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Corruption and the Institutional Environment for Growth

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Abstract: Several cross-country studies have found that corruption is detrimental to economic growth, but the findings are not universally robust. We utilize the economic freedom index to examine if corruption can facilitate growth by allowing entrepreneurs to avoid inefficient policies and regulations when economic freedom is limited. Using regression analysis, we find that corruption is growth enhancing when economic freedom is most limited but the beneficial impact of corruption decreases as economic freedom increases. Not all areas of economic freedom affect the corruption-growth relationship equally. In particular, we find that when we analyze individual areas of economic freedom the beneficial effect of corruption disappears most quickly when the size of government and the extent of regulation decrease.

JEL classification: D73; H10; O43; O57

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The development policy community widely believes that reducing corruption would improve growth rates in less developed countries. Since 1996 the World Bank has supported more than 600 anticorruption programs and governance initiatives developed by its member countries and publicly sanctioned 338 firms and individuals for corrupt practices. The World Bank also maintains an Institutional Integrity Department that investigates corrupt practices with a staff of more than 50 employees and consultants, and expenditures of more than \$10 million annually (World Bank: 2007).¹ According to Institutional Integrity Department director Suzanne Rich Folsom, “Corruption has a devastating impact on the capacity of governments to function properly; on the private sector to grow and create employment; on the talents and energies of people to add value in productive ways; and ultimately on societies to lift themselves out of poverty” (World Bank: 2007).²

Other development agencies express similar sentiments. For example, according to USAID: “Corruption ... undermines economic development. In the private sector, corruption increases the cost of business through the price of bribes themselves, the management cost of negotiating with officials, and the risk of breached agreements or detection. Although some claim corruption reduces costs by cutting red tape, an emerging consensus holds that the availability of bribes induces officials to contrive new rules and delays” (USAID).³

Despite these widely held beliefs, some economists going back to at least Leff (1964) and Huntington (1968) believe that corruption can enhance growth by allowing individuals to pay bribes in order to circumvent inefficient rules and bureaucratic delays. Simply put, in much of the third world, corruption is needed to get things done. If corruption is reduced without corresponding changes to eliminate inefficient rules, business activity and economic growth may slow. If a first best solution of “good rules” is unavailable then corruption that avoids some of the restrictions created by bad rules becomes a second best solution and an alternative path to growth.

To investigate this hypothesis we examine the empirical relationship between corruption and growth when we interact political and economic institutions with corruption. Previous studies (Mendez and Sepulveda 2006, Aidt, Duta and Sena 2006, and Meon and Sekkat 2005) have examined, with mixed results, how political institutions impact the relationship between corruption and growth. We directly build on this literature by first including proxies for political institutions into our analysis and then interacting them with a measure of corruption. We find the results differ dramatically depending on the

¹ Full website address:

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPUBLICSECTORANDGOVERNANCE/EXTANTI CORRUPTION/0,,contentMDK:21205078~menuPK:384461~pagePK:64020865~piPK:149114~theSitePK:384455,00.html>. <accessed May 2007>

² Full website address given in note 1 above.

type of institutions considered. In particular, corruption is found to be more beneficial to growth for greater levels of democracy, a seemingly perverse result, but one that is consistent with Mendez and Sepulveda (2006). The reverse, however, is found when considering economic institutions; corruption is more beneficial when economic freedom is low, and the benefits diminish as economic freedom improves. We also find that among the different types of economic freedom, this result is driven primarily by the size of government and extent of regulatory burdens.

Our paper proceeds as follows. In the next section we discuss other studies that have examined the relationship between corruption and growth and in particular we focus on the recent studies that have incorporated political institutions into their empirical analysis and describe how our study differs. A description of our data follows in section II. Our empirical methodology and results are presented in the penultimate section. The final section highlights specific findings and offers suggestions for further research in this area.

I. Literature review

I.1.

Numerous academic articles give credence to the development policy community's views about corruption. On the theoretic level Shleifer and Vishny (1993) argue that, for example, when it is necessary to get permission from many individuals for a project, and each has veto power over approval, the cost of corruption will rise and slow economic growth. Myrdal (1968) argues that corrupt officials may use their arbitrary power to create delays and barriers that would not otherwise exist in order to collect more bribes. Krueger (1974) represents a classic study of socially inefficient rent-seeking through corrupt trade restriction enforcement. In cases of corruption such as these, the de facto institutional environment would restrict economic activity more than the de jure legal restrictions on the official books.

However, there is also reason to believe that corruption could be good for economic growth. Leff (1964) and Huntington (1968) theorize that corruption can enhance growth by allowing individuals to pay bribes to circumvent inefficient rules and bureaucratic delays. Similarly, Lui (1985) shows that corruption can shorten the amount of time waiting in queues.⁴ In the face of bureaucratic delays that slow business formation or restrictions that prevent businesses and consumers from exploiting potential gains from trade, corrupt officials who circumvent inefficient rules could actually enhance growth. Some positive level of corruption may even enhance growth in countries with relatively efficient rules. Clague

³ Full website address: www.usaid.gov/our_work/democracy_and_governance/technical_areas/anti-corruption/ <accessed May 2007>

⁴ In the quote above, USAID acknowledged that corruption may be able to reduce costs associated with bureaucratic red tape.

(2003) draws a distinction between the types of corruption which inspire the strongest moral outrage and those which do the most damage to economic development. He argues international agencies focus too much attention on the former, increasing their anti-corruption rhetoric to the point of often creating political instabilities which create their own economic problems. It is also possible that the optimal level of corruption for growth may be small but positive because as corruption decreases it becomes increasingly costly to eliminate it entirely, much like crime in general (Klitgaard 1988). Colombatto (2003) also analyzes corruption theoretically in a variety of different institutional environments and finds that in some cases corruption can be efficient in developed countries as well as in totalitarian ones.

The empirical literature using cross-country data to estimate how corruption affects growth is mixed, reflecting the various offsetting theoretic effects corruption may have. Mauro (1995) produced the seminal study for empirically investigating corruption's impact on growth for a wide cross section of countries. He found that higher levels of corruption significantly decrease both investment and economic growth. Brunetti, Kisunko and Weder (1997), Brunetti and Weder (1998), Campos, Lien and Pradhan (1999), and Wei (2000), all also found that corruption had a negative impact on investment.

Mauro's (1995) finding that corruption negatively affects growth has been less universally supported. Mauro's own findings were sensitive to his choice of specification. Poirson (1998) and Leite and Weidmann (1999) found that corruption has a negative effect on growth. Mo (2001) found that corruption decreases growth after controlling for investment but that the effect of corruption becomes insignificant once education is controlled for. Gyimah-Brempong (2002) studied only African countries and found that corruption decreased growth rates and increased income inequality. However, Brunetti, Kisunko, and Weder (1997) found inconclusive results and Wedeman (1997) found that many corrupt countries have rapid growth rates. In Svensson's (2005) survey article on corruption he updated Mauro's calculations and although he found corruption did have a negative coefficient it was not statistically significant. Svensson concluded that "to the extent we can measure corruption in a cross-country setting, it does not affect growth" (p.39).⁵

Our hypothesis is that the empirical literature is unable to sort out whether corruption is beneficial or harmful to growth in a cross-country setting because most earlier studies have not controlled for institutional quality. In countries where the institutional environment is relatively good, we expect that corruption will mainly take the form of rent seeking activities that slow growth. In contrast, when the institutional environment presents a low level of economic freedom, we expect that entrepreneurs will use

⁵ For earlier surveys of the literature on corruption see Bardhan (1997), Rose-Ackerman (1999), Jain (2001) and Aidt (2003).

bribes to circumvent cumbersome regulations and thus corruption will promote growth.⁶ Next we review the few existing studies that have examined how corruption affects growth while including measures of institutional quality and explain how we add to that literature.

1.2. Corruption, Growth, and Institutions

Recent studies have begun to examine corruption's impact on economic growth contingent on a country's institutional environment. Typically political, rather than economic, institutions have been the focus. Mendez and Sepulveda (2006) use the Freedom House democracy index, which measures civil liberties and political rights. After splitting countries into groups classified as "free" or "not-free," they find no relationship between corruption and growth in "not-free" countries but a small, positive, growth-maximizing level of corruption in "free" countries. This finding is consistent with Klitgaard's (1988) hypothesis discussed above but not consistent with the idea that corruption mitigates some of the impact of poor institutions.

Aidt, Duta and Sena (2006) control for political institutions using the voice and accountability index, one of five indicators of governance constructed by Kaufmann, Kraay, and Zoido-Lobaton (1999). This index attempts to measure the degree to which citizens participate in the selection of their government and have the ability to hold government officials responsible for policy outcomes. Aidt et al. also find a non-linear relationship between corruption and growth once political institutions are controlled, but the pattern is somewhat different from the findings of Mendez and Sepulveda (2006). Aidt et al. conclude that when political institutions are of "low quality," corruption has little impact on growth. However, unlike Mendez and Sepulveda, they find that "high quality" political institutions result in corruption being harmful to growth.

Meon and Sekkat (2005) examine whether corruption "greases the wheels" or "sands the wheels" of economic growth when institutional quality and corruption interact. Their measure of institutional quality combines both political and some economic institutions. They use all five of Kaufmann et al.'s (1999) indicators of governance, namely: A) a "voice and accountability" indicator that measures "the extent to which citizens of a country are able to participate in the selection of governments" (this is the indicator used by Aidt et al. (2006)); B) "lack of political violence," which measures "perceptions of the likelihood that the government in power will be destabilized or overthrown by possibly unconstitutional and/or violent means"; C) "government effectiveness," which measures "perceptions of the quality of public service provision, the quality of bureaucracy, the competence of the civil servants, the

⁶ We recognize that inefficient institutional environments that do not allow much economic freedom may in some cases be intentionally created to allow officials to extract bribes. Furthermore, the underlying cultural capital could jointly cause both corruption and low levels of economic freedom.

independence of the civil service from political pressures, and the credibility of the government's commitment to policies"; D) "regulatory burden," which measures "the incidence of market unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burden imposed by excessive regulation"; and E) "rule of law," which measures "the extent to which agents have confidence in and abide by the rules of society." Meon and Sekkat find that the "regulatory burden" and "voice and accountability" measures are not significant in any of their specifications when they interact them with corruption. They find, however, that the "rule of law" and "government effectiveness" measures are consistently statistically significant when interacted with corruption, and that as institutional quality decreases corruption becomes more harmful to growth. They conclude that on net corruption "sands the wheels" of economic growth, supporting the conventional view, rather than "greasing the wheels" by allowing individuals to circumvent bad governance.

Each of these three studies furthers our knowledge of how political institutional quality impacts the relationship between corruption and growth. Mendez and Sepulveda (2006) and Aidt, Duta and Sena (2006) both find no relationship between corruption and growth in countries with low quality political institutions but they reach conflicting conclusions in countries with high quality political institutions. Meon and Sekkat (2005) find that corruption is harmful for growth overall and that it is even more harmful in countries with low quality political institutions. None of these studies support the view that corruption can increase growth in countries with low quality institutions.

However, none of these studies directly control for the role of economic institutions while investigating the interplay between corruption and democracy. Furthermore, only Meon and Sakkat (2005) examine the connection between economic institutions and the effect of corruption on growth, but their measure of economic institutions is quite limited.

We build on the current corruption-institutions growth literature by examining the relationship between corruption and growth while controlling for, and interacting, both the quality of political institutions and economic institutions. Existing studies have advanced our understanding by pointing to a non-linear relationship between corruption and growth contingent on institutional quality. We also find that when controlling for various types of economic freedom, corruption "sands the wheels" of growth in more autocratic nations but "greases the wheels" of growth in more democratic nations. This is a perverse result but similar to the findings of Mendez and Sepulveda (2006), who did not control for the quality of economic institutions in their study.

Our main interest, however, is in testing specific areas where corruption may be able to grease the wheels to circumvent inefficient regulations and improve growth. We expect that if corruption is to grease the wheels of growth, this would occur in places where the economic freedoms beneficial to

growth are restricted and barriers prevent voluntary exchange from exploiting the gains from trade.⁷ When economic, rather than political, freedom is low, corruption is most likely to improve growth. To test this, we interact both general levels of economic freedom and specific sub areas of economic freedom with corruption, while controlling for the overall level of democracy. Our results are the reverse of those found for democracy-corruption growth relationship. We find that corruption “greases the wheels” of growth when economic freedom is low but the benefit of corruption diminishes when economic institutions improve. Among the different areas of economic freedom (described below), this effect is driven primarily by the separate categories of government size and regulation.

II. Data

Our empirical focus is on the differential impact of corruption on growth, dependent upon the level of economic freedom. We first describe our measures of corruption, and political and economic freedom, and compare them against other measures in the literature. We then briefly describe our other variables.

Our measure of corruption comes from Transparency International’s Corruption Perceptions Index (CPI), which has been utilized in many studies. The CPI is an “index of indexes” that averages scores from 16 different surveys of the perceived level of corruption in a country. A nation must have a score for at least two of the surveys to be included in the CPI. The index is scaled from 0 (most corrupt) to 10 (most clean). In our empirical analysis we have inverted the index so that greater values represent more, rather than less, corruption. The recent studies that examine corruption and growth while controlling for political institutions (Meon and Sekkat 2005, Mendez and Sepulveda 2006, Aidt et al. 2006) use a variety of different measures of corruption, but the CPI is the only measure used in all of them. Thus, our choice of the CPI as a measure of corruption better enables comparison of our results with these studies.

The CPI has been calculated on an annual basis since 1995. The underlying survey scores on which the CPI is based are not available, however, and the number of surveys used to calculate the index and the number of countries covered varies from year to year. The original 1995 index covered only 41 countries, but by 2000 it included 90 countries. The CPI was chosen as our measure of corruption because of data availability, country coverage, and ability to compare our results to prior studies. Although the index is not consistently measured over time, due to the varying number of surveys included, the fact that

⁷ Paldam (2002), and Graeff and Mehlkop (2003), and Goel and Nelson (2005) have used the indexes of economic freedom to examine how economic freedom impacts corruption. They have generally found that the more economic freedom a country has the lower the level of corruption present; however, their studies did not examine how this relationship affects growth. As we show below the inverse relationship between corruption and economic freedom is important for predicting the impact corruption will have on growth.

the CPI is based on multiple surveys with different methodologies helps to reduce measurement error associated with a single survey.

Alternative indexes of corruption are available from the Institute for Management Development (IMD) and the International Country Risk Guide (ICRG). The IMD index covers only 50 countries, however. The ICRG is much more expensive to obtain than the CPI, and it measures the risk involved in corruption rather than the perceived level of corruption. These two proxies for corruption can conceivably differ from each other since public attitudes towards corruption vary between countries (Svensson 2005: 22). However, Mendez and Sepulveda (2005) have shown that for the countries in which the three indexes overlap, the CPI is highly correlated with both the ICRG index (0.91) and the IMD index (0.96), thereby suggesting that the choice of corruption index is unlikely to greatly influence the estimation results.

Our measure of political institutions is the traditional Polity IV index. The Polity IV index ranks a country's political institutions by giving each country a score from -10 to 10, ranging from pure autocracy to consolidated democracy. Polity IV scores are based on: the presence of institutions and procedures through which citizens can express their preferences; presence of institutionalized constraints on the executive; civil liberties for citizens in political participation and their daily lives; the extent of suppression of competitive political participation; and whether chief executives are chosen in a regularized process within the political elite. For ease of comparison to our economic freedom variable described below, and for interpreting interaction coefficients involving this democracy proxy, we have rescaled the Polity IV data to range from 0 to 10.

We chose to measure democracy using Polity IV data rather than the index of political rights and civil liberties from Freedom House used by Mendez and Sepulveda (2006).⁸ The political rights index incorporates a direct measure of corruption which would hinder estimation of an independent relationship between corruption and democracy. Similarly, the civil liberties index is based in part on respect for the rule of law, which many economists treat as a proxy for economic institutions in its own right to measure property rights (Knack and Keefer 1995, Barro 1997, Aron 2000), and is part of the index we use to measure the quality of economic institutions. Given that we want to specifically differentiate between democratic and economic institutions with separate proxy variables, relying on the civil liberties index

⁸ For a general comparison between alternative measures of democracy, see Munck and Verkuilen (2002).

would be problematic.⁹ Still, for our sample, the polity values are strongly correlated with both the political rights index (0.91) and civil liberties index (0.83).¹⁰

Our measure of economic institutions comes from Gwartney and Lawson's *Economic Freedom of the World Annual Report*. Their economic freedom of the world (EFW) index currently uses 37 criteria to measure freedom levels in five broad areas: size of government; legal structure and property rights; access to sound money; freedom to exchange with foreigners; and regulation of credit, labor and business. Each area score is based on the average value of the different components in that area (see Appendix I). Each component is assigned a value from 0 (least freedom) to 10 (most freedom). The overall index value is the simple average of the five area scores.¹¹

The EFW index provides us with a more direct measure of restrictive policies for which the "grease the wheels" form of corruption would be necessary to circumvent. Meon and Sekkat's (2005) measures of government effectiveness, regulatory burden, and rule of law have come the closest thus far to measuring the inefficient *economic* institutions that corruption might circumvent. Indeed, proxies for the latter two are included as part of the EFW index. However, Meon and Sekkat's government effectiveness measure also includes variables that could themselves be proxies for measures of corruption, such as the independence of the civil service from political pressures and the credibility of the government's commitment to policies. Their regulatory burden measure seems more directly related to the form of corruption that could potentially grease the wheels of development, but it is never statistically significant in their regressions. Area 5 of the EFW provides a broader measure of regulation that represents 14 specific components of regulation across the areas of credit, labor, and business. One of the five components of business regulation represents "irregular payments" (C.v.), which could be considered a measure of corruption. As such, this component is dropped from the EFW index we use.¹² Area 2 of the EFW index includes five measures of the legal structure and protection of property rights similar to Meon and Sekkat's rule of law measure.

The EFW index also has the advantage over the Kaufmann et al. (1999) index in its coverage of the size of government (Area 1), which includes measures of government spending, transfers, ownership of enterprises and investment, and tax rates. Clearly, there are opportunities for corruption in these areas that could either grease or sand the wheels of development. The inclusion of measures of access to sound

⁹ Scores for each of the separate components of the political rights and civil liberties indexes are not publicly available so the Freedom House democracy index cannot be purged of these particular elements.

¹⁰ The Freedom House scores are based on rank, so lower values represent more freedom. The indexes were inverted in order to match the Polity method of higher values representing greater democracy, and thus result in positive correlations.

¹¹ Because each area contains a different number of components, this aggregation method (which weights each area equally) does not weight all the individual components equally.

money (Area 3) and freedom to trade with foreigners (Area 4) in the EFW index provide additional areas of institutional variation where corruption could potentially grease the wheels. Meon and Sekkat (2005) do include a measure of trade openness but do not interact it with corruption. Also, their measure includes exports and imports as a percent of GDP, which reflects non-regulatory factors, such as geography, where corruption could not lead to greasing the wheels of development.¹³ The EFW index focuses directly on trade barriers where corruption could potentially increase efficiency and growth. It uses various measures to assess tariff and regulatory barriers to trade, and exchange rate and capital controls. In all of these areas, corruption has the potential to actually improve economic growth. For example, if the de jure rule is a 500 percent tariff rate, and customs officials can be bribed to allow goods in for less than that, international trade, and potentially growth, could increase. Thus, our main contribution to this literature is the introduction of a measure of institutions that, although still imperfect, more directly measures the types of economic policies for which corruption could potentially minimize the harm done by restrictions and thus promote growth. Because separate area scores are available, we can further investigate which, if any, of the economic institutions affect the relationship between corruption and growth.

Our base regression also includes the starting level of GDP per capita and investment to GDP ratio, both taken from the World Bank's *World Development Indicators*. Another standard determinant of growth is the extent of human capital. Country coverage for such variables is often incomplete. Cohen and Soto (2007) are critical of the methodology used to construct the standard cross-national education data sets (such as Barro-Lee). They develop their own education variables from an alternative source but coverage is even more limited. As such, our primary regressions do not include any controls for human capital, but we do consider the effect of including either Barro-Lee (2000) or Cohen-Soto (2007) education variables for robustness checks. Finally, we also include a set of regional dummies to control for any remaining unobserved heterogeneity that may differ systematically by geographic location.¹⁴

¹² We thank Bob Lawson for rescaling the area 5 scores and the overall EFW index without component C.v. when he sent us the EFW data.

¹³ Area 4 (Freedom to Exchange with Foreigners) component C of the EFW index includes a measure of the actual size of the international trade sector compared to the expected size. This measure may suffer from similar problems, but it does take account of structural and geographic characteristics of the country when calculating the expected size. Furthermore, it only accounts for four percent of the overall EFW score (20 percent of a country's Area 4 score).

III. Analysis

III.1. Descriptive Statistics

Our period of analysis is determined by the availability of CPI data, which begins in 1995. To avoid the potential for single year anomalies, we use average values for the explanatory variables (except starting year GDP to capture the “catch-up” effect). Averages over several years are also important for our main variables of focus because corruption and economic freedom are likely long-term phenomena that only change slowly and also because our measures of corruption are surveys of peoples’ opinions, which are likely influenced by many prior years’ experience with corruption.¹⁵ To ensure a sufficient number of years for both averaging the independent variables and still avoid any endogeneity by not overlapping with the growth period used as the dependent variable, we use 1995-2000 values to explain per capita growth over 2000-2005. The corruption variable is the average of all the years from 1995-2000 in which a country was rated. The economic freedom variable is the average value of 1995 and 2000 (annual data are not available until after 2000). The investment and democracy variables are the average for all years from 1995-2000. Initial GDP is measured in constant 2000 international dollars PPP. Our preliminary, complete data set includes 83 nations (see Appendix II). Finally, for the education variables we use the average for the number of years of schooling for 1995 and 2000 from the Barro-Lee dataset, and 2000 from Cohen and Soto (2007) who do not have measures for 1995. Including education reduces the sample to either 72 or 67 nations respectively (see Appendix II).

Descriptive statistics for the full set of 83 nations appear in Table 1. Among the economic freedom categories, freedom is highest on average for area 3 (sound money) and area 4 (international trade) and lowest for area 5 (regulatory burden) and area 1 (size of government). The other four columns stratify the sample by mean levels of democracy and economic freedom. Nations are evenly divided on their levels of economic freedom, with the mean approximately equal to the median, but the distribution is much more skewed in terms of the level of democracy, with the median democratic nation well above the average level.

The average levels in both the higher democracy (III) and higher economic freedom (V) samples are higher for initial wealth and investment, but lower for growth and corruption, compared to the respective lower level samples (II and IV). In the higher democracy (III) compared to lower democracy (II) samples, economic freedom is higher overall and in each separate category, except for area 1 (government size) where it is basically the same. The average level of democracy is also higher for

¹⁴ The regions include: Latin America, Asia, Europe, Africa, Middle East. North America is the default region not included.

¹⁵ The same is true for some of the components of economic freedom, described above.

nations with above average level of economic freedom (IV vs V). Every area of economic freedom is higher on average when the overall level of economic freedom is above average.

In our regression analysis, we will keep the five areas of economic freedom distinct, as studies have shown that their marginal impacts on growth differ (Carlsson and Lundstrom 2002, Heckelman and Knack 2008). Table 2 presents the correlation matrix among corruption, democracy and the areas of economic freedom. The areas of economic freedom are not highly correlated with each other. The highest correlation is only .61, between area 2 (legal structure and property rights) and area 4 (international trade). Area 1 (government size) is the least correlated with other areas of economic freedom, with only very weak positive correlations of .23 to area 5 (regulation) and .12 to area 3 (sound money), and inverse correlations of -.13 to area 4 (international trade) and -.43 to area 2 (legal structure and property rights). Others have shown that even the various components within each area are often not highly correlated with each other and may be more highly correlated with freedom components grouped into other areas (Caudill, Zanella and Mixon 2000, Heckelman and Stroup 2000). For the current version of EFW, 38 distinct pieces of data comprise the index components and subcomponents, so it is impractical to include each component variable separately in the regression analysis. As a compromise, we separate out the five areas of economic freedom in the regressions, keeping in mind that misspecification is still possible if the underlying components of each area have different marginal effects on growth.¹⁶

Democracy is correlated with the overall economic freedom index at the moderate level of .49. The highest correlation is with area 4 (international trade) at only .57, and there is basically no correlation with area 1 (government size), registering only at -0.02.

Consistent with the large differences in average corruption level presented in Table 1, Table 2 shows that corruption is highly inversely correlated with the overall EFW index, and with four of the five individual economic freedom areas. In particular, the correlation between corruption and freedom area 2 (legal structure and property rights) is -.93. Corruption is positively correlated only with area 1 (government size), but the correlation is modest at .30. The inverse correlation between corruption and democracy (-0.53) is also much weaker than between corruption and overall economic freedom.

III.2 Regression Analysis for Corruption, Democracy, Economic Freedom, and Growth

Regressions were initially estimated using Ordinary Least Squares. As described above, the independent variables include log initial GDP, investment, democracy, corruption, and a set of regional dummies to control for other inter-regional heterogeneity. While the coefficients on the control variables for GDP,

¹⁶ See Ayal and Karras (1999) and Heckelman and Stroup (2000), which show differing marginal impacts of the economic freedom components on growth using earlier versions of the EFW that contained fewer total components.

investment, and democracy, each had the expected sign, none came close to achieving statistical significance (corruption was not significant either). However, a White test rejected the null of no heteroskedasticity.¹⁷ A general White robustness correction did not affect the standard errors very much. A similar issue confronted Clarke (1995) and Fölster and Henrekson (1999) in their growth regressions, so they adopted Weighted Least Squares (WLS) as their preferred estimator. Because they used panel data, their weights for each country observation were based on the standard deviation of the country residuals. In a pure cross-section format such as ours, we are unable to follow suit.

Instead, we note that Fölster and Henrekson (1999) suggested growth will tend to vary less among larger nations because growth is measured as the average of growth in subregions, and subregions in larger nations tend to be more economically integrated, which, due to regional policy, factor mobilization, and other reasons will tend to smooth growth, compared to smaller countries. Based on this rationale, we use country population as our proportional weighting variable.¹⁸ This estimation technique was also used by Heckelman and Knack (2008) for their growth regressions.

Table 3 presents the WLS regressions.¹⁹ In column I, each estimated variable coefficient retains the same sign as in the OLS regression, and is now statistically significant at the 5% level. The negative coefficient on initial GDP supports evidence for conditional convergence, and higher levels of investment, democracy, and corruption also are shown to promote growth. The latter finding supports Wedeman's analysis (1997) but is counter to the empirical studies of Mauro (1995) and Mo (2001).

Column II includes measures of economic freedom. These estimates show that not all areas of economic freedom have the same impact. In particular, only freedom in areas 2 and 5 are significantly beneficial to growth, while an increase in freedom in area 1 is marginally harmful to growth. Based on the relative magnitudes of the area coefficients, the net impact from an equal across-the-board increase in every area of economic freedom is positive for growth overall.

A comparison of estimates from regressions (I) and (II) also shows the importance of controlling for economic freedom. The signs and significance for initial GDP, investment and corruption remain the same, but in regression (II) the impact of initial GDP and corruption are now enhanced, while the effect for investment is reduced (but still statistically significant). Because of the high degree of inverse correlation between corruption and economic freedom, failure to control for economic freedom can lead

¹⁷ The test statistic of 2.36 is distributed as $F(13,68)$ with p-value of 0.01. An alternative test statistic of $N \cdot R^2 = 25.52$ is distributed as $\chi^2(13)$ with p-value of 0.02.

¹⁸ Our results do not substantially differ if we applied a two-step WLS, using the residuals from OLS as the weighting proportion.

¹⁹ WLS contains no constant term, as the intercept is now the inverse of population (relative to the mean). As such, we do not report R-square measures because they do not retain their normal interpretation without a constant term. We also do not report specific estimates for the various regional dummies (Latin America, Asia, Europe, Africa, Middle East).

to a bias in the estimated impact of corruption. In additional regressions not presented in the table, we also find that if only one area of economic freedom is included at a time, the estimated coefficient for corruption remains positive and significant for areas 1, 2 and 5 at 5%, and area 4 at 10%. The estimated coefficient for corruption is also positive but not quite significant at 10% when controlling only for area 3 freedom. Thus, no matter which area of economic freedom was included, corruption was never found to reduce growth, and typically benefits growth. The increased impact of corruption shown in Column (II) appears to be driven primarily by controlling for area 2 (legal structure and property rights), as the coefficient on corruption jumps to 6.3 (t-statistic = 5.3).

The other major change between estimates from columns (I) and (II) is the effect of democracy is now negative, and weakly significant at the 10% level. Thus, controlling for economic freedom reverses the impact of democracy on growth. Even when controlling for just one area of economic freedom at a time (additional regressions not reported in the table) the impact of democracy is always reduced, and falls below the 5% level of significance for area 3, and below 10% for area 4. Again, area 2 appears to be the critical area needed to be controlled to generate the negative and significant coefficient on democracy (t-statistic = -2.1). Using the Freedom House index of democratic freedoms and the overall EFW Index, Gwartney, Lawson and Holcombe. (1996) find that economic freedom significantly benefits growth when controlling for democracy, but the reverse does not hold. Depending on the particular area of economic freedom controlled, and the level of statistical significance accepted, our results can be interpreted as broadly supportive of their findings.

III.3. Differing Effects of Corruption on Growth

In separate samples, Mendez and Sepulveda (2006) found the effect of corruption to be small but beneficial in nations rated democratically “free” by Freedom House, and that it had no impact in “not free” nations, suggesting a relationship on the interplay of democracy and corruption which they hypothesize might follow Klitgaard’s (1998) theory. One problem as previously noted is that the Freedom House democracy index directly considers the degree of corruption as part of the index score. We can assess the findings of Mendez and Sepulveda in our framework by interacting our Polity democracy variable with corruption. The coefficient on corruption by itself captures the effect of corruption in a purely autocratic nation (democracy = 0), and the coefficient on the interaction term captures changing effect of corruption as democracy begins to improve.

Our estimates, presented in column (III), are roughly in accord with Mendez and Sepulveda (2006), but stronger overall. We find that at the lowest levels of democracy, corruption is harmful to growth but becomes less harmful and eventually beneficial as the level of democracy increases. The

point at which the net impact of corruption becomes positive occurs at a democracy level of only 6.5, which is less than the mean level of democracy in our sample (see Table 1).²⁰

The effect of corruption found so far appears to be somewhat counter-intuitive. Our analysis in the opening sections suggests that the positive impact from corruption would be greatest when economic freedom is limited. To test this hypothesis, we interact our measures of corruption and economic freedom in column (IV).

As expected, the estimated coefficient for corruption is positive and statistically significant indicating that corruption benefits growth when other institutions and policies repress economic freedom to the maximum level possible (EFW = 0). In contrast, when economic freedom improves, the interaction term suggests corruption becomes less beneficial. Eventually, corruption does become harmful, but only at an exceedingly high EFW Index value of 9.6, which while theoretically possible, is not matched by any nations in our sample.²¹ Furthermore, replacing democracy by economic freedom in the interaction term returns the significant impact of investment, perhaps suggesting the democracy interaction was a misspecification. Finally, note also that the estimated coefficients and t-statistics on the separate economic freedom areas all become more positive than in either columns (II) or (III), with areas 3 and 4 now also considered statistically significant. Only area 1 has a negative coefficient, but contributes a negligible effect. These findings are consistent with the view that when a country has poor economic institutions, corruption can allow individuals to avoid inefficient rules that would otherwise slow growth even more. Our analysis is in direct contrast to Mendez and Sepulveda (2006), who found corruption had no impact in “not free” nations and was slightly beneficial in “free” nations, when they investigated only political rather than economic institutions.

III.4. Robustness

We also tested the sensitivity of the corruption effect on growth found in column (IV) to different specifications. To conserve space, Table 4 reports only the coefficient and t-statistics on the corruption and interaction term for each modification, but the control variables otherwise remain the same as the final specification in column (IV) of Table 3. First, we consider dropping each of the control variable categories (investment, democracy, regional dummies) one at a time. Dropping investment has no appreciable effect on either the corruption or interaction term. Dropping democracy allows for the inclusion of two additional country observations for Iceland and Luxembourg that were missing Polity data. The results remain substantially the same. Dropping the set of regional dummies suggests impact of

²⁰ Mendez and Sepulveda used a score of 7.5 as their cut off to break their sample into “free” and “not-free” countries but note that they found substantially the same results with cutoff values in the 5-9 range.

²¹ The five highest rated nations for EFW over the period 1995-2000 are United States (8.28), New Zealand (8.27), United Kingdom (8.06), Ireland (8.05), Switzerland (8.00).

corruption will turn negative at a slightly lower level of overall economic freedom, but still above the highest rated nation in our sample.

Next we added a control for education. Using the Barro-Lee data dropped 10 observations (Appendix II denotes the lost country observations by an asterisk) but results remained substantively the same. Using education data from Cohen and Soto (2007) however, led to different conclusions. Here, the coefficient on corruption is only one third of its previous estimate and is no longer statistically significant, suggesting the positive corruption effect in the absence of any economic freedom is both economically and statistically insignificant. The interaction term is again negative but significant at a lower level. The estimated EFW level at which corruption first becomes harmful occurs at the much smaller value than before. The EFW value of 6.16 is just below the mean and median values for the sample, suggesting that roughly half the nations in our sample are realizing reduced growth due to corruption. At first, this suggests the differences between the Barro-Lee and Cohen-Soto education proxies may be critical to our analysis. However, using the Cohen-Soto data reduced the sample to only 67 nations (denoted in Appendix II by the pound sign). Dropping the education variable for this reduced sample returns the regression back to the exact specification of column (IV) yet the results do not match. The magnitudes of both the corruption and interaction terms are much smaller than in column (IV) (and also somewhat smaller than with the inclusion of education) and neither comes close to achieving statistical significance. This suggests the differing results are not due to the education proxy but rather to the sample selection. Our findings on corruption are therefore somewhat sensitive to the sample. But the Cohen-Soto data reduces the main sample by almost 20%, and as indicated in Appendix II, the missing nations are predominantly Eastern European nations, leading to a bias in the sample if corruption effects differ among those nations.

The remaining rows in Table 4 consider if the effect of corruption is dependent on the particular type of economic freedom. We expect corruption to be more beneficial when the economic institutions necessary for growth are lacking. Judging from the results in Table 3, this appears to be most evident when freedom in areas 2 and 5 are low. Thus we expect the effect of corruption to be positive when these areas in particular are low but eventually to become negative when freedom reaches a high enough level.

Conversely, the positive impact on growth from areas 3 and 4 were less robust. Thus, our expectations on how corruption effects growth dependent on these types of freedom are much more tentative. Similarly, because larger values for area 1 reduce growth at the margin (although generally not to a significant degree), we might speculate that the effect of corruption relative to the level of freedom in area 1 would be the reverse of areas 3 and 4. However, given that the negative impact of freedom in area 1 is basically absent in the preferred specification (IV), this reverse effect is likely to be absent as well.

The estimated effects of corruption dependent upon the specific category of economic freedom are presented in the last 5 rows of Table 4. We find that freedom in areas 2 - 4 does not affect corruption, and that corruption is only found to have a significant impact at all when the interaction is with area 4. Although greater freedom in area 4 would reduce the benefits of corruption, the estimated t-statistic on the interaction term suggests this reduction is not statistically significant. For areas 1 and 5, however, corruption is again shown to be beneficial in the absence of freedom in these areas, but the benefit falls rapidly as economic freedom improves and eventually becomes harmful to growth. The estimated turning point of corruption occurs when freedom in area 1 is close to its mean and median values. For area 5, this occurs at a somewhat higher level; although the estimated value of 6.7 would appear to be feasible for a great number of nations, even the top rated nations in this area just barely manage to miss this threshold.²²

Our results suggest that when freedom from big government and regulations are low, corruption appears to be a beneficial way to circumvent growth-retarding government presence and regulations that would otherwise limit competition. When government size is small or freedom from regulation is already high, corruption becomes harmful to growth. The interpretation of our result for area 5 (freedom from regulation) is straight forward. As hypothesized by Leff (1964) and Huntington (1968) we find that when there are pervasive regulations that limit potential gains from trade corruption allows entrepreneurs to bypass official regulations and further capitalize on growth opportunities. As economies become freer from regulation, corruption serves this beneficial purpose less often. The interpretation of our result for area 1 (government size) requires greater elaboration. Area 1 measures government consumption spending as a percent of total consumption spending, transfers and subsidies a percent of GDP, government enterprises and investment as a percent of total investment, and marginal tax rates. One might theorize that corruption in this area of government would divert government spending away from the optimal provision of public goods and toward private interests while reducing growth in the process. Our results do not support such a view. Alternatively, if the political process serves private interests anyway, perhaps the introduction of explicit corruption actually enhances the process of allocating government funds by directing funds to those most willing to pay for the transfer rather than the most politically connected or largest voting bloc. If the highest bidder is best able to make efficient use of the resource then corruption in area 1 might actually move resources to their highest valued use and thus promote growth. Our results are consistent with this perspective but this conjecture remains more speculative than our conclusion regarding freedom from regulation.

IV. Conclusions

²² The highest rated nations for area 5 are New Zealand (6.63), United States (6.60), Namibia (6.59), and United Kingdom (6.57).

In theory, corruption can be either harmful or beneficial to growth, depending on the quality of the institutional environment. Several cross-country studies have found that corruption slows growth, but these findings are not universally robust. Recent attempts to control for the quality of institutions when examining the impact of corruption on growth have pointed to a potential non-linear relationship between them that depends on the quality of the institutions. However, most of the institutional measures previously employed control for the quality of political rather than economic institutions. By directly examining how controlling for economic freedom impacts corruption's effect on growth, we have more directly tested some areas where corruption may allow entrepreneurs to circumvent bad economic policies that would otherwise reduce growth.

Our initial findings are that corruption can have a positive effect on growth, most likely by allowing people to circumvent inefficient public policies. We further find that the benefits of corruption fall as the economic institutional environment improves. By breaking down the economic freedom index into each of its five areas, we find that corruption is only significantly growth enhancing when countries have low levels of freedom in the areas of government size, freedom to trade internationally, and regulation of credit, labor, and business. When economic freedom in the areas of government size and regulations improve, the benefits of corruption for growth significantly decline, and eventually turn negative.

These findings suggest that policy efforts to lower corruption across the board may not always improve economic growth rates. Instead, the particular form of corruption and the institutional quality of the country need to be addressed. In some cases eliminating corruption may improve growth. But in other instances, such as where inefficient rules limit entrepreneurial opportunities, ending corruption by solving principal agent problems might not improve growth. In these cases corruption with inefficient institutions is a second best result. Efforts at reform should focus on improving economic freedom to reduce the need for corruption rather than ending the discretion of decision-makers. Only after strong economic institutions are in place would reducing corruption be likely to improve growth prospects. Based on our regression analysis, reducing the size of government and decreasing the regulation of credit, labor and business, would do the most to alleviate the need for corruption to enhance growth. Furthermore, improvements in the legal structure and property rights, sound money policies, and freer trade, would also have direct benefits to growth independent of corruption.

Much research remains to be done. Current measures of corruption limit our ability to measure the specific forms of corruption occurring in different countries. More detailed measures of corruption could prove quite illuminating. Moreover, additional research could also examine in what instances the opportunity for growth enhancing corruption leads public officials to create inefficient institutions in the first place.

Table 1 Descriptive statistics: means with standard deviation in parentheses

Sample	<i>Full sample</i> (I)	<i>Democracy</i> <i>< mean</i> (II)	<i>Democracy</i> <i>> mean</i> (III)	<i>EFW Index</i> <i>< mean</i> (IV)	<i>EFW Index</i> <i>> mean</i> (V)
Growth	11.87 (11.73)	12.21 (16.19)	11.72 (9.47)	13.89 (14.81)	9.74 (6.78)
Log Initial GDP	8.92 (1.09)	8.07 (0.99)	9.27 (0.93)	8.58 (1.04)	9.27 (1.04)
Investment/GDP	22.03 (4.72)	21.05 (5.39)	22.44 (4.41)	21.58 (5.10)	22.51 (4.31)
Corruption Index	5.32 (2.27)	6.92 (1.03)	4.66 (2.32)	6.70 (1.19)	3.88 (2.25)
Democracy	7.94 (2.55)	4.40 (1.83)	9.40 (0.68)	6.65 (2.79)	9.29 (1.31)
EFW Index	6.28 (1.00)	5.59 (0.72)	6.56 (0.97)	5.47 (0.59)	7.11 (0.55)
Area 1 index	5.55 (1.61)	5.59 (1.33)	5.54 (1.72)	5.32 (1.50)	5.80 (1.71)
Area 2 index	6.20 (1.75)	5.02 (0.91)	6.69 (1.79)	5.20 (1.04)	7.25 (1.75)
Area 3 index	7.17 (2.19)	6.10 (1.80)	7.61 (2.19)	5.59 (1.81)	8.84 (0.97)
Area 4 index	7.05 (1.00)	6.29 (0.84)	7.36 (0.90)	6.48 (0.95)	7.64 (0.65)
Area 5 index	5.48 (0.57)	5.11 (0.52)	5.64 (0.52)	5.12 (0.45)	5.87 (0.41)
N	82	24	58	42	40

Table 2 Correlations between corruption, democracy, and economic freedom

	Corruption	Democracy	EFW	Area 1	Area 2	Area 3	Area 4
Democracy	-0.529						
EFW Index	-0.760	0.493					
Area 1	0.306	-0.024	0.206				
Area 2	-0.927	0.500	0.706	-0.430			
Area 3	-0.604	0.345	0.898	0.117	0.581		
Area 4	-0.670	0.574	0.699	-0.128	0.611	0.537	
Area 5	-0.632	0.439	0.781	0.228	0.537	0.590	0.527

Table 3 Growth regressions

Specification	I	II	III	IV
Intercept	-16.47 (-0.76)	-43.22 (-1.40)	94.03* (1.85)	-190.01** (-3.90)
Log initial GDP per capita	-3.59** (-2.88)	-5.79** (-4.71)	-5.06** (-4.32)	-5.87** (-5.21)
Investment	2.18** (8.62)	0.97** (2.57)	0.50 (1.30)	0.75** (2.13)
Democracy	1.12** (2.69)	-1.21* (-1.90)	-13.98** (-3.55)	0.07 (0.11)
Corruption	3.50** (2.93)	6.09** (3.73)	-11.13** (-2.03)	24.57** (4.72)
Corruption*Democracy			1.72** (3.28)	
Corruption*EFW Index				-2.55** (-3.70)
<u>Economic Freedom</u>				
Area1		-2.31* (-1.88)	-1.38 (-1.17)	-0.08 (-0.06)
Area2		5.01** (2.30)	4.93** (2.42)	7.94** (3.69)
Area3		0.05 (0.05)	-0.69 (-0.66)	4.15** (2.79)
Area4		-0.17 (-0.11)	0.89 (0.61)	6.92** (2.92)
Area5		9.63** (2.26)	7.36* (1.82)	10.62** (2.72)
Corruption effect turns positive			Democracy > 6.48	
Corruption effect turns negative				EFW > 9.64
Regression F-statistic	142.47**	124.86**	134.18**	139.59**

Notes. Regressions estimated by Weighted Least Squares using initial population. T-statistics in parentheses. Regressions also include regional dummies not reported. N=82.

* significant at 10%

** significant at 5%

Table 4 Sensitivity results for the effect of corruption on growth

Sample	N	corruption	corruption*EF	Corruption effect turns negative
Drop Investment	82	26.46** (5.02)	-2.81** (-4.03)	EFW > 9.42
Drop Democracy	84	24.31** (5.32)	-2.51** (-4.34)	EFW > 9.69
Drop regional dummies	82	27.26** (5.67)	-3.05** (-5.09)	EFW > 8.94
Include Barro-Lee education	72	25.12** (4.10)	-2.57** (-3.04)	EFW > 9.77
Barro-Lee education sample without education included	72	25.83** (4.29)	-2.66** (-3.19)	EFW > 9.71
Include Cohen-Soto education	67	7.89 (1.44)	-1.28* (-1.66)	EFW > 6.16
Cohen-Soto education sample without education included	67	7.26 (1.04)	-0.21 (-0.22)	--
EF area1 interaction	82	13.52** (7.01)	-2.26** (-5.45)	EF area1 > 5.97
EF area2 interaction	82	3.39 (0.61)	0.30 (0.51)	--
EF area3 interaction	82	6.63 (1.54)	-0.06 (-0.14)	--
EF area4 interaction	82	11.63** (1.97)	-0.76 (-0.98)	--
EF area5 interaction	82	39.29** (5.86)	-5.89** (-5.06)	EF area5 > 6.67

Notes. Regressions estimated by Weighted Least Squares using initial population. T-statistics in parentheses. Each regression except where otherwise noted also includes: log initial GDP per capita, investment, measure of democracy, economic freedom for areas 1 – 5, and a set of regional dummies. The interaction for corruption*EF uses the overall Economic Freedom of the World Index except in the last five rows where EF is limited to a specific area score.

* significant at 10%

** significant at 5%

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Appendix I: Components of Economic Freedom of the World

Area 1: Size of Government: Expenditures, Taxes and Enterprises

- A) General government consumption spending as a percentage of total consumption
- B) Transfers and subsidies as a percentage of GDP
- C) Government enterprises and investment as a percentage of total investment
- D) Top marginal tax rate and threshold at which it applies
 - i. Top marginal income tax rate (and threshold)
 - ii. Top marginal income and payroll tax rate (and threshold)

Area 2: Legal Structure and Property Rights

- A) Judicial independence
- B) Impartial courts
- C) Protection of intellectual property
- D) Military interference in rule of law and the political process
- E) Integrity of the legal system

Area 3: Access to Sound Money

- A) Average annual growth of the money supply in the last five years minus average annual growth of real GDP in the last ten years
- B) Standard inflation variability during the last five years
- C) Recent inflation rate
- D) Freedom to own foreign currency bank accounts domestically and abroad

Area 4: Freedom to Trade Internationally

- A) Taxes on international trade
 - i. Revenue from taxes on international trade as a percentage of exports plus imports
 - ii. Mean tariff rate
 - iii. Standard deviation in tariff rate
- B) Regulatory barriers to trade
 - i. Non-tariff barriers
 - ii. Compliance cost of importing and exporting
- C) Actual size of trade sector compared to expected size
- D) Difference between official exchange rate and black-market rate
- E) International capital market controls
 - i. Foreign ownership/investment restrictions
 - ii. Restrictions on the freedom of citizens to engage in capital market exchange with foreigners

Area 5: Regulation of Credit, Labor, and Business

- A) Credit market restrictions
 - i. Ownership of banks – percentage of deposits held in privately owned banks
 - ii. Competition – domestic banks face competition from foreign banks
 - iii. Extension of credit – percentage of credit extended to private sector
 - iv. Avoidance of interest rate controls and regulations that lead to negative real interest rates
- v. Interest rate controls
- B) Labor market regulations
 - i. Impact of minimum wage
 - ii. Hiring and firing practices (determined by private contract)
 - iii. Share of labor force whose wages are set by centralized collective bargaining
 - iv. Unemployment benefits
 - v. Use of conscripts to obtain military personnel
- C) Business regulations
 - i. Price controls
 - ii. Burden of regulation

- iii. Time with government bureaucracy
- iv. Ease of starting a new business
- v. Irregular payments (omitted from this study because it is a measure of corruption)

Appendix II Sample of nations

Albania*#	Latvia*#
Argentina	Lithuania*#
Australia	Malawi
Austria	Malaysia
Bangladesh	Mauritius
Belgium	Mexico
Bolivia	Morocco*
Botswana#	Namibia*#
Brazil	Netherlands
Bulgaria	New Zealand
Cameroon	Nicaragua
Canada	Nigeria*
Chile	Norway
China	Pakistan#
Colombia	Paraguay
Costa Rica	Peru
Cote d'Ivoire*	Philippines
Croatia#	Poland#
Czech Republic#	Portugal
Denmark	Romania
Ecuador	Russia*#
Egypt	Senegal
El Salvador	Slovak Republic#
Estonia*#	Slovenia#
Finland	South Africa
France	South Korea
Germany	Spain
Ghana	Sweden
Greece	Switzerland
Guatemala	Tanzania
Honduras	Thailand
Hungary	Tunisia
India	Turkey
Indonesia	Uganda
Ireland	Ukraine*#
Israel#	United Kingdom
Italy	United States
Jamaica	Uruguay
Japan	Venezuela
Jordan	Zambia
Kenya	Zimbabwe

* missing education data from Barro-Lee
missing education data from Cohen-Soto