow interests, whose influence is not filtered by any mechanisms of checks and balances. The personal and un-institutionalized nature of corrupt networks breaks the link between collective decision-making and the electorate's possibility to influence these decisions (Johnston 2005; Warren 2004). Second, efforts to 'cheat' is likely to target the public institutions for accountability and control directly. The strategic co-optation of members of parliament through private rewards is likely to be an integral part of such a strategy in a semi-democratic regime. Political corruption thus partly undermine the *de facto* power of the electorate.

In addition, some recent research suggests that the electorate in these semi-democratic regimes might be less antagonized by political corruption than in fully democratic systems. Where parties are weak and parliaments are not perceived as independent from the executive branch, politicians have problems making political promises credible to voters. The electorate might thus discount future promises of public-goods provision, knowing that institutions cannot bind politicians to their word. Several scholars discuss the emergence of patronage-based distribution through hierarchical networks, often organized along ethnic or religious lines, as a response to such commitment problems (see Englebert 2000; Robinson and Verdier 2002; Keefer 2007). Such networks offer immediate and tangible gains to voters, and tie the citizenry's continued benefits to their association with the patron. Through vote-buying, politicians succeed in bribing voters directly (Manzetti and Wilson 2007). This may trap semi-democratic regimes in an institutional equilibrium wherein a sufficiently large number of individuals derive such significant economic benefits from the corrupt exchange and their association with patrons that their incentives to press for more democratic political institutions are small and the incumbent's incentives for providing them are low. This will inhibit democratic transition in semi-democratic regimes.

Corrupt, semi-democratic regimes can also be more resistant to transitions towards autocracy. Since political corruption empowers the incumbent with *de facto* influence, it decreases his payoffs from trying to change the formal political institutions in a more autocratic direction. As an informal institution, political corruption substitutes for a stronger concentration of power

in the formal institutions. This suggests that political corruption will mediate the instability of semi-democratic political systems and make them more persistent to change.

Gates et al. (2006) show that semi-democracies are unstable institutional configurations because the formal institutions are not mutually reinforcing. When non-elected heads of state co-exist with strong elected parliaments, a power struggle will ensue and probably lead to institutional reform – either the executive becomes elected or the parliament becomes weaker. Likewise, an elected executive faced with a very weak parliament may take the opportunity to hold on to power rather than call new elections. Our discussion indicates that corruption can counter the destabilizing impact of such inconsistent institutions. Political corruption strengthens the incumbent, allowing his power base to co-exist with stronger institutions and broader participation then would have been possible without corruption. Corruption and autocratic features could thus be seen as substitutes for each other. Incumbents that face strong external pressure for democratization counteract the loss of power due to liberalizing reforms with an expansion of corruption. Increases in democratization might thus be offset by increases in corruption.

This discussion of reinforcing configurations of formal and informal political institutions suggests the following propositions regarding the relationship between political corruption and institutional transition:

Hypothesis 1_A High levels of corruption are sustainable in autocratic regimes.

Hypothesis 1_B Corruption renders autocratic regimes more resistant to institutional transition.

Hypothesis 2_A High levels of corruption are sustainable in semi-democratic regimes.

Hypothesis 2_B Corruption renders semi-democratic regimes more stable.

2.3 Can Political Corruption Subvert Democracy?

Democratic leaders also derive pay-offs from diverting public resources to their private requirements, for example using state resources for electioneering in an unconstitutional way. However, democratic

institutions both influence the incentives of the incumbent to engage in political corruption, as well as the citizenry's ability to monitor their politicians and hold them accountable for abuse of public office by voting them out.[8]

For the incumbent, scheduled and free elections and open executive recruitment make political leaders accountable to the citizenry. The formal institutions that allow the citizenry to vote corrupt politicians out of office, provide incentives for the incumbent to align their policy with the preference of the citizenry and thus abstain from illegitimate rent-seeking for political survival (Rose-Ackerman 1978). Several scholars report that higher electoral competition is associated with less political corruption (Treisman 2000; Montinola and Jackman 2002).

In addition to the accountability imposed by the electoral mechanism, scholars also argue that the incentives for leaders to rely on illegitimate patronage is lower in democracies. Bueno de Mesquita et al. (2003), for example, argue that since a democratic incumbent's political base derives from the majority vote in elections, economies of scale lead incumbents to switch from a selective accommodation of private interest to policies that enhance the welfare of all citizens in society. Because each individual's value of private goods decreases as the number of clients goes up, private goods offer small rewards to the 'median voter'. For a given total expenditure on private goods for the patron, a large political base dilutes the value of the tangible reward for each client, and in turn reduces the recipient's obligations to support the leader. The turnover of power in democracies also imply that the incumbent cannot credibly promise that the regulations that secure private actors extraordinary rents might continue into the future (Montinola and Jackman 2002). This lowers the incumbent constituency's willingness to endorse networks of corrupt exchanges.

For the citizenry, institutionalized democracy provides a low-cost option to check corrupt behavior and punish politicians through the electoral mechanism (Adzera, Boix and Payne 2003; Lederman, Loayza and Soares 2005; Persson, Tabellini and Trebbi. 2003). Freedom of information and association facilitates monitoring of public officials, limiting their opportunities to engage in political corruption (Montinola and Jackman 2002). To the extent that electoral checks are effective, political corruption is unlikely to endanger the stability of the democratic regimes. Instead, political

[8]There is a large literature on the institutional determinants of corruption within the democratic regime category, see for example Tavits (2007).

corruption is curbed as democratic institutions bring electoral control from below.

Hypothesis 3_A High levels of corruption are not sustainable in democratic regimes.

Hypothesis 3_B Corruption renders democratic regimes less stable.

3 Data

We test our hypotheses on a dataset covering 128 countries over the 1985–2004 period. For the formal political institutions, we use the 'Scalar Index of Polities' (SIP) measure of democracy developed in Gates et al. (2006).[9] The SIP index is based on a three-dimensional conception of democracy that takes into consideration the nature of the recruitment of the executive (e.g. open elections vs. hereditary designation), the extent to which the executive is constrained by other institutions, and the extent of popular participation (Eckstein 1973; Gurr 1974). The data are based on a combination of the Polity index of democracy (Jaggers and Gurr 1995) and the Polyarchy index of Vanhanen (2000).[10] Each of the dimensions is measured on a scale ranging from 0 to 1. Executives that are non-elected according to the Polity project score 0 on the executive dimension; elected executives score 1. Polities with executives that completely dominate competing institutions as captured by Polity's XCONST indicator score 0, whereas polities with parliaments that are at par with the executive score 1. Finally, the participation component is a log-transformation of a variant of Vanhanen's Polyarchy index, rescaled to range from 0 to 1.[11] This measure is condensed to a unidimensional measure of democracy by taking the average of the three sub-indicators for executive recruitment, constraints, and participation. The resulting SIP measure is normalized to

[9] The dataset is available at http://www.prio.no/page/cscw/datasets/9649/47323.html.

[10] We have data at a finer temporal resolution than the year for both the corruption (quarterly series) and democracy indicators (daily series). We assign the value of the last observation within the year as the annual observation.

[11] Vanhanen (2000) codes two indicators, 'Participation' and 'Competition', and combines them by calculating their product. Participation is the percentage of the population that voted in the most recent election. Competition is the percentage of the valid vote won by all parties except the plurality winner or winning electoral alliance. We modify Vanhanen's composite measure (Participation * Competition) slightly. If the percentage of the valid vote won by the plurality winner is less than 70%, we use the Participation component without modification. If the percentage is higher than 70%, we multiply Participation by [Competition/30%]. This allows us to remove an artificial distinction between proportional representation and majoritarian systems in Vanhanen's original index.

range from 0 (perfect autocracy) to 1 (perfect democracy).[12]

The data on political corruption are from the International Country Risk Guide (PRS Group 2006).[13] No objective data on the extent of corruption exist, and the ICRG annual index of perceived corruption builds on assessments by country experts. While such assessments are by definition 'subjective', different cross-national ratings of corruption tend to be highly correlated with each other and with cross-national polls of business people's and inhabitants' perception of corruption (Treisman 2007). The ICRG corruption rating has two advantages over other corruption measures. First, it is the one with the best coverage for cross-section time-series analysis. Second, while taking into account financial corruption in the form of demands for special payments and bribes, it is primarily concerned with political corruption organized from above, which is the focus of the theoretical argument. The rating records 'actual corruption in the form of excessive patronage, nepotism, job reservations or *quid pro quo* deals, secret party funding, and suspiciously close ties between politics and business' (PRS Group 2006). We have reversed the original index so that higher numbers signify higher levels of corruption.

To set up a model that takes the reciprocal relationship between corruption and political systems into account, we divided the democracy index into three categories and the corruption index into two. We define countries as non-democratic if they have SIP score less than or equal to .15, as democratic if the score is higher than .80, and as semi-democratic if they fall in between. We define countries as low-corruption if their score is less than 4, and corrupt if higher or equal to 4. By combining these variables, we obtain a six-category dependent variable.

To control for the confounding effect of economic development we include data on GDP per capita from the World Development Index (World Bank 2007). We are interested in GDP per capita as an exogenous variable. Income levels, however, are affected both by corruption and by political instability. To minimize endogeneity bias, we use observations of GDP per capita prior to the time-frame for the analysis. We use data for 1983, or, in the few cases where the time series

[12]Changes to political institutions often take time and are associated with a period of turmoil. The Polity project codes these transition periods with a set of transition codes (–77, –88, –99). Such periods may last for several years. To take such transitions into account when observing countries annually, we replace transition codes with the regime type observed immediately before the transition.

[13]For more information about the data and coding, see www.icrgonline.com. The data are available from www.countrydata.com.

starts later, data for the first available year. We log-transform the variable, using the logarithm with base 2 to facilitate an intuitive interpretation of the results – a one-unit increase in the ln(GDP per capita) variable is then a doubling of average income.

We also enter a measure of oil dependence in the model. For many economies, GDP per capita is a good proxy for the extent to which the country has a 'modern dynamic pluralist' society, in the words of Dahl (1989). In economies that are highly dependent on oil exports, however, the correlation is much lower between GDP per capita and factors that we have argued affect corruption and regime stability – such as urbanization, literacy, economic diversification, and the mobility of capital. Oil economies may have high average incomes without any of these social characteristics. Moreover, as discussed above, oil economies are by definition dominated by a highly appropriable asset even when GDP per capita is high. This accentuates the need to distinguish these economies from other economies. We use an indicator variable from Fearon and Laitin (2003) that denotes whether oil accounts for at at least 33% of export income.

4 Results

4.1 Observed Transitions

The six-state matrix of observed transition frequencies for the 1985–2004 period is reported in Table 1. It shows a cross-tabulation of the observed state at year t with the observed state the year before. Beneath the transition frequency matrix, we report the observed distribution over the six states for the 1985–2004 period.

The observed transition probabilities can be calculated from the frequencies in Table 1.[14] Figure 2 shows a graphical representation of these transition probabilities. The six circles represent the six states. The sizes of the circles are proportional to the probability of remaining in the same state from one year to another. The arrows between circles reflect the probabilities of transition from one state to another. The widths of the arrows are proportional to the transition probabilities.[15]

[14] The transition probability corresponding to cell j,i is the column proportions, or the probability of observing a state j at t given that a country was in state j at $t-1$.

[15] We have omitted transition probabilities less than 1% in the figure.

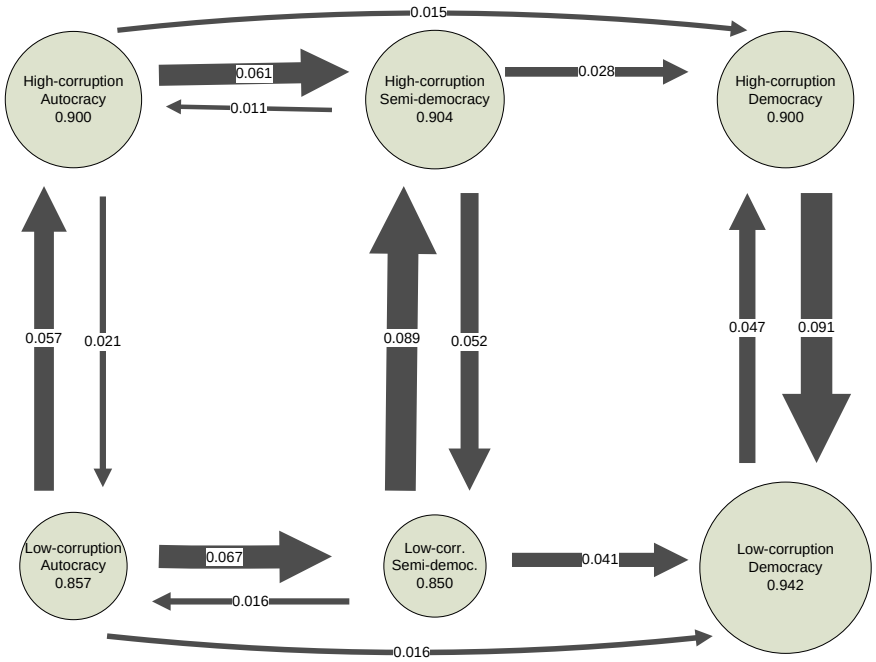
Table 1: Matrix of Observed Transition Frequencies for States of Corruption and Institutional Types, 1985–2004

	State at t						
	— High-corruption —			—Low-corruption —			
State at t–1	Autocracy	Semi-democracy	Democracy	Autocracy	Semi-democracy	Democracy	Sum
High-corruption autocracy	297	20	5	7	1	0	330
High-corruption semi-democratic	4	328	10	0	19	2	363
High-corruption democracy	1	1	207	0	0	21	230
Low-corruption autocracy	18	1	0	270	21	5	230
Low-corruption semi-democratic	1	39	1	7	373	18	439
Low-corruption democracy	1	1	44	1	7	884	938
Sum	322	390	267	285	421	930	2615
Observed distribution	0.123	.0.149	0.102	0.356	0.161	0.109	
Steady-state distribution	0.041	0.111	0.271	0.018	0.072	0.497	

The patterns observed in Table 1 and Figure 2 give preliminary support for our hypotheses. Corruption is clearly sustainable in autocratic regimes, as stated in Hypothesis 1_A. Only 2.1% of the high-corruption autocracies transition into a low-corruption state. The corresponding figures for semi-democratic and democratic regimes are 5.2% and 9.1%. High-corruption autocracies are also much more stable than low-corruption autocracies (Hypothesis 1_B) – 90.0% of the corrupt autocracies remain in the same state as compared with 85.7% among the low-corrupt autocracies. Figure 2 shows that semi-democratic systems also have a net flow toward more corruption, as expected in Hypothesis 2_A. As a consequence, semi-democratic systems are more stable with high corruption levels than with low: 90.4% remain semi-democratic as compared to 85.0% (Hypothesis 2_B). As predicted in Hypothesis 3_A, the opposite patterns hold for consistent democracies: 4.7% of the low-corruption democracies transition into the high-corruption state, as compared to 5.7% and 8.9% for autocracies and semi-democracies. There is less clear support for Hypothesis 3_B – consistent democracies are very stable. Over the 20-year period, there are only 12 transitions from democracy to other regime types. None of these transition probabilities are larger than 1%.

Note that very few high-corruption systems change into a low-corruption system of a dif-

Figure 2: Observed Transition Probabilities, All Countries, 1985–2004



The circles represent the six states in our model. Their areas are proportional to the probability of remaining in the same state in 10 consecutive years. The width of the arrows are proportional to the probability of transition from one state to another.

ferent type within the same year. In the upper-right and lower-left quarters of Table 1, there are observations almost only on the diagonal. This mainly reflects that both corruption and regime type change but infrequently, and the likelihood of observing both transitions within the same year is very low.

Figure 2 also reflects the trend toward more democracy in the 1985–2004 period seen in Figure 1 – arrows pointing to the right (more democracy) are thicker than those pointing to the left. The figure clearly shows how corruption interacts with this process of democratization: The arrows from autocracy to semi-democratic regimes are roughly of the same size at both levels of corruption, but the arrows from semi-democratic to consistent democracy are much thinner among

the high-corruption countries. Political corruption thus seems to stifle democratization.

The figure also indicates that authoritarian leaders use corruption as a substitute to autocratic institutions. A thick arrow (6.7% annually) leads from low-corruption autocracy low-corruption semi-democracy. From here, though, twice as many transition into high-corruption semi-democracy as into consistent democracy. A pair of thick lines also go from low-corruption autocracy to high-corruption semi-democracy via high-corruption autocracy.

What are the long-term trends implied by these transition probabilities? In the bottom row of Table 1, we report the steady-state distribution of the transition probability matrix – i.e. the long-term distribution over our six states.[16] The strong net outflow of transitions from the autocratic systems depicted in Figure 2 results in a low share of autocratic systems – only 5.9% are consistent autocracies in the long run given these transition probabilities. In line with our argument that corruption renders autocracies more persistent to change, most of the remaining autocracies are high-corruption systems (4.1% as compared with 1.8%).The semi-democratic states are not very stable either. In the long run, 11.1% will remain high-corruption semi-democratic systems, and 7.2% will be of the low-corruption type. Only the democratic states have a net inflow of transitions. As expected, most of these have low corruption: 27.1% are high-corruption democracies and 49.7% low-corruption democracies.

The discussion so far, however, is based on the observed transition probabilities and implicitly assume that transition probabilities are independent of other factors. In the next section, we will model the transition probabilities statistically as functions of exogenous variables such as average income and oil dependence, allowing for the possibility that autocratic regimes are more sustainable in Ethiopia than they would have been in Switzerland.

[16]The steady-state probabilities or the 'stationary probability distribution' can be generated by multiplying the matrix of transition probabilities with itself a high number of times, simulating many repeated transitions. The steady-state distribution can also be obtained by solving a system of linear equations, see Taylor and Karlin (1998, p. 247).

4.2 Estimating Transition Probabilities as Functions of Explanatory Variables

We now move on to model the transition probabilities statistically. The multinomial logit model allows relating a categorical dependent variable with J categories to a vector of explanatory variables. The estimated probabilities of observing each of the J outcomes are modeled as

$$\Pr(Y = j) = \frac{e^{X\beta^{(j)}}}{\sum_{j=1}^{J} e^{X\beta^{(j)}}}$$

for each outcome j. The six corruption and institution states at time t constitute our outcome variable. The transition probabilities are estimated with the multinomial logit when we include the states at $t-1$ as variables in the linear component $X\beta^{(j)}$. By adding further control variables to the linear component, we use the model to estimate transition probabilities as functions of these variables and to assess the extent to which differences in transition probabilities are due to systematic patterns rather than random variation.

We include five exogenous variables: initial income per capita, oil dependence, and dummy variables that distinguish between four periods within the 1985–2004 time-frame. These variables are regularly included in the literature on democratization and corruption (Przeworski et al. 2000; Ross 2001; La Porta et al. 1999; Treisman 2000, See for example).[17] The model also includes all six states at $t-1$ as covariates and has no constant term. The results are reported in Table 2.

High-corruption autocracy is the reference outcome and the five columns refer to the five other outcomes of combinations of corruption and institutions. All estimates are interpreted as how much the log risk of an outcome relative to the reference outcome changes when the explanatory variable changes by one unit.[18] The model has been simplified by two types of constraints. First, several parameters that were very far from statistical significance (with p-values larger than 0.60)

[17] The multinomial logit model with six categories for the dependent variable requires the estimation of a large number of parameters. We refrain from including additional variables to avoid over-fitting of the model.

[18] The estimate of 1.611 in the last line of the first column, for instance, means that the risk of being in the high-corruption democracy state relative to the reference outcome is exp(1.611)= 5.0 times higher in the 2001–2004 period than in the 1985–1989 period.

Table 2: Multinomial Logit Model Estimates of Transition Probabilities, 1985–2004

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5
	High-corr. semi-democratic	High-corr. democracy	Low-corr. autocracy	Low-corr. semi-democratic	Low-corr. democracy
High-corr.	$-4.057^{\dagger}$	-1.751^{**}	-2.563^{**}	-5.851^{***}	$-4.057^{\dagger}$
autocracy	(0.511)	(0.850)	(0.905)	(1.061)	(0.511)
High-corr.	3.653^{***}	3.552^{***}	$-4.057^{\dagger}$	2.042^{***}	–
semi-democratic	(0.597)	(0.866)	(0.511)	(0.654)	(–)
High-corr.	–	8.628^{***}	$-4.057^{\dagger}$	$-4.057^{\dagger}$	3.535^{***}
democracy	(–)	(1.134)	(0.511)	(0.511)	(0.904)
Low-corr.	-3.806^{***}	$-4.057^{\dagger}$	4.015^{***}	–	-1.265^{*}
autocracy	(1.138)	(0.511)	(0.891)	(–)	(0.701)
Low-corr.	1.800^{**}	–	2.886^{**}	5.219^{***}	2.102^{**}
semi-democratic	(0.885)	(–)	(1.235)	(0.823)	(0.931)
Low-corr.	–	7.019^{***}	–	2.498^{***}	7.170^{***}
democracy	(–)	(1.120)	(–)	(0.913)	(0.817)
Income	0.116	-0.287^{**}	–0.096	0.073	0.131
	(0.079)	(0.122)	(0.131)	(0.061)	(0.082)
Oil	–0.601	-1.835^{**}	–	-0.998^{**}	-1.987^{***}
	(0.417)	(0.621)	(–)	(0.399)	(0.541)
Period	1.216^{***}	–	–	1.164^{***}	0.856^{***}
1990–96	(0.362)	(–)	(–)	(0.307)	(0.308)
Period	–	-1.432^{**}	-1.641^{***}	-1.359^{***}	-1.611^{***}
1997–00	(–)	(0.535)	(0.506)	(0.345)	(0.486)
Period	1.771^{***}	1.611^{***}	-3.063^{***}	–	–0.465
2001–04	(0.347)	(0.457)	(0.890)	(–)	(0.473)
$N = 2294$					
Log likelihood $= -881.22$					
Log likelihood null model $= -4119.30$					

High-corruption autocracy is the reference outcome. Standard errors in parentheses.
$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$.
† All these estimates constrained to be equal to each other. The joint estimate has p-value $p < 0.01$,
(–) All these estimates are constrained to be zero.

were set to 0. These are marked with dashes in Table 2. Another set of parameters needed a different treatment. These parameters are closely associated with transitions where corruption level and political system change simultaneously. As is apparent in Table 1, these transitions are rare or never observed. Such 'empty-cell' observations lead to estimation problems.[19] To obtain robust estimates, we constrained all these parameters to have the same value and obtained an estimate of -4.057 and a standard error of 0.51 for the set.

[19]The parameters corresponding to empty cells are estimated to be large negative numbers, corresponding to relative risks approaching zero, with very large standard errors. The presence of such poorly defined estimates also hurt the precision of other parameters in the model.

4.3 Testing Hypotheses: Equilibria

Our hypotheses cannot be formulated as tests of individual parameter estimates as reported in Table 2. They can, however, be evaluated on the basis of estimated transition probabilities and steady-state distributions. Most of the inferences drawn below are not based on hypothesis testing in the classical sense. However, it should be borne in mind that the estimates in Table 2 constitute the best available representation of the transition matrix.[20] It is not possible to remove any of the parameters associated with the state at $t-1$ without reducing the goodness-of-fit of the model, and no parameter can be added to improve the model according to standard goodness-of-fit criteria. In other words, we are able to reject the hypotheses that an alternative model fits the data better than the reported model.

To report our testing procedure, we introduce a notation convention: we refer to the low-corruption states using Greek letters (α, δ, σ), and the high-corruption states with Latin letters (*A, D, S*), for autocracies, democracies, and semi-democratic regimes, respectively. We use $p_{A\alpha}$ as shorthand for the probability of transition from high-corruption autocracy to low-corruption autocracy, and SS_α for the steady-state distribution for low-corruption autocracies.

The first step in our testing procedure is to estimate the transition probability matrix using Clarify (King, Tomz and Wittenberg 2000).[21] The estimated transition probabilities are calculated for a 'typical' case within the 1997–2000 period where initial GDP per capita is at the median (1,600 USD) and oil dependence is low. We also requested 95% confidence intervals for the predicted probabilities. The estimated probabilities are represented in Figure 3.[22]

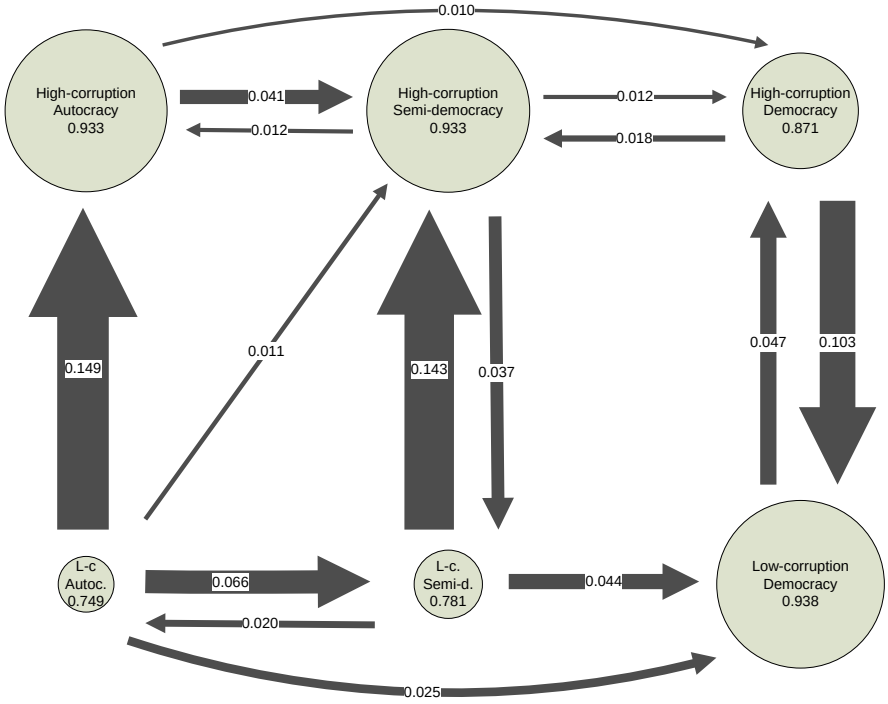
From this matrix of transition probabilities, we calculate the predicted steady-state distributions of the six regime-corruption types at different levels for the control variables. In Table 3, we compare the predicted steady-state distributions for our 'typical case'. According to Hypothesis $1_A, B$, corruption is sustainable in autocratic regimes, and corruption renders autocratic regimes

[20] Given the choice of multinomial logistic regression model and the set of explaanatory variables presented here.

[21] Clarify is a simulation and prediction tool that draws a number of realizations of parameters based on the estimate vector and the variance-covariance matrix for a model and reports the distribution of predictions from each of these realizations.

[22] The matrix of predicted transition probabilities and corresponding 95% confidence intervals are reported in Appendix Table A-1. Because of a limitation in the Clarify software, we simplified the model reported in Table 1 and constrained the 'empty-cell' parameters *ex ante* to have a value of –4.

Figure 3: Estimated Transition Probabilities, Median-income non-oil exporters, 1985–2004



The circles represent the six states in our model. Their areas are proportional to the estimated probability of remaining in the same state in 10 consecutive years. The width of the arrows are proportional to the estimated probability of transition from one state to another.

much more resistant to institutional change. In Table 3, this pair of hypotheses is formulated as $SS_A > SS_\alpha$ – in steady-state, the estimates in Table 2 imply that the proportion of high-corruption autocracies is larger than that of low-corruption autocracies. The difference in steady-state probabilities is large, 11.8% compared with 1.0%, clearly supporting our hypothesis. The corresponding comparisons for semi-democratic and democratic regimes are equally supportive: High-corruption semi-democratic systems are more stable than semi-democratic regimes with low corruption. High-corruption democracies are less stable than low-corruption ones.

To distinguish between our A and B hypotheses, we decompose them into sets of comparisons of the estimated transition probabilities shown in Figure 3. Table 4 shows the comparisons

Table 3: Comparing Predicted Steady-State Proportions

Hypothesis	Comparison	High-Corr. SS distr.	Low-Corr. SS distr.	Supported?
$H_{1_{A,B}}$ (Autocracies)	$SS_A > SS_\alpha$	.118	.010	Yes
$H_{2_{A,B}}$ (Semi-democratic)	$SS_S > SS_\sigma$	.287	.067	Yes
$H_{3_{A,B}}$ (Democracies)	$SS_D < SS_\delta$	.171	.381	Yes

Steady-state distributions are calculated from the estimates in Table A-1 for median-income, non-oil-dependent countries within the 1997–2000 period.

Table 4: Comparing transition probabilities: Sustainability of corruption

i) Probability of increase in corruption levels

Hypotheses	Comparison	High-Corr. Est.	Low-Corr. Est.	Supported?
$H_{1A,3A}$ Autoc. vs. democ.	$p_{\alpha A} > p_{\delta D}$	.149 (.060,.267)	.047 (.024, .083)	Yes*
$H_{2A,3A}$ Semi-democ. vs. Democ.	$p_{\sigma S} > p_{\delta D}$	.143 (.086, .214)	.047 (.024, .083)	Yes*

ii) Probability of decrease in corruption levels

Hypotheses	Comparison	High-Corr. Est.	Low-Corr. Est.	Supported?
$H_{1A,3A}$ Autoc. vs. Democ.	$p_{A\alpha} < p_{D\delta}$	.009 (.002,.024)	.103 (.049, .186)	Yes*
$H_{2A,3A}$ Semi-Democ. vs. Democ.	$p_{S\sigma} > p_{D\delta}$	.037 (.019, .067)	.103 (.049, .186)	Yes

Transition probabilities are calculated for median-income, non-oil-dependent countries within the 1997–2000 period. All estimates are reported in Table A-1.
$*$: Comparisons that are significant, i.e. that 95% confidence intervals do not overlap.

of the transition probabilities that relate to the stability of corruption in the different systems (A hypotheses). The Clarify simulations yield both point estimates and 95% confidence bands for all transition probabilities allowing us to evaluate roughly whether *pairs* of transition probabilities are different from each other.[23]

The A hypotheses imply that the different political systems differ in the propensity for corruption levels to increase or decrease. These comparisons are given in Table 4. These implications of the hypotheses are largely supported by the comparison of transition probabilities. In the upper panel of Table 4, we see that the predicted probabilities of increases in corruption levels are significantly higher in autocracies and in semi-democracies than in democracies. The estimated probability of increase in corruption levels are similar in autocracies and semi-democracies. In the lower panel, we show that the probability of reducing corruption is lower in autocracies and semi-

[23]Clarify does not allow comparing sums of probabilities, however. Two estimated transition probabilities are not independent of each other, nor are their confidence intervals. The confidence interval for the sum $p_{\alpha A} + p_{\alpha\alpha}$ is therefore not $(.060 + .563, .267 + .886)$, but a more narrow interval.

Table 5: Comparing transition probabilities: Stability of regime type

i) Probability of transition between selected regime types by level of corruption

Hypothesis	Comparison	High-Corr. Est.	Low-Corr. Est.	Supported?
H_{1B} (Autocracies)	$p_{AS} < p_{\alpha\sigma}$	.041 (.019, .079)	.066 (.022, .147)	Yes
H_{2B} (Semi-democratic)	$p_{SA} < p_{\sigma\alpha}$	.012 (.004, .029)	.020 (.006, .051)	Yes
H_{2B} (Semi-democratic)	$p_{SD} < p_{\sigma\delta}$	.012 (.004, .029)	.044 (.019, .088)	Yes
H_{3B} (Democracies)	$p_{DS} > p_{\delta\sigma}$	.018 (.003, .059)	.009 (.003, .021)	Yes

ii) Stability of high-corruption state versus low-corruption state

Hypothesis	Comparison	High-Corr. Est.	Low-Corr. Est.	Supported?
H_{1B} (Autocracies)	$p_{AA} + p_{A\alpha} > p_{\alpha A} + p_{\alpha\alpha}$	.942	.898	Yes†
H_{2B} (Semi-democratic)	$p_{SS} + p_{S\sigma} > p_{\sigma S} + p_{\sigma\sigma}$	.970	.924	Yes†
H_{3B} (Democracies)	$p_{DD} + p_{D\delta} < p_{\delta D} + p_{\delta\delta}$	.974	.985	Yes†

Transition probabilities are calculated for median-income, non-oil-dependent countries within the 1997–2000 period. All estimates are reported in Table A-1.
†: Direct significance tests are not readily available.

democracies than in democracies. The probability of reducing corruption is also somewhat lower in autocracies than in semi-democracies.

Table 5 looks into the B hypothesis that state how corruption affects regime stability. According to Hypothesis 1_B, high-corruption autocracies are more stable than low-corruption autocracies. One implication of this is that the probability of transition from autocracy to semi-democracy is higher if corruption is low than if corruption is high. The first line in the upper panel of the table shows that this is the case. Likewise, the probability of transition from semi-democracy to autocracy or to democracy is lower if corruption levels are high. As expected by Hypothesis 3_B, the probability of transition from democracy to semi-democracy is higher if corruption levels are high. We do not have sufficient with data to show that these comparisons are statistically significant, but the differences are large and the pattern is consistent.

In the lower panel of Table 5 we compare the probabilities of remaining in the same regime type for the two levels of corruption. If Hypothesis 1_B is correct, the probability $p_{AA} + p_{A\alpha}$ of remaining in the autocratic state if corruption levels are high is higher than $p_{\alpha A} + p_{\alpha\alpha}$ of remaining autocratic state if corruption is low. The first line in Table 4 shows that this aspect of the hypothesis holds. Table A-1 also shows that high-corruption autocracies are much less likely to transition into full-scale democracy if they transition: $(p_{AD} + p_{A\delta} = 0.016)$ which is considerably less than $(p_{\alpha D} + p_{\alpha\delta} = 0.025)$.

Similar conclusions can be drawn for Hypothesis 2_B from the second line in the lower panel of Table 5. Semi-democratic regimes are more likely to persist when corruption levels are high. From Table A-1, we also note that the probability of transition from a low-corruption semi-democratic regime to democracy ($p_{\sigma D} + p_{\sigma\delta} = 0.0445$) is much higher than the corresponding probability for high-corruption semi-democratic regimes ($p_{ID} + p_{S\delta} = 0.018$).

The corresponding transition probabilities for Hypothesis 3_B are compared in the bottom line of Table 5. At median income levels, high levels of corruption are associated with lower stability of democratic institutions. The probabilities of transition from democracy to either autocracy or semi-democratic regimes are considerably higher in high-corruption systems – .026 as compared to .015. Corruption thus seems to not only stifle the emergence of democracy, but also prevent democratic consolidation. This finding is consistent with the literature that finds a relationship between the age of democracy and the level of corruption (Treisman 2000), though our argument suggests a novel explanation for it. And again, Table A-1 shows that the probability of a change all the way to autocracy is higher when corruption levels are high – $(p_{DA} + p_{D\alpha} = 0.0080) > (p_{\delta A} + p_{\delta\alpha} = 0.0023)$

5 Conclusion

This is the first article to examine statistically the reciprocal relationship between corruption and political institutions. In line with the rich qualitative literature, the results from the dynamic multinomial regression model suggest that autocratic and semi-democratic regimes are more stable with political corruption than without, and that corruption, in turn, thrives well in these regime types. High-corruption semi-democracies, in particular, are remarkably resistant to pressure for democratization. Political corruption seems to trap these regimes in a vicious equilibrium where a number of individuals derive such significant economic benefits from the networks of corrupt exchange that their incentives to press for more accountable political institutions are small.

We also show that full democracies are much more effective in reducing corruption than the more authoritarian regimes. Conversely, democracies are more stable with when corruption levels

are low than when they are high.

Our argument and the results shed new light on the third wave of democratization. The remarkable increase in the number of democracies during the time-frame of our analysis has been accompanied by an increase in the number of semi-democracies and possibly an increase in corruption levels as measured here. According to our argument, this is not an anomaly, but a deliberate adaption from powerful elites under international pressure to democratize. The third wave of democratization may be less strong than it appears from studying increases in average levels of formally democratic institutions. The results have implications for studies of the effects of democracy on a variety of outcomes that do not take the informal 'institutions' into account.

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A Appendix

Table A-1: Predicted Transition Probabilities, Median Income Non-Oil-Exporting Country, 1985–2004

	State at t					
State at t-1	A: High-corruption Autocracy	D: High-corruption Democracy	S: High-corruption Semi-democratic	α: Low-corruption Autocracy	δ:Low-corruption Democracy	σ: Low-corruption Semi-democratic
A: High-corruption autocracy	.933 (.886, .964)	.006 (.001, .017)	.041 (.019, .079)	.009 (.002, .024)	.010 (.003, .027)	.002 (.0002, .009)
D: High-corruption democracy	.008 (.001, .030)	.871 (.766, .938)	.018 (.003, .059)	.00002 (9e-7, .0001)	.103 (.049, .186)	.0001 (7e-6, .0002)
S: High-corruption semi-democratic	.012 (.004, .029)	.012 (.004, .028)	.933 (.888, .962)	.00003 (2e-6, .0001)	.006 (.002, .017)	.037 (.019, .067)
α: Low-corruption autocracy	.149 (.060, .267)	.0001 (8e-06, .0004)	.011 (.0008, .050)	.749 (.563, .886)	.025 (.005, .071)	.066 (.022, .147)
δ: Low-corruption democracy	.002 (.0004, .006)	.047 (.024, .083)	.004 (.001, .012)	.0003 (.00001, .002)	.938 (.897, .966)	.009 (.003, .021)
σ: Low-corruption semi-democratic	.013 (.002, .037)	.0005 (.00002, .002)	.143 (.086, .214)	.020 (.006, .051)	.044 (.019, .088)	.781 (.685, .856)
Steady-state distr.	.118	.171	.287	.010	.381	.067

Estimated transition probabilities for the 1997–2000 period. 95% confidence intervals in parentheses. All estimates obtained by Clarify.