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**Democracy, Property Rights, Income
Equality, and Corruption**

Working Paper No. 2010 - 23

Democracy, Property Rights, Income Equality, and Corruption

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Abstract

This paper presents theoretical and empirical evidence on the nexus between corruption and democracy. We establish a political economy model where the effect of democracy on corruption is conditional on income distribution and property rights protection. Our empirical analysis with cross-national panel data provides evidence that is consistent with the theoretical prediction. Moreover, the effect of democratization on corruption depends on the protection of property rights and income equality which shows that corruption is a nonlinear function of these variables. The results indicate that democracy will work better as a control of corruption if the property right system works and there is a low level of income inequality. On the other hand if property rights are not secured and there is strong income inequality, democracy may even lead to an increase of corruption. In addition, property rights protection and the mitigation of income inequality contribute in a strong manner to the reduction of corruption.

JEL classification: D73; H11; P16

Keywords: Corruption; Democracy; Income inequality; Property rights

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1. Introduction

Rose-Ackerman (1999, p.127) stresses: “Democracies based on strong legal foundation provide a stable framework for economic activity. For this framework to operate efficiently, however, politicians must seek reelection and must feel insecure about their prospects, but not too insecure. This leads to a ‘paradox of stability’. Too much security of tenure can further corrupt arrangements. Too much insecurity can have the same effect.” Interestingly, prior literature on the relationship between democracy and corruption provides mixed evidence. Ades and Di Tella (1999) find that fewer political rights are correlated to low corruption levels. Ades and Di Tella (1997) and Fisman and Gatti (2002), however, fail to find any substantial effects on corruption of political rights and civil liberties respectively. Triesman (2000) does not find a significant direct effect of democracy on corruption either, but he documents that the duration of democracy significantly reduces corruption. On the other hand, Goldsmith (1999) reports that political democratization is associated with a lower degree of political corruption. Chowdhury (2004) also finds that the presence of democracy can reduce the level of corruption significantly. From a slightly different angle, Bohara, Mitchell and Mittendorff (2004) highlight that citizens’ participation in competitive elections increases the control of corruption. Recently, Goel and Nelson (2005) provide empirical evidence that less democratic countries always have a higher incidence of corruption. Emerson (2006) also shows that more political rights have a depressing effect on corruption. Billger and Goel (2009), however, document in their quantile regressions that democracy significantly reduces corruption only in the most corrupt countries.

Instead of exclusively testing the linear democracy-corruption association, Montinola and Jackman (2002) provide evidence that the effect of political competition on corruption is nonlinear. Corruption is lower in dictatorial countries than in ones partially democratized. It will, however, decline after the democratic level has reached a threshold. Sung (2003), on the other hand, reports that the cubic function best fits the cross-national data on the relationship between democracy and corruption.

Inconsistent empirical results suggest the demand for theoretical guidance. Unfortunately there is little theoretical evidence on the relationship except Mohatdi and Roe (2003). They build a two-sector endogenous growth model where agents switch between rent seeking and production. Then a reversed-U effect of democratization on corruption is derived. Rents and hence levels of corruption increase in the young democracies but decrease in the mature democracies. However, it is a question of whether their longitudinal section mechanism,

though enlightening, is able to explain existing cross-section evidence of the nexus between democracy and corruption.

Currently, two empirical articles more related to our study have emerged. Rock (2007) utilizes the instrument variable approach to empirically show an inverted U relationship between democracy and corruption. Saha et al. (2009), however, perform fixed-effect regressions to find that economic freedom always reduces corruption, while democracy increases corruption under weak economic freedom and decreases corruption under strong economic freedom. Both papers document the complexity of the nexus between democracy and corruption. However, the corruption indices both papers use are actually not suitable for panel analysis, which we will discuss later. And the economic freedom index in Saha et al. (2009) contains eight components ranging from micro business freedom to macro monetary freedom. This has the disadvantage that it is difficult to identify a clear mechanism for the interactions between democracy, economic freedom and corruption from their results. Indeed Goel and Nelson (2005) found that different components of economic freedom influence corruption in different ways.

This paper attempts to clarify miscellaneousness in past research with a uniform framework, therefore, contributing to the literature on the linkage between democracy and corruption. We first develop a theoretical model that incorporates the effects of property rights protection and income distribution into the relationship between democracy and corruption. The final effect of democracy on corruption depends on the combination of property rights protection and income distribution in a country. For example, Uslaner (2008) stresses that the transition to democracy and a market economy in Eastern Europe brought great instability and rising levels of inequality. Then we utilize a large panel sample including about 108 countries from 1995-2006 to examine the conclusion of the theory. With two alternative measures of democracy, our empirical analysis adopts the fixed-effect approach, and then the instrumental variable approach, to validate important aspects of the theoretical model. We find in our empirical analysis that the effect of democracy on corruption obviously depends on the level of property rights protection and income equality. The democracy's effect is different under different property rights protection and income equality conditions. The finding is particularly robust for property rights protection. We therefore provide an insightful mechanism for the nexus between democracy and corruption, both theoretically and empirically.

The rest of this paper is organised as follows. Section 2 presents the theoretical model. Section 3 provides the corresponding empirical analysis. Section 4 concludes with some comments.

2. Theory

Current conflicting linear and nonlinear evidence of the linkage between democracy and corruption may imply that further factors need to be taken into account in order to thoroughly understand the relationship. From our point of view, the impact of democracy on corruption is conditional on income distribution and property rights protection, which can be seen in the model that follows.

According to our knowledge, there are only two recent theoretical studies related to ours. As discussed above, Mohatdi and Roe (2003) model the association between democracy and corruption. Alesina and Angeletos (2005), with a non-overlapping-generation model, document the existence of multiple steady states in the levels of inequality, redistribution and corruption. It seems that no work, however, has explicitly explored the nexus between democracy, income distribution, property rights and corruption. We aim to fill this void.

Mohatdi and Roe (2003) assume that “democracy is about the flow of information and access to the government” (p. 450). We, however, follow Dahl (1974) who stress that from a constitutional perspective the essence of democracy is electoral participation and political competition. In line with Murphy et al. (1993) and Alesina and Angeletos (2005), we treat corruption as a rent-seeking activity.

The political economy mechanism provided here is closely related to Persson and Tabellini (1994). The pivotal voter in a country determines the redistribution policy. The redistributive decision therefore hinges on the difference between the income of the pivotal voter and the average income in the society. Unequal societies where the income of the pivotal voter is lower than the average income consequently have more redistribution from the rich to the poor than equal ones. Rent-seeking activities and hence corruption emerges in the allocation of the redistributive tax revenue. Furthermore, in the absence of property rights protection, the rich are likely to gain more from appropriation of the redistributive tax revenue than the poor though all have the access to the appropriation (rent-seeking) technology (Gradstein, 2007). Redistribution thus cannot mitigate income inequality as expected. As a result, high levels of corruption and income inequality might be self-sustaining in democracies with unsecure property rights. Oligarchies, however, may avoid this situation because their “pivotal agents” are often richer than the average. The situation

can also be mitigated or even eliminated in democracies with equal income distribution and/or secure property rights. In sum, it can be seen that democracy may breed corruption due to intensive redistribution, especially in countries which lack income equality and property rights protection. Below we will discuss this in detail. It is worth noting that unlike some prior studies, we treat democracy as an exogenous variable in order to focus on studying the relationship between democracy and corruption.

2.1. The Model

We consider a non-overlapping-generations model where altruistic individuals with monotonic preferences live only for one period. Each generation comprises a large number of individuals distributed uniformly over $[0,1]$. Similar to Gradstein (2007), each member i in generation t has the following utility:

$$u_{it} = \ln c_{it} + \ln y_{it+1} \quad (1)$$

where c_{it} is his own consumption, y_{it+1} is the income in next period accrued to his child. The budget constraint is,

$$y_{it} = c_{it} + k_{it+1} + r_{it+1} \quad (2)$$

where y_{it} is income of individual i from his parent, k_{it+1} is his productive capital and r_{it+1} is his unproductive capital in rent seeking. For convenience we further assume

$$y_{it} = y_t + e_{it} \quad (3)$$

where y_t is the average income of generation t . $e_{it} = y_{it} - y_t$, and its distribution therefore indicates the degree of income inequality in the model economy. The production function without government is

$$y_{it+1} = Ak_{it+1}^\alpha, \quad A > 0, 0 < \alpha < 1. \quad (4)$$

which exhibits diminishing returns to scale.

Following Alesina and Angeletos (2005), we assume that the government levies a flat tax on individual capital to fund a lump-sum transfer across all individuals. The tax rate is τ which is decided by previous voting. Then the sum of the transfer is $\tau \int_0^1 k_{jt+1} dj$. However, the distribution of the transfer among individuals is determined by rent seeking activities. Similar to Sonin (2003) and Gradstein (2007), we suppose that the share of the transfer which the individual i can grab is

$$q_{it+1} = \frac{k_{it+1}(r_{it+1} + P_{t+1})}{\int_0^1 k_{jt+1}(r_{jt+1} + P_{t+1})dj} \quad (5)$$

which implies that given the level of public property rights protection $P_{t+1} (> 0)$, the share of transfer an individual gains increases with his own input and decreases with the competing

inputs of the others. According to Alesina and Angeletos (2005), the corruption level is plausibly assumed to increase with the amount of transfer.

Then the net capital endowment of individual i after redistribution is given by productive and unproductive investments:

$$k_{it+1}^n = \frac{\tau_{t+1}k_{it+1}(r_{it+1} + P_{t+1})}{\int_0^1 k_{jt+1}(r_{jt+1} + P_{t+1})dj} \int_0^1 k_{jt+1}dj + (1 - \tau_{t+1})k_{it+1} \quad (6)$$

And the output produced by individual i in period $t+1$ is

$$y_{it+1} = A(k_{it+1}^n)^\alpha = A\left(\frac{\tau_{t+1}k_{it+1}(r_{it+1} + P_{t+1})}{\int_0^1 k_{jt+1}(r_{jt+1} + P_{t+1})dj} \int_0^1 k_{jt+1}dj + (1 - \tau_{t+1})k_{it+1}\right)^\alpha \quad (7)$$

So the utility of individual i can be expressed as following,

$$u_{it} = \ln c_{it} + \ln\left[A\left(\frac{\tau_{t+1}k_{it+1}(r_{it+1} + P_{t+1})}{\int_0^1 k_{jt+1}(r_{jt+1} + P_{t+1})dj} \int_0^1 k_{jt+1}dj + (1 - \tau_{t+1})k_{it+1}\right)^\alpha\right] \quad (8)$$

Similar to Sonin (2003) and Gradstein (2007), we assume that $\int_0^1 k_{jt+1}dj$ and $\int_0^1 k_{jt+1}r_{jt+1}dj$ are exogenous to any individual since there are numerous individuals in each generation.

2.2. Economic Equilibrium

Given the policy, each individual makes his optimal decision¹.

$$\begin{aligned} & \max_{c_{it}, k_{it+1}, r_{it+1}} u_{it} \\ \text{s. t. } & y_{it} = c_{it} + k_{it+1} + r_{it+1} \end{aligned}$$

In the economic equilibrium, individual i hence has

$$c_{it} = \frac{1}{2\alpha + 1} \left(y_{it} + P_{t+1} + \frac{(1 - \tau_{t+1})R}{\tau_{t+1}K} \right) \quad (9)$$

$$k_{it+1} = \frac{\alpha}{2\alpha + 1} \left(y_{it} + P_{t+1} + \frac{(1 - \tau_{t+1})R}{\tau_{t+1}K} \right) \quad (10)$$

$$r_{it+1} = \frac{\alpha}{2\alpha + 1} \left(y_{it} + P_{t+1} + \frac{(1 - \tau_{t+1})R}{\tau_{t+1}K} \right) - \left(P_{t+1} + \frac{(1 - \tau_{t+1})R}{\tau_{t+1}K} \right) \quad (11)$$

where we let

$$K = \int_0^1 k_{jt+1}dj, \quad R = \int_0^1 k_{jt+1}r_{jt+1}dj$$

¹ Following the spirit of Gradstein (2007), we do not include taxation into the budget constraint because the government does not consume any in our simple model. And taxation here is a component of the technology (7) that agents employ. There are actually two stages in the technology. In the first stage agents obtain their net capital endowment by paying taxes and rent seeking. Agents then produce output with their net capital endowment.

Here we can easily find that c_{it+1} and k_{it+1} decrease while r_{it+1} increases when τ_{t+1} rises, which is consistent with prior findings. The optimal utility of individual i is

$$u_{it} = (2\alpha + 1)\ln\left(y_{it} + P_{t+1} + \frac{R(1 - \tau_{t+1})}{K}\right) + \alpha\ln\tau_{t+1} + C \quad (12)$$

where C denotes the constant term,

$$C = \ln A - (2\alpha + 1)\ln(2\alpha + 1) + \alpha(2\ln\alpha + \ln k - \ln r)$$

2.3. Political Equilibrium

The optimal tax rate τ_{it+1} to individual i must satisfies

$$\frac{\partial u_{it}}{\partial \tau_{it+1}} = 0$$

So τ_{it+1}^* is solved as

$$\tau_{it+1}^* = \frac{\alpha + 1}{\alpha\left[\frac{K}{R}(y_{it} + P_{t+1}) - 1\right]} \quad (13)$$

If the tax rate is determined by a majority vote in the society, the pivotal voter m will eventually decide the tax rate.

$$\tau_{t+1}^* = \frac{\alpha + 1}{\alpha\left[\frac{K}{R}(y_{mt} + P_{t+1}) - 1\right]} \quad (14)$$

Not losing generality, we suppose that $y_{mt} = y_t + e_{mt}$, where y_t is the average income of individuals in time t and e_{mt} hence indicates income inequality in the economy. Then

$$\tau_{t+1}^* = \frac{\alpha + 1}{\alpha\left[\frac{K}{R}(y_t + e_{mt} + P_{t+1}) - 1\right]} \quad (15)$$

As in Alesina and Angeletos (2005), the tax rate τ in our model indicates the corruption level because the increase in tax rate leads to the enhancement of rent-seeking for tax revenue and hence the rise of corruption levels, or vice versa. Therefore, we conclude from equation (15) that the effect of democracy on corruption depends on property rights protection, income inequality and economic development of a society. Under some circumstances democracy may even increase corruption. However, one should note that we use a simplistic notion of democratization where the process is mainly the delegation of power by a pivotal voter in the previous enfranchised group (the elite) to another citizen, who turns out to be the pivotal voter in the extended enfranchised group². The extended enfranchised group is therefore, as

² For example, the model disregards positive externalities derived in a direct-democratic environment via referenda and initiative. Being able to renegotiate and shape the political environments can lead to an increase in civic virtues. The more citizens can participate in political decision making by popular rights, the more the “political contract” is based on trust between state/public officials and the citizens which may promote civic

historical evidence suggests, often poorer than the previous enfranchised group, on average. The income level of the pivotal voter, namely the median voter, in the extended enfranchised group is lower than that of the previous pivotal voter. This means that democratization tends to make a poorer citizen the pivotal voter. According to (15), democratization may raise the tax rate due to increased demand for redistribution, which eventually results in corruption, other things equal. The effect of democracy will be obstructed in countries with income inequality and inefficient protection of property. This finding is similar in spirit to Cervellati et al. (2008) who contend that under high income inequality, democracy causes social conflict while oligarchy can avoid it.

The second conclusion deduced from (15) is that *ceteris paribus*, income inequality causes corruption. When there is high income inequality in a country: $e_{mt} < 0$, the pivotal voter's income is below the average hence they tend to choose a high tax rate for more redistribution, which in turn results in more corruption. When income distribution is more equal in a society: $e_{mt} > 0$, the pivotal voter, with his income above average, will select a low tax rate due to his disinclination for redistribution, which therefore reduces corruption. In sum, income inequality is a fertile ground for corruption, especially in democracies. Actually Glaeser et al. (2003) and Sonin (2003) also claim that unequal income distribution is a hotbed for poor governance.

The conclusions above are in the spirit of “tyranny of the majority”, which Tocqueville (1835) warned may occur in democracies. Tyranny of the majority refers to the circumstance where the majority might use its strength in a democracy to place its interests above those of the minority. Specifically, if income distribution is unequal in a country, the democratic system providing more political equality might lead to excessive redistribution or even public expropriation, which can weaken property rights protection and cause corruption. This danger, however, will not appear in the ideal state with perfect equality and freedom as depicted by Tocqueville.

It is obviously that property rights protection is negatively correlated with corruption in our model. This is reasonable since secure property rights limit expropriation (Besley and Ghatak, 2009). In (15) τ_{t+1}^* decreases when P_{t+1} increases, which suggests that property rights protection depresses corruption. We can confirm this result from below

duty. Citizens are in this case treated as “citizens” with extensive rights and obligations (Frey, 2003). The voting procedure, especially public discussions prior to votes, creates a sense of civic duty, as citizens become aware of the importance of following the endogenously generated rules. The possibility to vote promotes social norms of compliance and therefore may reduce corruption.

$$\frac{\partial \tau_{t+1}^*}{\partial (K/R)} < 0, \quad \left(\frac{K}{R} = \frac{\int_0^1 k_{jt+1} dj}{\int_0^1 k_{jt+1} r_{jt+1} dj} \right) \quad (16)$$

As we know, r_{jt+1} is negatively correlated with the level of property rights protection since rational individuals will invest more on expropriation under weaker protection of property rights, other things being equal. Therefore, K/R reflects the security of property rights. Inequality (16) shows that secure property rights reduce or control corruption, which coincides with the above finding. We can further deduce from equation (15) that property rights protection may act as a multiplier of democracy and income inequality in terms of influence over corruption. In addition, democracy might influence property rights protection via the tax rate. However, the mechanism here is somewhat indirect: voting decides the tax rate τ_{t+1}^* hence affects r_{jt+1} and k_{jt+1} , and through this channel it finally influences property rights protection (K/R).

It is worth noting that as Cervellati et al. (2008) argue, democracy is neither sufficient nor necessary for protection of property rights, although it has often been found to promote property rights protection. Actually Glaeser et al. (2004) observed secure property rights in oligarchies.

Last but not least, based on the inequality derived from (15): $\partial \tau_{t+1}^* / \partial y_t < 0$, we can demonstrate the basic fact that the average income level, namely economic development, controls corruption, which has been verified by most empirical studies (Treisman, 2007).

To summarize, our theoretical finding is that corruption level is jointly determined by democracy, property rights protection, income and income inequality. Specifically, the effect of political democracy on corruption depends on other social and economic conditions: property rights protection, income and income inequality.

3. Evidence

Our empirical analysis employs data from a large sample of 108 countries during the period 1995–2006. We first discuss the methodology and data used and report the results afterwards.

3.1. Methodology and Data

Our empirical analysis aims to shed new light on the causal effect of democracy on corruption testing our theoretical predictions. We are aware of the potential bias in OLS identification due to the endogeneity problem that omitted historical factors might influence both corruption and democracy. We therefore employ two strategies to address the endogeneity problem. Our first strategy is to use fixed effects regressions to deal with

potential biases, since the omitted variables here affecting both corruption and democracy are generally institutional or country-specific, which are approximately time-invariant. However, the conventional fixed effects approach is not applicable in the current situation. As seen below, key explanatory variables such as democracy and property rights protection in our regressions rarely changes and hence are nearly time-invariant. Standard fixed effects regression is inefficient in estimating the effect of minutely varying variables. According to Plumper and Troeger (2007, p.125), “An inefficient estimation is not merely a nuisance leading to somewhat higher SEs. Inefficiency leads to highly unreliable point estimates and may thus cause wrong inferences in the same way a biased estimator could.” We therefore adopt a common strategy utilized by economists and political scientists in their empirical analyses concerning institutions. Specifically, we group countries and areas in our study by the UN standard country and area codes classifications to generate regional dummies³. Then we use OLS estimation including regional fixed effect dummies and time fixed effect dummies to identify the impact of democracy on corruption. With this approach we can raise the efficiency of our estimation by increasing the “within variance” while still controlling for most of omitted country-specific factors which may affect both corruption and democracy, since countries in the same category are to a large extent homogenous. For convenience, the approach is still called as a fixed-effects approach in this paper, even though it not the conventional one.

The fixed effects approach, however, is not a substitute for the instrumental variables approach. For this reason our second strategy is to use the instrumental variables approach to identify the causal effect of democracy on corruption as there may be some time-variant omitted country characteristics influencing both democracy and income, which cannot be controlled for by the fixed effects. Previous studies have made great efforts to address the endogeneity problem with instruments. Hall and Jones (1999) use the distance from the equator and the proportion of the population speaking a major European language as the instruments for institutional quality. Acemoglu et al. (2001), however, suggest that European settler mortality and aboriginal population density in 1500 can be employed as

³ There are originally 22 categories in the UN standard country and area codes classifications: Eastern Africa, Middle Africa, Northern Africa, Southern Africa, Western Africa, Caribbean, Central America, South America, Northern America, Central Asia, Eastern Asia, Southern Asia, South-Eastern Asia, Western Asia, Eastern Europe, Northern Europe, Southern Europe, Western Europe, Australia and New Zealand, Melanesia, Micronesia, Polynesia. However, we treat Israel, the only Jewish state in the world, as an independent category since it is obviously different from neighbouring Arabic countries (see, Anderson, Seibert, and Wagner, 2006). Therefore, we actually categorize countries into 23 groups.

instruments for current institutions in ex-colonies. When studying the effect of democracy on corruption, Rock (2007) uses the population fraction of protestant and the latitude of a country's capital as instruments for democracy. All these instruments are intended to capture the western influence on current institutional quality. However, because the western influence is manifold and correlated with many aspects of institution, it is difficult to declare what specifically these variables are instruments for. As we know, corruption level reflects institution quality. If we use these instruments for democracy in our case, they may influence corruption through not only the channel of democracy but also through many other institutional channels. It therefore violates the exclusion restriction. We hence need to choose a more specific instrument for democracy to guarantee the validity of our IV approach. Following Mobarak (2005), we construct a dummy indicating any country with the largest proportion of population practicing Islam (CIA, the World Factbook 2000⁴) as an instrument for democracy. The distribution of Muslims is of course exogenous, especially in our time horizon. Huntington (1991, p. 307) argued: "To the extent that government legitimacy and policy flow from religious doctrine and religious expertise, Islamic concepts of politics differ from and contradict the premises of democratic politics." Treisman (2000) and Paldam (2001), on the other hand, have found that the direct effect of Islam on corruption is insignificant. We therefore can plausibly suppose that the Islamic religion influences the corruption level only through the channel of democracy. This validates our instrumental variable.

We now describe the data we use in our empirical analysis. To secure robustness, we attempt to employ alternative measures of key variables in our regressions. However, we cannot find more than one corruption measures suitable for panel analysis. Many researchers such as Treisman (2007) have pointed out that two corruption indices often used in research: Corruption Perception Index (CPI) compiled by Transparency International (TI) and Control of Corruption Indicator (CC) constructed by the World Bank⁵, are actually inappropriate for panel analysis. Both indices have altered their constructing methodologies and data sources over the years. Annual variations of both indices may reflect changes in the methodologies and data sources rather than actual corruption perceptions. Kaufmann and Kraay (2002) acknowledge that about 50% of the across-time variance of the CC index originates in changes in data sources and weights assigned to each data source. We hence need to choose

⁴ <http://www.umsl.edu/services/govdocs/wofact2000/index.html>

⁵ Saha et al. (2009) and Rock (2007) use the two indices respectively.

another common corruption measure: the rating of corruption in the International Country Risk Guide (ICRG), to perform our panel regressions. The ICRG corruption index, ranging from 0 (most corrupt) to 6 (least corrupt), measures the degree of corruption within the political system (e.g., demand of special payments, bribes connected with import and export licenses, exchange controls, tax assessment, police protection, or loans) prevailing in countries on the basis of the experts' assessment. The ICRG index provides comparable corruption data over time and across countries, and hence is the only corruption data set available for the panel analysis. To obtain a proxy for corruption rather than the lack of corruption we use negative values of the ICRG index in our estimations (-ICRG).

The first measure of democracy used to test our theoretical model is the Polity Regime Index: Polity 2, the difference between the Polity Democracy Indicator and the Polity Autocracy Indicator in Polity IV database. It is coded on evaluation of the competitiveness of political participation, the competitiveness and openness of executive recruitment and constraints on the chief executive. It ranges from -10 (full autocracy) to 10 (full democracy). The second measure of democracy we use is the Political Rights Index from Freedom House. This index measures the degree to which citizens in a country have control over governors using a checklist of 10 questions about the electoral process, political pluralism and participation, and functioning of government. It ranges from 1 (highest political rights) to 7 (lowest political rights). We use this index mainly as a robustness check, since one of its ten checklist questions assesses national corruption levels, which, as Rock (2007) points out, might lead to the problem regressing corruption on itself. To keep the consistency with the Polity2, we use negative values of the Political Rights Index in our regressions.

We use the property rights rating in the Index of Economic Freedom produced by the Heritage Foundation and the Wall Street Journal, commonly utilized in previous research, to measure the security of property rights in our analysis. This index, ranging from 0 (no protection of property rights) to 100 (full protection of property rights), mainly assesses the degree to which the laws of a country protect private property rights and the degree to which its government enforces those laws. According to our knowledge, no more data source of property rights protection can cover our investigating period. The Index of Protection of Property Rights compiled by the Fraser Institute, used in some priori studies, only covers 2000-2006 hence cannot be employed in our analysis.

We do not construct the actual Gini coefficient series to measure income inequality over time and across countries since there is not a complete time series in many countries in the World Income Inequality Database (WIID). More importantly Gini coefficients available in

WIID often seem incomparable across countries and/or over time due to their differences in survey base (income/expenditure), concept, population/area coverage and several other aspects. As income equality in most countries does not change dramatically in the time perspective of a decade, we instead construct a dummy to indicate income equality in countries by reviewing all available WIID data in our investigating period. The dummy equals to 0 if a country passes the international warning line for the Gini coefficient 0.40, and 1 otherwise. In this simple way, we reduce the measurement error of income equality data and make them more comparable. It is worth noting that we only consider income-based Gini coefficients in the dummy construction. Following Deininger and Squire's (1996), we add 6.6 to the expenditure-based Gini coefficients if there are no income-based ones available in a country.

We also include other determinants of corruption identified by previous research in our regressions. GDP per capita, population, openness proxied by import volume in percent of GDP and natural resource abundance proxied by fuel exports in percent of merchandise exports are all from the World Development Indicators. Adult literacy rates, reflecting education attainments of countries, are gathered from the UN Human Development Reports (1998-2009). Ethnolinguistic fractionalization data come from Alesina et al. (2003). The detailed description of our data is provided in Table 1.

Table 1 Descriptive Statistics

Variable	Observations	Mean	Standard Deviation
<i>Corruption (ICRG)</i>	1299	3.05	1.25
<i>Democracy (Polity IV)</i>	1510	4.51	5.96
<i>Democracy (Freedom House)</i>	1560	3.21	2.03
<i>Property Rights (Index)</i>	1476	52.40	22.89
<i>Income Equality (Dummy)</i>	1560	0.45	0.50
<i>GDP per capita</i>	1541	6.38	9.90
<i>Literacy Rate</i>	1534	82.06	27.16
<i>Resource abundance (Fuel export / Commodity export)</i>	1289	12.16	21.74
<i>Openness (Import / GDP)</i>	1513	44.76	25.83
<i>Ethnic fractionalization</i>	1560	0.42	0.25
<i>Population</i>	1548	0.45	1.45

3.2. Results

To obtain intuitions directing econometric analysis, we first plot the relationship between democracy and corruption in Figure 1. It seems that both the linear negative effect and quadratic effect of democracy on corruption documented in the literature are reasonable. Such a descriptive analysis however, only gives us information about the raw effects, and not

the partial effects. We then test the relationship between democracy and corruption in a multivariate analysis.

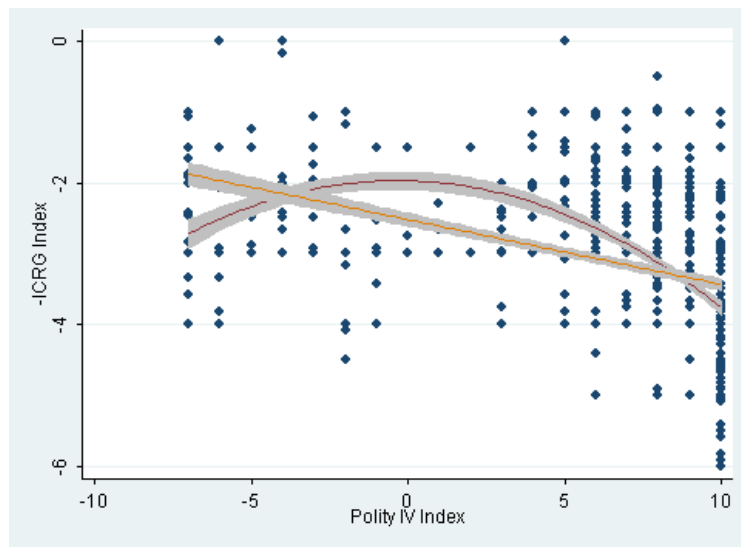


Figure 1 Relationship between democracy and corruption

We first briefly examine previous findings with (regional) fixed-effects panel regressions. Column (1) and (2) in Table 2 successfully replicate previous results supporting the findings that democracy reduces corruption (see Goldsmith 1999 and Rock 2009). When we take into account effects of property rights protection and income inequality on corruption, the linear effect of democracy in column (3) loses its significance, which correlates with Ades and Di Tella (1997), and Fisman and Gatti (2002). The quadratic effect of democracy in column (4), however, remains statistically significant. It seems that the nonlinear effect of democracy is robust, as Rock (2009) argues. However, in column (5) the quadratic term of democracy loses its significance when the interactions between property rights protection, income distribution and democracy is taken into consideration. The results actually indicate that the effect of democracy on corruption is modified by property rights protection and income distribution as can be seen looking at the interaction terms. The overall effect of democracy on corruption, therefore, depends on the combination of income equality and security of property rights in a country, as predicted by our theoretical model. The positive coefficient of democracy can be interpreted as the effect of democracy on corruption when property rights and income equality are 0. Thus, in countries with no property rights and a very high income inequality democracy induces corruption. The results of the two interaction terms also indicate that a high level of property rights and income equality promote the controlling effect of democracy on corruption.

Table 2 Effect of democracy on corruption: review and implication (fixed effects results)

	Corruption level (-ICRG)				
	Fixed effects				
	(1)	(2)	(3)	(4)	(5)
<i>Democracy</i>	-0.020*** (0.0060)	-0.0071 (0.0068)	-0.0077 (0.0067)	0.0017 (0.0073)	0.047*** (0.016)
<i>Democracy</i> ²		-0.0049*** (0.0013)		-0.0038*** (0.0014)	-0.0018 (0.0015)
<i>GDP per capita</i>	-0.062*** (0.0052)	-0.058*** (0.0055)	-0.044*** (0.0059)	-0.042*** (0.0060)	-0.039*** (0.0062)
<i>Literacy rate</i>	-0.0024*** (0.00076)	-0.0022*** (0.00080)	-0.0026*** (0.00089)	-0.0025*** (0.00092)	-0.0024** (0.00010)
<i>Resource abundance</i>	0.0055*** (0.0011)	0.0048*** (0.0011)	0.0031*** (0.0012)	0.0027** (0.0012)	0.0030*** (0.0011)
<i>Openness</i>	-0.0054*** (0.0013)	-0.0060*** (0.0014)	-0.0035** (0.0014)	-0.0041*** (0.0015)	-0.0045*** (0.0016)
<i>Ethnic fractionalization</i>	-0.15 (0.15)	-0.21 (0.15)	-0.16 (0.15)	-0.20 (0.14)	-0.26* (0.15)
<i>Population</i>	0.015 (0.018)	0.027 (0.018)	0.0023 (0.017)	0.012 (0.017)	0.018 (0.018)
<i>Property rights</i>			-0.013*** (0.0021)	-0.012*** (0.0021)	-0.0076*** (0.0028)
<i>Income equality</i>			-0.28*** (0.063)	-0.26*** (0.063)	-0.18*** (0.064)
<i>Democracy* Property rights</i>					-0.00086*** (0.00033)
<i>Democracy* Income equality</i>					-0.037*** (0.013)
<i>Constant</i>	-2.90*** (0.16)	-2.66*** (0.17)	-2.13*** (0.19)	-1.99*** (0.19)	-2.21*** (0.21)
R-squared	0.65	0.65	0.66	0.66	0.66
Observations	1107	1107	1089	1089	1089

Robust standard errors in parentheses, ***, ** and * denote significance at 1%, 5% and 10% respectively. Regional and time fixed effects are controlled for in all regressions.

It makes sense to provide more evidence to consolidate our new finding. Table 3 supplies fixed-effect results as expected. Preliminary results are in column (1) and (2) with pooled-OLS regressions. Then we use regressions including regional and time fixed effects to obtain further results in column (3) and (4). Protection of property rights substantially reduces corruption as expected, while income inequality is an important source of corruption, which also coincides with our prediction. The coefficients are statistically significant in all four estimations. More importantly, the effect of democracy on corruption is observed to be significantly modified by property rights protection and income distribution. Both interaction terms are statistically significant with a negative sign. As to other controls, income level and education attainment are observed to significantly reduce corruption, which is in line with

prior studies. And also consistent with literature, openness is found to decrease corruption, while resource abundance is observed to increase corruption.

Table 3 Effect of democracy on corruption: fixed effect results

	Corruption level (-ICRG)			
	Pooled OLS		Fixed Effects	
	(1)	(2)	(3)	(4)
<i>Democracy</i>	0.034*** (0.013)	0.031** (0.015)	0.038*** (0.014)	0.050*** (0.015)
<i>Property rights</i>	-0.023*** (0.0021)	-0.020*** (0.0025)	-0.017*** (0.0023)	-0.0072*** (0.0027)
<i>Income equality</i>	-0.23*** (0.065)	-0.17** (0.070)	-0.23*** (0.062)	-0.18*** (0.063)
<i>Democracy* Property rights</i>	-0.00095*** (0.00024)	-0.00062** (0.00028)	-0.00065** (0.00028)	-0.0010*** (0.00030)
<i>Democracy* Income equality</i>	-0.034*** (0.0092)	-0.032*** (0.010)	-0.046*** (0.012)	-0.040*** (0.013)
<i>GDP per capita</i>		-0.023*** (0.0053)		-0.040*** (0.0061)
<i>Literacy rate</i>		-0.0038*** (0.0012)		-0.0024** (0.00099)
<i>Resource abundance</i>		0.0012 (0.0013)		0.0032*** (0.0011)
<i>Openness</i>		0.0019 (0.0013)		-0.0043*** (0.0016)
<i>Ethnic fractionalization</i>		-0.062 (0.12)		-0.26* (0.15)
<i>Population</i>		0.069*** (0.015)		0.014 (0.018)
<i>Constant</i>	-1.39*** (0.10)	-1.34*** (0.19)	-2.41*** (0.15)	-2.29*** (0.20)
R-squared	0.50	0.54	0.63	0.66
Observations	1232	1089	1232	1089

Robust standard errors in parentheses, ***, ** and * denote significance at 1%, 5% and 10% respectively.

As a further robustness test, we rerun the regressions in Table 4 with an alternative measure of democracy, namely the Political Rights Index. Results in Table 4 generally support those in Table 3. The interaction term between democracy and income equality in Table 4 is the only exception. It shows the expected sign but loses statistical significance in the fixed-effect regressions. Moreover, the results for the control variables remain robust.

Table 4 Effect of democracy on corruption: alternative measure of democracy

	Corruption level (-ICRG)			
	Pooled OLS		Fixed Effects	
	(1)	(2)	(3)	(4)
<i>Democracy</i>	0.11*** (0.038)	0.10** (0.048)	0.055 (0.041)	0.14*** (0.051)
<i>Property rights</i>	-0.038*** (0.0024)	-0.030*** (0.0033)	-0.027*** (0.0030)	-0.024*** (0.0032)
<i>Income equality</i>	-0.50*** (0.11)	-0.44*** (0.12)	-0.28 (0.17)	-0.38** (0.18)
<i>Democracy* Property rights</i>	-0.0036*** (0.00070)	-0.0028*** (0.00088)	-0.0021*** (0.00081)	-0.0039*** (0.00092)
<i>Democracy* Income equality</i>	-0.064** (0.028)	-0.058* (0.031)	-0.018 (0.037)	-0.046 (0.040)
<i>GDP per capita</i>		-0.022*** (0.0044)		-0.037*** (0.0051)
<i>Literacy rate</i>		-0.0034*** (0.0012)		-0.0024*** (0.00093)
<i>Resource abundance</i>		0.0011 (0.0013)		0.0031*** (0.0011)
<i>Openness</i>		0.0012 (0.0011)		-0.0046*** (0.0012)
<i>Ethnic fractionalization</i>		-0.083 (0.11)		-0.26* (0.14)
<i>Population</i>		0.059*** (0.015)		0.016 (0.017)
<i>Constant</i>	-0.95*** (0.15)	-0.91*** (0.23)	-2.17*** (0.22)	-1.68*** (0.26)
R-squared	0.52	0.55	0.63	0.67
Observations	1269	1119	1269	1119

Robust standard errors in parentheses, ***, ** and * denote significance at 1%, 5% and 10% respectively.

The previous regressions do not necessarily identify the causal effect of democracy on corruption, since both democracy and corruption might be influenced by an omitted time-varying factor. We therefore introduce IV regressions to deal with potential endogeneity problems. As discussed before, we utilize the Muslim dummy to instrument democracy in our 2SLS regressions. Table 5 results generally support our earlier results. The interaction term between democracy and property rights protection remains statistically significant reporting the same sign. However, the product of democracy and income equality loses its statistical significance while remaining its expected sign. This result actually reflects the fact that the interaction between democracy and income equality is a bit weaker than the one between democracy and property rights protection, as our theoretical model reveals.

Table 5 Effect of democracy on corruption: IV results

	Corruption level (-ICRG)			
	(1)	(2)	(3)	(4)
<i>Democracy</i> (<i>Polity IV</i>)	0.13*** (0.040)	0.090** (0.044)		
<i>Democracy</i> (<i>Political Rights Index</i>)			0.30*** (0.099)	0.19* (0.11)
<i>Property rights</i>	-0.0031 (0.0044)	-0.000097 (0.0048)	-0.052*** (0.0068)	-0.032*** (0.0075)
<i>Income equality</i>	-0.20** (0.087)	-0.19** (0.088)	-0.039 (0.26)	-0.23 (0.22)
<i>Democracy* Property rights</i> (<i>Polity IV</i>)	-0.0036*** (0.00085)	-0.0026*** (0.00092)		
<i>Democracy* Income equality</i> (<i>Polity IV</i>)	-0.0089 (0.020)	-0.011 (0.020)		
<i>Democracy* Property rights</i> (<i>Political Rights Index</i>)			-0.0098*** (0.0019)	-0.0063*** (0.0021)
<i>Democracy* Income equality</i> (<i>Political Rights Index</i>)			0.029 (0.062)	-0.016 (0.057)
<i>GDP per capita</i>		-0.031*** (0.0061)		-0.029*** (0.0051)
<i>Literacy rate</i>		-0.0023* (0.0013)		-0.0025** (0.0010)
<i>Resource abundance</i>		0.00073 (0.0012)		0.00041 (0.0013)
<i>Openness</i>		-0.0045** (0.0020)		-0.0038** (0.0015)
<i>Ethnic fractionalization</i>		-0.28** (0.11)		-0.19** (0.097)
<i>Population</i>		0.057*** (0.017)		0.048*** (0.016)
<i>Constant</i>	-2.72*** (0.22)	-2.47*** (0.24)	-1.22*** (0.41)	-1.55*** (0.48)
First stage regressions				
F test of excluded IVs				
<i>Democracy</i>	102.77[0.00]	65.92[0.00]	142.89[0.00]	108.21[0.00]
<i>Democracy* Property rights</i>	157.27[0.00]	80.25[0.00]	284.95[0.00]	165.40[0.00]
<i>Democracy* Income equality</i>	183.99[0.00]	162.47[0.00]	324.67[0.00]	280.51[0.00]
Anderson canon. corr. LM statistic	97.62[0.00]	84.79[0.00]	116.78[0.00]	100.36[0.00]
R-squared	0.52	0.60	0.56	0.63
Observations	1232	1089	1269	1119

Robust standard errors in parentheses, p-value in brackets, ***, ** and * denote significance at 1%, 5% and 10% respectively.

In general, the effect of democracy on corruption remains conditional on the protection level of property rights and income distribution in IV regressions. The overall effect of democracy on corruption stays positive in countries with insecure property rights and unequal income distribution, while it turns negative in countries with secure property rights and equal

income distribution. Control variables in IV regressions also have similar signs and significances with those in the previous regressions.

IV regressions can be justified only if the instrumental variable is valid. We hence need to check the validity of our instrument. On the bottom of Table 5 we can see that the Muslim dummy satisfies the relevance condition. We then run original regressions explicitly including the Muslim dummy. We find that the coefficient of Muslim dummy is small and statistically insignificant in Table A1 in the Appendix. It suggests that the Muslim dummy satisfies the exogeneity condition: it influences corruption only through the channel of democracy. The validity of our instrumental variable is thus confirmed.

In all regressions above, economic development significantly depresses corruption, which is consistent with our theoretical prediction and previous empirical results. We here do not care much about the potential simultaneity between corruption and economic development because as Treisman (2000) and Gundlach and Paldam (2009) have documented with the IV approach, the causality in the cross-country analysis is generally from economic development to corruption. As for effects of other controls in our regressions, education attainment and trade openness, significantly and robustly decrease corruption, as contended in prior literature. Resource abundance and country size (population) appear to increase corruption, which is also in line with the earlier research. Ethnic diversity, however, counter-intuitively reduces corruption in our regressions. Treisman (2000) observed that the originally positive effect of ethnic diversity on corruption becomes negative and insignificant when controlling for economic development in cross-country regressions. His interpretation that ethnic diversity only indirectly influences corruption by reducing development, seems at odds with to our negative and significant results. Our theoretical model, however, provides us with a plausible explanation. There is always at least one ethnic group dominant in politics in an ethnically divided country. The pivotal voter in this kind of country therefore belongs to the dominant ethnic group(s). In practice, these ethnic groups are often richer than others due to the power in their hands. *Ceteris paribus*, the pivotal voter in an ethnically divided country, according to our model, will choose a relatively low tax rate since he is comparatively rich. This country then will have a low corruption level according to our mechanism. In other words the seemingly counterfactual effect of ethnic division in our regressions actually provides a substantial support to our theoretical modeling.

To show the overall effect of democracy on corruption, we calculate the marginal effect of democracy on corruption. In our specification, the marginal effect of democracy can be expressed as

$$\frac{\partial y_{it}}{\partial x_{it}^D} = \beta_{democracy} + \beta_{interaction}^P * x_{it}^P + \beta_{interaction}^E * x_{it}^E \quad (18)$$

where y_{it} , x_{it}^D , x_{it}^P and x_{it}^E are corruption, democracy, property rights protection and income distribution indicators of country i in period t respectively, while $\beta_{democracy}$, $\beta_{interaction}^P$ and $\beta_{interaction}^E$ are the coefficients of democracy, the interaction term between democracy and property rights protection, and the interaction term between democracy and income equality. The average marginal effects of democracy computed from regressions with prior specification have been listed in Table 6. We find that the overall effect of democracy on corruption is significantly negative. This supports the notion that democracy reduces corruption. However, we also observe in Table 6 that both marginal effects of democracy in IV regressions are, though not by much, obviously smaller than those in fixed-effect regressions. The most plausible explanation for this is that there might be an unobserved time-variant variable causing: $Cov(x_{it}^D, u_{it}) > 0$ (u_{it} is the error term in equation (16)). Fixed effects estimators hence are biased upwards. If this is the case, we can treat our fixed effects results as upper bounds of the causal effect of democracy on corruption as Acemoglu et al. (2008) suggest.

Table 6 Marginal effect of democracy on corruption

Democracy Measures	Polity IV Index		Political Rights Index	
	FE	IV	FE	IV
Marginal Effects	-0.021*** (0.0080)	-0.053*** (0.013)	-0.083*** (0.023)	-0.15*** (0.037)
Observations	1089	1089	1119	1119

Standard errors in parentheses, ***, ** and * denote significance at 1%, 5% and 10% respectively.

More importantly, with marginal effects in Table 6 we can reinterpret previous empirical research from a new angle. Most previous studies adopt the linear-additive model without interaction terms, to study the relationship between democracy and corruption. The coefficient on democracy in their linear-additive models actually represents the (weighted) average marginal effect of democracy in our interaction model (Brambor et al. 2006). The results obtained in Table 6 are consistent with most previous empirical papers, which support a negative linear effect of democracy on corruption. Our results also show that corruption is, in fact, a nonlinear function of several variables including democracy, property rights and income inequality. As in Sung (2004) and Rock (2009), higher degree terms of democracy such as the quadratic or cubic term in regression can partially reflect the actual nonlinear

relationship between democracy and corruption, and might be significant in some cases, though this kind of polynomial approximation is not very appropriate. In sum, without considering the interactions between democracy, property rights protection and income distribution, previous studies only partially capture the actual effect of democracy on corruption.

4. Conclusion

Democracy is believed to have many beneficial effects on countries. However, does it prevent corruption? Rose-Ackerman (1999, p. 142) stresses: “Democratic elections are not invariably a cure for corruption. Instead, some electoral systems are more vulnerable to special influence than others. When narrow groups wield power, some use legal means, and others are corrupt”. Previous literature provides mixed evidence, which leaves the problem still open. In this study we find strong evidence that the effect of democracy on corruption depends upon other variables such as property rights or income inequality. In particular, we provide a theoretical and empirical investigation of the causal nexus between democracy and corruption. Our theoretical model offers a mechanism through which democracy influences corruption. It extends previous models by introducing property rights and income distribution into the theoretical framework. Our empirical results are consistent with the theoretical model. The effect of democracy on corruption is conditional on income distribution and property rights protection. The findings indicate that democracy will work better as a control of corruption if property right system works and there is a low level of income inequality. On the other hand if property rights are not secured and there is strong income inequality, democracy may even lead to an increase of corruption.

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Appendix

Table A1 Validity of instrument: Muslim

	Corruption level (-ICRG)	
	(1)	(2)
<i>Democracy</i> (<i>Polity IV</i>)	0.030** (0.014)	
<i>Democracy</i> (<i>Political Rights Index</i>)		0.11** (0.044)
<i>Property rights</i>	-0.0098*** (0.0025)	-0.025*** (0.0030)
<i>Income equality</i>	-0.18*** (0.063)	-0.38*** (0.10)
<i>Democracy* Property rights</i> (<i>Polity IV</i>)	-0.00084*** (0.00027)	
<i>Democracy* Income equality</i> (<i>Polity IV</i>)	-0.028*** (0.0090)	
<i>Democracy* Property rights</i> (<i>Political Rights Index</i>)		-0.0039*** (0.00082)
<i>Democracy* Income equality</i> (<i>Political Rights Index</i>)		-0.046* (0.027)
<i>GDP per capita</i>	-0.037*** (0.0052)	-0.032*** (0.0042)
<i>Literacy rate</i>	-0.0027*** (0.0010)	-0.0027*** (0.00095)
<i>Resource abundance</i>	0.00043 (0.0011)	0.00024 (0.0011)
<i>Openness</i>	-0.0023* (0.0013)	-0.0025** (0.0011)
<i>Ethnic fractionalization</i>	-0.16 (0.10)	-0.17* (0.096)
<i>Population</i>	0.062*** (0.014)	0.052*** (0.013)
<i>Muslim dummy</i>	0.094 (0.065)	0.041 (0.060)
<i>Constant</i>	-2.23*** (0.21)	-1.80*** (0.23)
R-squared	0.62	0.63
Observations	1089	1119

Notes: Robust standard errors in parentheses, ***, ** and * denote significance at 1%, 5% and 10% respectively.