

# **Do the effects of corruption upon growth differ across political regimes?**

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### **ABSTRACT**

Many studies find that corruption lowers economic growth. However, most of these studies do not consider whether the effects of corruption upon growth differ across countries. This paper investigates whether the association between corruption and economic growth differs between democracies and authoritarian regimes. Consider illegal corruption and legal lobbying, both forms of rent seeking, as imperfect substitutes. Suppose lobbying is easier to do in democracies. Then, lowering corruption in authoritarian regimes could have greater growth benefits because of the lower substitutability between corruption and lobbying in these countries. Using cross-country, annual data from 1984 to 2007, we regress economic growth on: the inverse of the level of corruption, the degree of democracy, and an interaction term combining the two. We find that coefficients are positive on the first two variables. However, the coefficient on the interactive term is negative, suggesting that the benefits upon growth of controlling corruption are actually greater in authoritarian regimes.

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## 1. Introduction

Understanding the vast differences in income levels and economic growth rates has attracted much attention with many explanations for these differences. Many see these differences stemming from institutional causes as some institutions provide incentives for productive activities whereas others lead to rent seeking.<sup>1</sup> One example of rent seeking is corruption where public officials abuse their power in order to extract payments from firms. Such abuse commonly results in personal gain for those in command at the expense of the populace (World Bank, 1997). Since such practices dissuade productive activities, they have the potential to lower growth (Svensson, 2005).

Corruption has not always been viewed negatively. Earlier studies considered corruption as pro-growth because it allowed firms to avoid distortions caused by government failures. Corruption was seen as “speed up” money that facilitated productive activities (Leff, 1964; Huntington, 1968 and Aidt, 2003). However, in recent years, most views see corruption as lowering growth (Shleifer and Vishny, 1993; Mo, 1991; and Mauro, 1995).<sup>2</sup> Much empirical work has also found negative associations between corruption and growth. We also empirically consider the effects of corruption upon economic growth but we consider a different specification than do most others. We allow the effects of corruption upon economic growth to differ across countries. Perhaps corruption is more harmful for some countries than for others.

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<sup>1</sup> See North (1990), Hall and Jones (1999), and Acemoglu, Johnson, Robinson (2001) for examples and surveys of this literature.

<sup>2</sup> The conventional wisdom among the public is that corruption is anti-growth (see Lambert-Mogiliansky, Majumdar and Radner, 2007). According to the World Bank, corruption is the greatest obstacle to effective social and economic development (Akai, Horiuchi, & Sakata, 2005).

More specifically, we investigate whether the effects of corruption upon economic growth differ across political regimes, namely authoritarian ones versus democracies. Suppose opportunities for rent seeking differ across political regimes. For example, if (legal) lobbying and (illegal) corruption are imperfect substitutes, then a crackdown of corruption should lead to an increase in lobbying. If lobbying of government officials is easier in democratic regimes, then the crackdown upon corruption will have less effect on the *total* level of rent seeking in democracies and so have fewer growth benefits. Our empirical analysis will determine whether this story is viable or not. Past researchers have also considered links between political regime and corruption. However, such research has often considered whether democratization leads to more or less corruption (see section 2 for examples). Instead, we consider whether the type of political regime influences the effects of corruption upon economic growth. To the best of our knowledge, ours is the first paper that empirically examines this issue.

The rest of the paper is organized as follows. Section 2 presents an overview of the different studies on corruption, democracy and economic growth. Section 3 provides more details as to how the type of political regime can influence the effects of corruption upon economic growth. Data for our study is described in section 4. Section 5 then presents the empirical model. Section 6 shows results. Section 7 concludes the paper by providing suggestions for future work.

## **2. Literature Review**

Economists and political scientists have long debated how corruption affects economic growth. Leff (1964) and Huntington (1968) argue that corruption might

enhance growth for two reasons. First, it might be used as “speed money” that allows agents to avoid delays due to bureaucratic red tape. It “greases the wheels”. Second, corrupt employees might work harder because bribes create incentives for greater work effort. On the other hand, Tanzi and Davoodi (2000) view corruption as lowering growth.<sup>1</sup> Mauro (1995) explains the lower growth through corruption’s negative effect on investment. Mo (1991) sees corruption as lowering growth through less political stability. In addition to growth, Gupta, Davoodi, and Alonso-Terme (2002) state that higher levels of corruption increase income inequality and poverty. To the extent that corruption harms growth, then this is most problematic in developing countries as corruption is most pervasive in developing regions (Svensson, 2005).

Another research path has examined the association between democracy and growth although with little consensus. Some studies such as Levine and Renelt (1992) and Alesina et al (1996) find no direct relationship between growth and democracy. In contrast, Barro (1996) asserts a non-linear relationship between the two. At low levels of democracy the effects upon growth are positive while at higher levels of democracy the association among the two becomes negative. Wacziarg and Tavares (2001) considered several channels through which democratization could affect growth: human capital, physical capital, income inequality, openness, etc. Although some channels had positive associations and some negative ones, the total effect upon growth was small. More recent work, however, such as Papaioannou and Siourounis (2008), Rodrik and Wacziarg

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<sup>1</sup> See also Knack & Keefer (1995), Ades & Di Tella (1999), Triesman (2000), Mauro (1998), Shleifer and Vishny (1993).

(2005) and Giavazzi and Tabellini (2005) employ panel techniques and do find that democratization raises economic growth.

Our study considers whether corruption affects growth differently in democracies as opposed to dictatorships. Although we believe we are the first to empirically examine this question, we are not the first to consider that the effects of corruption upon economic growth could differ across countries. Mendez and Sepulveda (2006) examine whether the effects of corruption upon growth differ across government size although they do not find strong evidence that it does. Swaleheen and Stansel (2007) explore whether the impact of economic freedom alters the relationship between corruption and growth. Utilizing a panel specification, they find that corruption raises economic growth in countries with high economic freedom, while corruption lowers growth in countries with low levels of economic freedom. Similarly, Meon and Weill (2010) suggest that corruption is less harmful to efficiency in countries where institutions are less effective.

### **3. Economic Framework**

In every political system, some rent seeking is inevitable, involving large opportunity costs of employing resources in this manner.<sup>1</sup> Svensson (2005) defines rent seeking as “the socially costly pursuit of rents, often created by governmental interventions in the economy”. Murphy, Shleifer and Vishny (1993) [MSV] divide rent-seeking into two forms, namely private and public. Our focus in this paper is on the latter

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<sup>1</sup> Rent seeking lowers social welfare because of misallocation of scarce resources in pursuing redistributive outcomes that are not socially optimal. For a detailed discussion on the effects of rent-seeking on economic outcomes see Krueger (1974), Olson (1982), Bhagwati (1982), Murphy et al. (1993) and Lambsdorff (2002). Also, North (1990) argues that rent-seeking lowers growth.

where corruption redistributes wealth from the private sector to government officials. MSV argue that innovation drives economic growth. But for these innovations to occur, “government-supplied goods” – such as permits, licenses and perhaps import quotas – must be issued to innovators. The high demand of these “goods” makes innovators primary targets of illegal activities which in turn lowers economic growth.

Nevertheless, bribing corrupt officials need not be the only way that rent seeking could occur in pursuit of private gains from public officials. MSV also divide rent seeking into (illegal) corruption and (legal) lobbying<sup>1</sup>. Past work on rent seeking often differentiates corruption from lobbying based on who is being influenced. While corruption is often associated with money given to policy enforcers, lobbying is usually associated with political campaign activities or other practices that aim to influence decision makers as they enact policies (Campos and Giovannoni, 2008).

Harstad and Svensson (2006, 2010) see these two types of rent seeking as substitutable, at least to some degree. They suggest that a firm could switch the rules through lobbying while through bribery it could bend the rules. Firms that successfully lobby the government to change the rules then need not bribe officials to bend the rules.<sup>2</sup> On the other hand, firms that can easily bribe officials might not then lobby for a change in the rules, especially if the outcomes of such attempts are greatly uncertain. Firms, though, could always spend resources to pursue both means and later abandon the type of rent seeking that is less useful.

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<sup>1</sup> Of course, what is a legal activity in one country need not be legal in others.

<sup>2</sup> Of course, this substitutability is not perfect since a corrupt official could require a bribe if he would, instead, fraudulently claim that the firm is not following the rules.

Since we consider lobbying as targeted towards decision makers (representatives/MPs) whereas corruption is targeted toward bureaucrats that enforce the rules, the aforementioned substitutability between corruption and lobbying might not be identical across countries. If opportunities for lobbying are less available in authoritarian regimes with fewer decision makers, then the degree of substitutability between the two is lower in these countries. Perhaps lowering corruption in authoritarian regimes could have greater benefits for economic growth because of the lower substitutability between corruption and lobbying in these countries. We test this hypothesis in the empirical work below.

#### **4. Description of the Data and Descriptive Statistics**

We use annual data from 119 countries from 1984 to 2007. To measure output per capita levels (GDP) and growth rates (GROWTH), we use data from the Penn World Tables, version 6.3. Details of these and other variables are described in the appendix. The appendix also lists our sample countries and categorizes their political regimes following the classification by Papaioannou and Siourounis (2008). The democracy and corruption variables are described below.

Democracy (DEM) is measured using the Freedom House (also known as the Gastil) index. The index begins in 1972 and considers two measures of political freedom. The political rights component measures the extent of free and fair elections, political pluralism and the rights of political minorities. The civil liberties index measures individual liberties such as the freedoms of speech, to practice one's religion, and to peaceably assemble. Both sub-indices range from one to seven where lower numbers



indicate higher levels of freedom. We rescale and invert this variable to the range 0-6 so that higher levels denote more political freedoms.<sup>1</sup>

As an alternative measure of democracy we use the binary variable from Papaioannou and Siourounis (2008). They consider the Freedom House measures but they also consider other factors in assigning countries as democracies or not. They create a dummy variable, DEM\_PS, that takes the value one for a democracy and zero otherwise. Like them, we consider a country as democratic regardless of whether they classify it as “partially democratic” or “fully democratic”. In their classification system, a country is only considered to have democratized if that democratization was sustained and so did not revert back to authoritarianism. Therefore, once DEM\_PS becomes “one” it retains this value throughout the remainder of the sample period.<sup>2,3</sup>

The corruption index comes from Political Risk Services, a private firm that annually publishes the International Country Risk Guide (ICRG). This index is based on the opinion of experts and captures the degree to which “high government officials are likely to demand special payments” and to which “illegal payments are generally expected throughout lower levels of government in the form of bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or

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<sup>1</sup> Even though the Freedom House index is the most commonly used measure in empirical studies, it still has components that are not exactly measures of democracy. For instance, the power of the citizenry to exercise the right to own property, to make free economic resource-allocation decisions and to enjoy the fruits of such decisions are all included (Gastil, 1989). Another potential problem discussed in Barro (1996) stems from the fact that the Freedom House index is an ordinal variable and not a cardinal one.

<sup>2</sup> Unlike the indices of democracy mentioned above, Gerring et al. (2005) consider democracy as a stock variable and so their variable takes on larger values the longer a country remains democratic.

<sup>3</sup> Their dataset ends in 2003. Therefore, to extend DEM\_PS to 2007, we follow their methodology. In addition, we removed Thailand from their set of countries that democratized given the events of 2007.

loans.” ICRG classifies countries on a scale from 0 to 6, with 6 indicating low levels of corruption.<sup>1</sup>

Democratization often accompanies economic reforms and not controlling for these could bias upward the estimated effects of democracy upon economic growth. Therefore, as a robustness check, we control for economic reforms utilizing the dataset constructed by Sachs and Warner (1995) and updated by Wacziarg and Welch (2003). That is a dummy variable [REFORM] that gets the value of one indicating trade openness and zero otherwise 0.<sup>2</sup> Also, we control for economic freedom (ECON\_ FREE)<sup>3</sup> as in Swaleheen and Stansel (2007). Presumably, there is a positive correlation between democracy and economic freedom.

Table 1 Panel A presents descriptive statistics. Table 1 Panel B provides the covariances and correlations between the key variables in our study. The growth rate of real GDP per capita shows significant variation between 88.74 to -64.36 as outliers are clearly present. To better estimate coefficients applicable to the majority of countries, we remove observations whose absolute growth rate is greater than 10%. Nevertheless, the

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<sup>1</sup>An alternative measure of corruption comes from the World Bank’s World Governance Indicators constructed by Kaufmann et al. (1999). Unfortunately, the first year of data begins in 1996 and annual data does not begin until 2000. Despite the diminished sample size, our results are robust to using this WGI measure.

<sup>2</sup> REFORM is constructed based on five criteria. A country is considered closed as long as one of the following criteria holds: (1) average tariff rates are higher than 40%, (2) nontariff barriers covered on average more than 40% of imports, (3) it has a socialist economic system, (4) it has a state monopoly of major exports, and (5) the black market premium exceeded 20%. Their presumption is that this variable is correlated with more general liberalizations. That is free trade policies are correlated with more widespread liberalizations within the economy.

<sup>3</sup> The variable for Economic Freedom is comprised of 10 components and is compiled by Heritage Foundation. Since two of our independent variables – corruption and government- are each included as one of the components of the Economic Freedom we exclude those two components from the Economic Freedom index.

results remain robust to their inclusion. The bottom panel shows correlations. We observe no strong association between democracy and growth or between corruption and growth. On the other hand, corruption and democracy are significantly correlated. However, these correlations do not necessarily imply causal links (or the lack thereof). The next two sections more deeply consider these potential links. Finally, figure 1 shows how the cross-country averages of these variables have evolved over time.

## 5. Methodology

### 5.1 The Model

We employ panel data techniques in order to capture the within country variation within the data. Consider the following empirical specification which we adapt from Ehrlich and Lui (1999), using many of their same control variables. The methodology we are using is also similar with the one Méon and Sekkat (2005) performed:

$$G_{it} = \beta_{0i} + \beta_{1t} + \beta_2 X_{it} + \beta_3 (DEM)_{it} + \beta_4 (CO)_{it} + \beta_5 (DEM*CO)_{it} + \varepsilon_{it} \quad (1)$$

where  $i, t$  denote country and time respectively. GROWTH is the growth rate of real GDP per capita adjusted for PPP. The intercepts  $\beta_{0i}$  and  $\beta_{1t}$  indicate country and year fixed effects in order to control for time invariant factors specific to a country as well as global shocks that influence all countries similarly. Matrix X will initially be empty but will later contain control variables such as the lag of the natural log of GDP per capita (GDP) as well as the population growth rate (GPOP). DEM is the Freedom House

democracy index, CO is the ICRG control of corruption index, and DE\*CO is the interaction term between them. Finally,  $\varepsilon$  denotes the error term where  $E(\varepsilon_{it}) = 0$  for all  $i$  and  $t$ . If  $\beta_5 < 0$ , then an increase in the control of corruption raises growth more in authoritarian regimes.

### *5.2 Potential endogeneity*

Potential endogeneity problems are present in the above empirical framework. Previous studies considered both corruption and democracy as endogenous variables.<sup>1</sup> Haque and Kneller (2005) find two-way causality between corruption and economic development due to the existence of threshold effects and multiple equilibria, explaining why the level of corruption varies across countries. Blackburn, Bose and Haque (2002) also see development (i.e. growth) as affecting corruption. Using a theoretical model, they find that low development regimes are characterized with high incidents of corruption while high development regimes are characterized with low incidents of corruption. Recent empirical studies have considered instruments to address these concerns, such as using ethnolinguistic fractionalization to instrument for corruption in a growth regression as did Mauro (1995). However, Easterly and Levine (1997) posit that ethnic diversity has direct effects on growth, and so is perhaps not a suitable instrument for corruption.<sup>2</sup> The use of fixed effects, though, in our model lessen endogeneity concerns because historical factors that influence growth, democracy, and corruption are

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<sup>1</sup>See Aidt, Dutta and Sena (2007), Ehrlich and Lui (1999), Ades and Di Tella (1999) and Kauffman and Wei (2000) for examples where corruption is endogenous.

<sup>2</sup> Moreover, this instrument or others such as legal origin that have been used in the past are not useful for our purposes since they do not vary over time.

all implicitly captured by the fixed effects. Of course, fixed effects do not resolve these issues and so we will also estimate (1) using difference-GMM estimation techniques. Nevertheless, in the remainder of this section we provide other evidence as to why democracy and corruption can be seen as exogenous in our specification.

Acemoglu, Johnson, Robinson and Yared (2008) [AJRY] argue that income does not lead to democratization. We use a specification similar to theirs:

$$DEM_{it} = \beta_0 i + \beta_1 t + \beta_2 DEM_{it-1} + \beta_3 GDP_{it-1} + \varepsilon_{it} \quad (2)$$

where  $i, t$  denote country and time respectively. The dependent variable is the Freedom House political rights index, the same measure they consider.

From column 1 of table 2, the coefficient estimate of  $\beta_3$  suggests that lagged income is insignificant. This implies that income does not cause democratization once we control for time and fixed effects (AJRY, 2008). Faster growing countries do not appear to be the ones becoming democratic. We perform a similar specification but we replace DEM with the control of corruption (CO) in column 2. Again, the results suggest that income does not cause corruption. These results are not panaceas for alleviating endogeneity concerns but they do provide some indication that increases in income are not driving democratization or the control of corruption.

Unfortunately, other endogeneity concerns also arise. Several papers have considered how democracy affects corruption. Musila (2007) suggests that authoritarian countries are less prone to corruption than countries at intermediate levels of democracy, and, that beyond the threshold level of democracy, more democratic countries are less prone to corruption. He also presents empirical results supporting this conjecture. Shen

and Williamson (2005) suggest that democracy has a positive effect on the perceived level of corruption control. Ali and Isse (2003) also present evidence that political freedom and transparency are positively correlated with corruption control. Conversely, Ehrlich and Lui (1999) affirm that autocratic regimes could achieve growth rates equal to or higher than decentralized democracies because corruption is more constrained in the autocracies.<sup>1</sup> Rivera-Batiz (2002), using a theoretical model, shows that stronger democratic institutions influence governance by constraining the actions of corrupt executives.

In contrast, our work does not consider democracy as a causal factor of corruption. To help show that democracy does not systematically cause corruption (or the lack thereof) we disaggregate countries into two groups, presented in Table 3. The first group consists of countries that were always autocratic throughout our sample period. The second group consists of countries that were initially autocratic but experienced some form of democratization within our sample period. We then take the average change in corruption for each group<sup>2</sup>. For the countries remaining autocratic, CO increased 1.18 on average. For the second group (those becoming democratic), CO increased a nearly identical 1.28 points. The countries that democratized during the sample period did not see a greatly different change in the level of corruption compared to those countries that remained autocratic.

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<sup>1</sup> See also Rock (2008) where he claims an inverted U relationship between the age of democracy and corruption.

<sup>2</sup> For each country we find the difference in corruption between the first year and the last year in our sample period. Then, we obtain the value of the total average change in corruption for each group.

We also list all the countries that democratized during our sample period in Table 4. For each country, we provide the average corruption score for the five years before and after democratization (or for fewer years for the countries where data is not available). For some countries the corruption score went up, for others down, and for others it stayed the same. Therefore, no clear pattern emerges between democratization and changes in corruption.

Taking a step further we separate all the countries that democratized during our sample period into the five categories listed below: a) countries where the corruption index increased by more than one, b) countries where the corruption index increased but by less than one, c) countries where the corruption index decreased by more than one, d) countries where the corruption index decreased but by less than one and e) countries where the corruption index remained the same. Panel B indicates that democratization does not appear to have a “common” effect on corruption across the sample. Ideally, we would hope to see that corruption does not change at all after democratization. However, we believe that the above frequency breakdown gives us to the next best outcome -- no clear relation between democratization and corruption -- which supports (to some extent) our view that democratization is generally not a causal factor of corruption.<sup>1</sup>

An additional step towards addressing endogeneity is the use of dynamic GMM estimation techniques. The specification becomes:

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<sup>1</sup> Treisman (2000) finds that corruption is lower in long-standing democracies but recent democracies are not associated with lower corruption. Presumably, our fixed effects model can capture historical conditions promoting *persistent* democracy and low corruption. On the other hand, recent moves to democracy -- and so ones not captured by the fixed effects -- do not seem to lower corruption. See also Billger and Goel (2009) where they explore the determinants of corruption using quantile regressions. They find that democracy lowers corruption but only in the most corrupt countries.

$$\text{GDP}_{i,t} = \alpha_i + \beta_t + \zeta \text{GDP}_{i,t-1} + \theta Z_{i,t} + \varepsilon_{i,t} \quad (3)$$

where  $Z$  denotes the possibly endogenous variables of DEM, CO, and their interaction. We then take the first difference of (3) to arrive at the growth rate. Because of the potential endogeneity of DEM and CO, we first estimate (3) using the difference estimator of Arellano and Bond (1991) using the second lag of the endogenous variables as instruments. For these specifications, we use a Sargan test to examine whether these instruments are valid. A key assumption is that  $\varepsilon$  is not serially correlated and so we also test the residual for first and second order serial correlation. As shown below, neither the null hypothesis of valid instruments nor the null hypothesis of no second order serial correlation is rejected.

Additionally, we also estimate (3) using the system-GMM estimator from Arellano & Bover (1995) and Blundell & Bond (1998) which improves on the Arellano & Bond (1991) difference GMM estimator. In the case of persistent explanatory variables (which is likely to be the case for our variables), Bond, Hoeffler and Temple (2001) suggest that the first-differenced GMM estimator can produce biased coefficients since the lagged levels of these variables serve as weak instruments. Alternatively, the Blundell & Bond (1998) system GMM estimates equation (3) in both first differences and levels which obtains more moment conditions thereby increasing efficiency.<sup>1</sup> See

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<sup>1</sup>A critical assumption, however, of system-GMM is that the fixed effects are not correlated with changes in the endogenous variables.



Blundell & Bond (1998), Hauk and Wacziarg (2009) and Roodman (2006) for further details.

## **6. Econometric Results**

In table 5 we present the baseline results obtained from our fixed-effects model in (1). In column 1, we estimate the first specification without including any explanatory variables but corruption, democracy and the interactive term. We then add other control variables one at a time. Column 3 shows results when adding GDP and GPOP as in Ehrlich and Lui (1999). We find positive coefficients for corruption and democracy. The control of corruption and the level of democracy are positively associated with economic growth. Columns 2 and 4 repeat these specifications but only for countries that were not always democratic during the sample period.

These results are in line with empirical findings from previous studies. Firstly, more recent studies show that democracy enhances growth (Papaioannou and Siourounis, 2008; Rodrik and Wacziarg, 2005). Secondly, we provide evidence that corruption lowers economic growth (Mauro, 1995). However, the coefficient on the interactive term is negative. The association between corruption and economic growth is less positive in democracies, suggesting that the benefits upon growth of controlling corruption are actually greater in authoritarian regimes as we hypothesized. The results are robust when we replace the Freedom House index with the DEM\_PS indicator (Papaioannou & Siourounis, 2008). Column 1 of Table 6 presents these results when no other control variables are included in our specification. Column 2 presents the results after we control

for population growth and the level of initial income. In both cases the coefficient of the interactive term between corruption and DEM\_PS remains statistically significant.

To explore the economic magnitude suggested by these coefficient estimates, consider three hypothetical countries A, B, C, where the level of democracy is low (DEM=0), average (DEM=3) and high (DEM=6), respectively. For country A and using the coefficient estimates from Table 5 – column 1, growth increases by 0.90 (=0.65 – 0.14\*1) percentage points when CO increases by one standard deviation, 1.39. For country B, the control of corruption raises growth only by 0.31 percentage points. For the fully democratic country C, the control of corruption lowers growth by 0.26 percentage points. Certainly, the results indicate that the effects of corruption upon growth can vary greatly across countries with different political regimes. Most interestingly, the results reveal that the control of corruption might even lower growth in strong democracies. Perhaps corruption in these strong democracies is more benign. Bribes could be used to “grease the wheel” in facilitating the commencement of productive activities and so limiting corruption would then lower growth. This is not to say that corrupt activities always promote growth in democracies nor that these benign forms of corruption are absent in other countries, only that the proportions of these two types of corruption vary across countries.

Table 7 considers additional control variables. Column 1 presents the coefficient estimates when we control for economic freedom from the Heritage Foundation. Swaleheen and Stansel (2007) report that corruption lowers growth where economic freedom is high and lowers growth where economic freedom is low. Since many democracies are considered economically free, perhaps our democracy variables are

proxies for economic freedom which is the real determinant of how corruption influences economic growth. Using the same measure of economic freedom as do Swaleheen and Stansel (2007), the coefficient upon DEM and CO\*DEM remains robust.

Column 2 shows the parameter estimates when we add lagged government purchases (GOV) to the model. Column 3 reports results with lagged investment (INV). Column 4 considers both. In all three columns, the coefficients on CO, DEM, and DEM\*CO remain robust. Column 5 adds REFORM. As before, corruption, democracy, and their interaction term remain statistically significant.<sup>1</sup>

As an additional robustness check we performed dynamic GMM estimation as discussed above. Table 8 presents these results for both difference-GMM and system-GMM estimators. We run a specification with the only regressors being the lagged dependent variable, corruption, democracy and the interactive term between the two. We consider all three variables endogenous and use their second lags (or second and third lags) as instruments. The results of the GMM estimates are in agreement with the ones obtained from the fixed effects model. Both the coefficient estimates of control of corruption and democracy are significant and positive. In contrast, the interactive term between the two is negative and statistically significant. In columns 2 and 4 of Table 8 we replace the Democracy index with the one compiled by Papaioannou and Siourounis (2008) to obtain similar results with the previous measure of democracy. Lastly, all six specifications in Table 8 pass the Sargan and the second order serial correlation tests.

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<sup>1</sup> We also considered life expectancy as an additional control variable although many observations are missing and so we do not report those results here. Nevertheless, the coefficients on DEM, CO, and their interaction remained significant.

## 7. Conclusions

Using a fixed-effects model and annual panel data from 1984 to 2007, we regressed economic growth on various controls and three additional variables: the inverse of the level of corruption, the degree of democracy, and an interaction between the two. We find that the control of corruption and the level of democracy are positively associated with economic growth. However, the coefficient on the interactive term is negative. The association between corruption and economic growth is less positive in democracies. Several checks were performed to address endogeneity concerns.

We speculated that corruption and lobbying are two forms of rent seeking and that they are imperfect substitutes. With greater opportunities for lobbying in democracies, lobbying provides for a better substitute with corruption than it does in nondemocracies. Therefore, controlling corruption in nondemocracies will have greater effects on growth. Our findings provide some evidence that these conjectures are correct. However, the empirical work in this paper does not directly test these conjectures and so perhaps other possibilities can explain our findings. Future work will more carefully examine the substitutability between these forms of rent seeking and how they could vary across political regimes.

In addition, we also found that controlling corruption could even lower growth in strong democracies and speculated that the nature of corruption could also differ across countries. Perhaps corrupt activities are more productive in one set of countries, such as strong democracies, where bribes could more likely be used as “speed money” to help launch productive projects. Controlling corruption in these countries might then lower growth. Further examining this possibility is also left for future work.

## **Appendix**

### **Variable Definitions and Sources**

**GROWTH:** Annual growth rate of GDP per capita adjusted for PPP. Source: Penn World Tables, version 6.3 (Constant Prices: Chain Series).

**GDP:** Natural log of GDP per capita adjusted for PPP. Source: Penn World Tables, version 6.3 (Constant prices: Chain Series).

**GOV:** Annual Government Share of Real GDP per capita. Source: Penn World Tables, version 6.3 (Constant \$).

**INV:** Annual Investment Share of Real GDP per capita. Source: Penn World Tables, version 6.3 (Constant \$).

**REFORM:** Dummy variable that indicates whether a country is open to trade. Source: Sachs and Warner (1995) and Wacziarg and Welch (2003).

**ECON\_FREE:** Index of Economic Freedom from Heritage Foundation.

**GPOP:** Annual Population Growth. Source: World Bank World Development Indicators CD-ROM (2009 Edition).

**CO:** International Country Risk Guide indicator of corruption from Political Risk Services, Inc.

**DEM:** Freedom House (Gastil) Index.

**DEM\_PS:** Dummy variable for democratization events; 0 before; 1 after and can be used as a proxy for democracy. Papaioannou & Siourounis (2008).

The classification of countries in Table 9 between democratic and authoritarian regimes is taken from Papaioannou and Siourounis (2008).

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Table 1: Summary Statistics and Correlation, Covariance Matrices

Panel A: Summary Statistics

Variable	Observations	Mean	Maximum	Minimum	Std. Dev.
Growth Rate of Real GDP per capita	2823	1.66	88.74	-64.36	6.61
CO	2823	3.09	6	0	1.39
DEM	2823	3.38	6	0	1.99
DEM_PS	2823	0.55	1	0	0.49
GDP	2823	8.71	11.38	5.03	1.21
GOV	2823	16.83	62.44	3.05	7.93

Panel B: Correlation and Covariance Matrices

Observations	Covariance	Correlation	Observations	Growth	CO	DEM	DEM_PS	GDP	GOV
Growth	43.73	1.00	2823						
CO	0.47	0.05	2823	1.93	1.00				
DEM	1.42	0.10	2823	1.43	0.51	3.99			
PS_DEM	0.36	0.11	2823	0.25	0.37	0.82	0.24		
GDP	0.86	0.10	2823	0.88	0.52	1.19	0.20	1.48	
GOV	-1.80	-0.03	2823	-0.25	-0.02	-1.66	-0.26	-2.10	62.90
									1.00
									2823

**Table 2: Total Average Change in Corruption for the period 1984-2007**

GROUP A	Change in Corruption	GROUP B	Change in Corruption
Albania	3	Algeria	1.5
Bangladesh	2.041667	Angola	1
Brazil	1.416	Bahrain	1
Bulgaria	2	Brunei	2.5
Chile	1.16	Burkina Faso	2
El Salvador	0.5	Cameroon	2.25
Ethiopia	1	China	1.875
Ghana	0.083	Congo, Dem. Rep.	1
Guatemala	0.5	Congo, Republic of	2
Guyana	1	Cote d'Ivoire	0.7
Hungary	1	Cuba	0.5
Indonesia	2.04	Egypt	0.33
Iran	1	Gabon	1
Korea, Republic of	0.33	Guinea	1
Madagascar	4	Guinea-Bissau	0
Malawi	2.125	Haiti	1
Mali	1	Iraq	1.66
Mexico	1	Jordan	0
Mongolia	2	Kenya	1.5
Mozambique	2.33	Kuwait	0
Nicaragua	0.5	Liberia	1.5
Niger	2.7	Malaysia	2.16
Nigeria	0.16	Libya	1.5
Panama	0	Morocco	1
Paraguay	0.75	Oman	0.5
Philippines	2	Qatar	0.5
Poland	0.5	Saudi Arabia	1.33
Romania	0.5	Sierra Leone	0.5
Senegal	0.5	Singapore	1.5
South Africa	3.5	Somalia	3
Suriname	0	Sudan	0.41
Tanzania	0.74	Syria	0.58
Thailand	1.5	Togo	0.5
Uruguay	0	Tunisia	1
Zambia	1.91	Uganda	1
		United Arab Emirates	1
		Vietnam	0.95
		Zimbabwe	3.33
Total Avg. Change in Corruption	1.28		1.18

Group A: Countries that experienced some form of democratization between 1984 -2007.

Group B: Countries that were always autocratic in the period 1984-2007.

**Table 3: Average Corruption Score – Democratized Countries between 1984 -2007**

**PANEL A:**

Country	5 years before Democratization	5 years after democratization		Country	5 years before Democratization	5 years after democratization
Albania	4.00	3.57	19	Mongolia	4.00	4.00
Bangladesh	0.02	1.67	20	Mozambique	4.00	4.00
Brazil	3.41	4.00	21	Nicaragua	4.88	5.00
Bulgaria	3.58	4.20	22	Niger	1.72	0.80
Chile	3.00	3.00	23	Nigeria	1.90	1.00
El Salvador	2.23	3.33	24	Panama	2.00	2.00
Ethiopia	2.32	2.00	25	Paraguay	0.80	2.03
Ghana	3.10	2.42	26	Philippines	0.56	2.00
Guatemala	2.00	3.80	27	Poland	4.00	4.98
Guyana	1.00	2.15	28	Romania	2.00	3.90
Hungary	4.00	4.95	29	Senegal	3.00	3.00
Indonesia	0.27	2.20	30	South Africa	5.00	4.73
Iran	3.63	3.79	31	Suriname	2.28	3.00
Korea, Republic of	2.21	2.75	32	Tanzania	4.00	2.78
Madagascar	4.00	4.00	33	Thailand	3.00	3.00
Malawi	3.50	3.00	34	Uruguay	3.00	3.00
Mali	1.45	2.60	35	Zambia	2.00	3.33
Mexico	2.90	2.73				

**PANEL B: Corruption Index - Frequency Breakdown**

Increased by <1	Increased by >1	Remained the same	Decreased by <1	Decreased by >1
Brazil	Bangladesh	Chile	Albania	Tanzania
Bulgaria	El Salvador	Madagascar	Ethiopia	
Hungary	Guatemala	Mongolia	Ghana	
Iran	Guyana	Mozambique	Malawi	
Korea, Republic of	Indonesia	Panama	Mexico	
Nicaraguw	Mali	Senegal	Niger	
Poland	Paraguay	Thailand	Nigeria	
Suriname	Philippines	Uruguay	South Africa	
	Romania			
	Zambia			

Table 4: PANEL DATA REGRESSIONS: Fixed Effects Models

	Dependent variable	
	Democracy	Corruption
	1	2
1984-2007		
Constant	1.31*** (0.44)	0.57 (0.57)
DEM (-1)	0.82*** (0.01)	
GDP (-1)	-0.07 (0.04)	-0.01 (0.06)
CO (-1)		0.84*** (0.01)
R <sup>2</sup>	0.96	0.93
# of Countries	119	119
# of observations	2732	2705

(i) Standard errors in parentheses

(ii) \*\*\* and \*\*denote significance at the 1% and 5% levels, respectively

(iii) Regressions performed utilized White heteroskedastic-consistent covariance matrices

Table 5: PANEL DATA REGRESSIONS: Fixed Effects Models

Dependent variable: annual per capita GDP growth (1984 – 2007)				
	1	2	3	4
Constant	-1.56 (1.117)	-1.73** (1.49)	73.40** (14.96)	33.96*** (10.45)
CO	0.659** (0.332)	0.94*** (0.48)	0.85** (0.42)	1.02* (0.59)
DEM	0.878*** (0.296)	1.40*** (0.47)	1.01*** (0.35)	1.24** (0.54)
CO*DEM	-0.149** (0.074)	-0.41*** (0.13)	-0.24*** (0.09)	-0.38** (0.16)
GDP(-1)			-8.60*** (1.75)	-4.65*** (1.19)
GPOP			-0.03** (0.50)	0.80* (0.591)
R <sup>2</sup>	0.11	0.11	0.17	0.29
# of Countries	119	76	119	76
# of observations	2823	1803	2713	1641

(i) Standard errors in parentheses

(ii) \*\*\* and \*\* denote significance at the 1% and 5% levels, respectively

(iii) Regressions performed utilized White heteroskedastic-consistent covariance matrices

Columns 2 and 4 remove countries that were always democratic during the sample period.

Table 6: PANEL DATA REGRESSIONS: Fixed Effects Models  
 Robustness Checks using alternative measure for Democracy

Dependent variable: per capita GDP growth		
	1	2
1984-2007		
Constant	-0.10 (0.79)	35.65*** (10.07)
CO	0.38 (0.30)	0.37 (0.26)
DEM_PS	2.03** (0.93)	2.24** (0.87)
CO*DEM_PS	-0.73*** (0.30)	-0.67** (0.30)
GDP(-1)		-4.63*** (1.24)
GPOP		0.88*** (0.30)
R <sup>2</sup>	0.18	0.28
# of Countries	76	76
# of observations	1780	1641

(i) Standard errors in parentheses

(ii) \*\*\* and \*\*denote significance at the 1% and 5% levels, respectively

(iii) Regressions performed utilized White heteroskedastic-consistent covariance matrices



Table 7: PANEL DATA REGRESSIONS: Fixed Effects Models with additional control variables

Dependent variable: per capita GDP growth (1984-2007)					
	1	2	3	4	5
Constant	-3.62 (3.87)	34.57*** (8.72)	32.64*** (9.97)	36.54*** (9.29)	20.13*** (7.59)
CO	1.36** (0.67)	1.10** (0.57)	1.03* (0.58)	1.00* (0.57)	0.91* (0.55)
DEM	1.48*** (0.52)	1.23*** (0.52)	1.26** (0.53)	1.20** (0.53)	1.05** (0.45)
CO*DEM	-.30** (0.14)	-0.35*** (0.15)	-0.37** (0.15)	-0.34** (0.15)	-0.29** (0.13)
GDP(-1)		-4.46*** (0.95)	-4.65*** (1.13)	-4.73*** (0.98)	2.82*** (0.83)
GPOP		0.80** (0.41)	0.76* (0.42)	0.76* (0.43)	0.4 (0.33)
GOV(-1)		-0.15** (0.07)		-0.14* (0.08)	-0.11* (0.06)
INV(-1)			0.06** (0.02)	0.03 (0.03)	0.03 (0.04)
REFORM					1.44** (0.66)
ECON_FREE	0.001 (0.98)				
R <sup>2</sup>	0.29	0.30	0.29	0.30	0.29
# of Countries	71	76	76	76	76
# of obs.	838	1611	1611	1641	1365

(i) Standard errors in parentheses

(ii) \*\*\* and \*\* denote significance at the 1% and 5% levels, respectively

(iv) Regressions performed utilized White heteroskedastic-consistent covariance matrices

TABLE 8: Dynamic GMM regressions 1984-2007

	Dependent Variable - Real GDP per capita (GDP)					
	diff-GMM	diff-GMM	diff-GMM	sys-GMM	sys-GMM	sys-GMM
GDP (-1)	1.04 <sup>***</sup> (0.003)	1.04 <sup>***</sup> (0.001)	1.07 <sup>***</sup> (0.009)	1.00 <sup>***</sup> (0.000)	1.00 <sup>***</sup> (0.000)	1.00 <sup>***</sup> (0.001)
CO	0.013 <sup>***</sup> (0.001)	0.010 <sup>***</sup> (0.000)	0.018 <sup>***</sup> (0.003)	0.003 <sup>***</sup> (0.000)	0.003 <sup>***</sup> (0.001)	0.019 <sup>***</sup> (0.001)
DEM	0.027 <sup>***</sup> (0.001)	0.023 <sup>***</sup> (0.001)		0.018 <sup>***</sup> (0.001)	0.010 <sup>***</sup> (0.000)	
DEM_PS			0.11 <sup>***</sup> (0.022)			0.15 <sup>***</sup> (0.132)
CO*DEM	-0.002 <sup>***</sup> (0.000)	-0.001 <sup>***</sup> (0.000)		-0.001 <sup>***</sup> (0.000)	-0.001 <sup>***</sup> (0.000)	
CO*DEM_PS			-0.025 <sup>***</sup> (0.005)			-0.041 <sup>***</sup> (0.003)
Lags of Instruments Included	2	2,3	2	2	2,3	2
# of Countries	119	119	119	119	119	119
# of Observations	2607	2607	2607	2726	2726	2726
Sargan Test (p-value)	0.23	0.95	0.53	0.71	0.98	0.11
AR(2) Test (p-value)	0.46	0.46	0.11	0.43	0.43	0.57

(i) Robust Standard errors in parentheses

(ii) \*\*\* and \*\*denote significance at the 1% and 5% levels, respectively

DEM, DEM\_PS, and CO are all assumed to be endogenous.

**Table 9: Political Regimes (119 cross-sections)**

<b>Political Regime Classification 1984 -2007</b>		
<b>No.</b>	<b>Country</b>	<b>Classification</b>
1	Albania	Democratization: 1992
2	Algeria	Always Autocracy
3	Angola	Always Autocracy
4	Argentina	Always Democracy
5	Australia	Always Democracy
6	Austria	Always Democracy
7	Bahamas	Always Democracy
8	Bahrain	Always Autocracy
9	Bangladesh	Democratization:1991
10	Belgium	Always Democracy
11	Bolivia	Always Democracy
12	Botswana	Always Democracy
13	Brazil	Democratization:1985
14	Brunei	Always Autocracy
15	Bulgaria	Democratization:1991
16	Burkina Faso	Always Autocracy
17	Cameroon	Always Autocracy
18	Canada	Always Democracy
19	Chile	Democratization:1990
20	China	Always Autocracy
21	Colombia	Always Democracy
22	Congo, Dem. Rep.	Always Autocracy
23	Congo, Republic of	Always Autocracy
24	Costa Rica	Always Democracy
25	Cote d'Ivoire	Always Autocracy
26	Cuba	Always Autocracy
27	Cyprus	Always Democracy
28	Denmark	Always Democracy
29	Dominican Republic	Always Democracy
30	Ecuador	Always Democracy
31	Egypt	Always Autocracy
32	El Salvador	Democratization:1994
33	Ethiopia	Democratization:1995
34	Finland	Always Democracy
35	France	Always Democracy
36	Gabon	Always Autocracy
37	Gambia, The	Reverse Transition:1994
38	Ghana	Democratization:1996
39	Greece	Always Democracy
40	Guatemala	Democratization:1996
41	Guinea	Always Autocracy
42	Guinea-Bissau	Always Autocracy
43	Guyana	Democratization:1992

44	Haiti	Always Autocracy
45	Honduras	Always Democracy
46	Hungary	Democratization:1990
47	Iceland	Always Democracy
48	India	Always Democracy
49	Indonesia	Democratization:1999
50	Iran	Democratization:1997
51	Iraq	Always Autocracy
52	Ireland	Always Democracy
53	Israel	Always Democracy
54	Italy	Always Democracy
55	Jamaica	Always Democracy
56	Japan	Always Democracy
57	Jordan	Always Autocracy
58	Kenya	Always Autocracy
59	Korea, Republic of	Democratization:1988
60	Kuwait	Always Autocracy
61	Lebanon	Reverse Transition:1975
62	Liberia	Always Autocracy
63	Libya	Always Autocracy
64	Luxembourg	Always Democracy
65	Madagascar	Democratization:1993
66	Malawi	Democratization:1994
67	Malaysia	Always Intermediate
68	Mali	Democratization:1992
69	Malta	Always Democracy
70	Mexico	Democratization:1997
71	Mongolia	Democratization:1993
72	Morocco	Always Autocracy
73	Mozambique	Democratization:1994
74	Namibia	Always Democracy
75	Netherlands	Always Democracy
76	New Zealand	Always Democracy
77	Nicaragua	Democratization:1990
78	Niger	Democratization:1999
79	Nigeria	Democratization:1999
80	Norway	Always Democracy
81	Oman	Always Autocracy
82	Pakistan	Volatile
83	Panama	Democratization:1994
84	Papua New Guinea	Always Democracy
85	Paraguay	Democratization:1993
86	Peru	Always Democracy
87	Philippines	Democratization:1987
88	Poland	Democratization:1990
89	Portugal	Always Democracy
90	Qatar	Always Autocracy
91	Romania	Democratization:1990

92	Saudi Arabia	Always Autocracy
93	Senegal	Democratization:2000
94	Sierra Leone	Always Autocracy
95	Singapore	Always Autocracy
96	Somalia	Always Autocracy
97	South Africa	Democratization:1994
98	Spain	Always Democracy
99	Sri Lanka	Always Democracy
100	Sudan	Always Autocracy
101	Suriname	Democratization:1991
102	Sweden	Always Democracy
103	Switzerland	Always Democracy
104	Syria	Always Autocracy
105	Tanzania	Democratization:1995
106	Thailand	Democratization:1992
107	Togo	Always Autocracy
108	Trinidad & Tobago	Always Democracy
109	Tunisia	Always Autocracy
110	Turkey	Always Democracy
111	Uganda	Always Autocracy
112	United Arab Emirates	Always Autocracy
113	United Kingdom	Always Democracy
114	United States	Always Democracy
115	Uruguay	Democratization:1985
116	Venezuela	Always Democracy
117	Vietnam	Always Autocracy
118	Zambia	Democratization:1991
119	Zimbabwe	Always Autocracy

Figure 1. Mean Democracy, Corruption, Growth (1984-2007)

