

Is corruption endogenous to foreign direct investment in resource-rich developing economies?

by

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I. Introduction

The issue of corruption has recently become a heated debate among economists and international development institutions. The World Bank has identified corruption as among the “greatest obstacles to economic and social development. It undermines development by distorting the rule of law and weakening the institutional foundation on which economic growth depends.” Citing empirical evidence that corruption impedes development and undermines good governance in developing countries, many donor countries and development institutions have emphasized reducing corruption as a major development tool. Despite these sustained commitments and increased efforts, evidence available as of today suggests that the intensity of corruption is far from having subsided and may even becoming worse in some resource-rich developing countries.

As of the late 1990s, due to difficulties associated with measuring corruption, efforts to gauge the impacts of corruption were fraught with ambiguity and controversy; earlier literature on corruption concluded that corruption could be a desirable one. Leff (1964) and Huntington (1968) suggested that bribes acted as “grease money” or “speedy money” which allowed individuals to avoid bureaucratic delay and obtain public goods and hence promoted growth. They argued that corruption acted like a piece meal, thus providing incentives for government officials to work harder. Similar views were shared by Lui (1996; 1985) who argued that corruption acted as an optimal response to market distortion. Their findings, however, were rigorously contested and challenged subsequently as more and more evidence and data become available; Shleifer and Vishny (1993) provided preliminary argument that corruption tend to lower economic growth, and Rose-Ackerman (1978) argued that it is unrealistic to limit corruption to areas in which it might be economically desirable; Murphy,

Shleifer, and Vishny (1991) showed that societies where highly trained individuals were allocated to rent-seeking activities tended to grow slowly.

So, why do we care so much about corruption? Corruption can give rise to deleterious consequences. One of them is its impact on growth. There are a number of ways through which corruption can inhibit growth. Confronted with uncertainty and corrupt bureaucracy, economic agents become reluctant to commit resource to future contracts. Consequently, few investors will allocate their resource in risky economic activities where corrupt bureaucratic practices and malfeasance can wipe away their investment returns. Consequently, investment will decline and hence growth will be depressed. Using ethnic-linguistic fractionalization as an instrumental variable for government institutions and subjective indices of bureaucratic honesty, Mauro (1995) showed that corruption tends to lower saving rate, and eventually lower economic growth. He found that a one standard deviation increase in bureaucratic honesty is associated with a one half percentage point increase in the GDP growth rate.

The changing international economic environment prompted development agencies and governments to argue for the merits of foreign direct investment (FDI) as a primary mean by which developing economies can sustain economic growth. A direct consequence of this initiative was that researchers began to consider corruption as a major determinant of FDI exogenously. Earlier literature, however, failed to establish a negative association between corruption and FDI. Wheeler and Mody (1992) found no strong evidence that corruption reduced inflow of foreign direct investment. A similar conclusion was drawn by Hines (1995). The unavailability of reliable measures of corruption could have contributed to this negative finding as the measure they were using combined twelve other indicators which could well be of less relevance to investors. As higher quality indices became available in

late 1990s, this was no longer an issue and corruption has proven to be negatively associated with FDI. Using commercially available corruption indices and bilateral investment from 14 OECD countries to 45 host countries, Wei (2000) showed that an increase in corruption level from that of Singapore to that of Mexico has the same negative impact on inflow of investment as raising a tax from eighteen percent to fifty percent on investors. To reduce financial and appropriation risks, investors operating in highly corrupt countries are prone to forge joint ventures with local firms. On the other hand, technologically more advanced firms are found to be less likely to engage in partnerships with local firms (Smarzynska & Wei – 2000). Hines (1995) also found that U.S. firms are the least likely to enter joint venture partnerships with local authorities or firms.

While the potential benefits and merits of FDI and the pernicious effects of corruption have been appreciated, one fundamental issue remains unsolved: potential endogeneity of corruption. Our study is fully motivated by asking the questions: Are the consequences of corruption different across economies? Are reactions towards corruption different among investors? How can governments of host economies influence corruption and FDI? We feel that research on the implications of increasing FDI inflow in host countries lags very much behind. None of the studies mentioned earlier address this issue. In conventional FDI empirical studies, the perceived corruption level in host countries is treated as being exogenous and the possibility of a two-way causal relationship between corruption and FDI has largely been disregarded. Consequently, the estimation by OLS will produce inconsistent and biased results should corruption and FDI be jointly determined. In this article, we try to fill this gap by systematically examining how corruption and FDI can co-evolve conditional on the development level and the availability of natural resources.

The rest of the paper is organized as follow. Sections II & III present the case as to why corruption could potentially be endogenous to FDI. Section IV briefly discusses the data used in this study. Section V discusses results followed by conclusions in section VI.

II. Is corruption endogenous to FDI in resource-rich economies?

The preponderance of empirical studies on corruption focus on its consequences, including the factor's propensity to deter the inflow of FDI as it acts like a tax on investors (Wei 2000). It has been assumed here that the determinants and consequences of FDI are formulated by two mutually independent equations, i.e. investors take corruption as given; investors and host economies have no influence on each other and, hence, there is no mutual relationship among them. A growing body of evidence, however, suggests that this might not always be the case. Are there economic or political factors under the control of host countries that can be maneuvered by host countries' government to attract investors and vice versa? Or are host countries merely playing passive roles in determining the direction of FDI? Consider a fledgling economy with abundant natural resource, operating under weak institutions or tenuous political regimes, and is relatively closed to the rest of the world. Also, let's assume that this economy is facing extreme credit constraints with no access to international lending institutions. Will these unique economic and political dimensions play significant role in attracting FDI? Indeed, this study is fully motivated by observing some idiosyncratic behaviors of investors who are not deterred by the pervasiveness of corruption in some host countries. Still, it has always been a convention in FDI literature that investors react pessimistically towards widespread corruption and have no influence on corruption levels in host countries. Investors are being treated in the literature as a homogeneous group of economic agents deliberately eschewing paying bribes, malfeasance, and public grafts. As a result, investors tend to avoid investing in countries with high level corruption. While this may be true for majority of investors, recent developments and evidence surfacing from some

developing countries suggest there may be some cases where corruption and FDI can be jointly determined.

We depart from this strict assumption and assume instead that investors are different in their strategic goals and perceptions towards corruption. Depending upon local economic and political conditions, investors will strategically adjust their operations and modes of entry, and ultimately become attuned to local norms. If promised exclusive rent sharing opportunities and monopolistic power by host governments, investors will gradually become acclimatized to strategies and operational practices conducive to local norms, economic circumstances and political environment. Moreover, the extent to which investors are guaranteed rents and a favorable regulatory framework depends upon the underlying economic and political systems prevailing in host countries, the development level (technological know-how, depth of financial market, infrastructure, etc.), the strength and maturity of institutions under existing political and economic systems, and societal and cultural norms. The amount of bribe payment and license fees demanded by host economies' governments depends upon the rents offered to investors. Definitely, entering a market with high corruption level may entail cost at first. However, to some investors, it may be worth entering the market if the total expected returns exceed costs. In extreme cases, worsening economic and political situations in resource-rich developing economies beset by economic woes such as high inflation will prompt governments to consume more FDI through sale of natural resource in exchange for much-needed foreign currencies. It is, therefore, conceivable that not only can corruption in host countries affect FDI inflow, but FDI inflow can in turn affect the magnitude of corruption.

Countries like Burma, Nigeria, Algeria, Angola, and Indonesia, just to name it a few, offer singularly strong evidence of this. These countries have many similarities: They rank high on corruption level, have abundant natural resources, have weak institutions governed by authoritarian regimes (Burma, Algeria, Angola), and democratic governments (Indonesia, Nigeria) whose bureaucracies are fraught with corruption and excessive red tape. Yet, they remain favorite destinations for many investors, foreign and domestic alike. Burma is ranked by Transparency International (TI) as among countries with the highest level of corruption in the world. Yet it has been receiving a sizable inflow of FDI for many years from Asian nations intent on securing access to its natural resources. Indonesia offers another interesting paradox. Foreign investment stock in Indonesia has been growing steadily despite persistent high corruption. These anecdotal evidences suggest that all investors can not be treated as a homogeneous group. Their tolerance level towards corruption and their adaptability to corrupt environments may be flexible enough for corruption to become less of an issue if promises of rent sharing opportunities exist in host economies.

As we have previously mentioned, rent seeking opportunities available to foreign investors depend upon the level of and abundance of natural resources in host countries. Demand for foreign direct investment (be technical, financial, or legal) will be relatively high in less developed countries endowed with natural resource. The primary reason for this is that there are many practical challenges facing less developed resource-rich economies; liquidity constraints may prevent them from investing in extractive, primary, and lucrative domestic industries; lack of technological know-how prevents them from exploring and exploiting domestic natural resource; and low levels of human capital may not permit them to nurture and develop domestic industries. Faced with these economic and technological constraints,

they are forced to share rents with foreign investors in exchange for much-needed foreign currencies and revenues. Classic example includes, but not limited to, Burma which has entered contracts worth of billions dollar with countries like China, India, and some Asian economies that will permit these countries to explore and exploit its natural resource in exchange for much-needed foreign currencies. In such a situation where an under-developed economy with abundant natural resource exchanges economic rents for foreign revenues with foreign investors, corruption in host countries will not deter some investors from investing, or in the worst scenarios, may even facilitate economic exchange between host countries and foreign investors.

To provide preliminary evidence to support my claim, I present a summary of statistics of how corruption and FDI inflow correlate with each other over time in resource-rich developing economies. Tables 1&2 present data on the average corruption perception index (CPI) (subjective measure of corruption), Polity (an index for democracy), and FDI in millions of dollars flowing into resource-rich economies with income per capital less than US\$ 5000. The Original Corruption Perception Index ranks countries on a scale of 1 to 10 with 1 being the most corrupt and 10 being the least. We reverse the order so that 1 represents the least corrupt and 10 being the most corrupt. Polity is an index for democracy and authoritativeness ranging from a value of -10 to 10 (-10 represents the most authoritarian regime, 10 the most democratic regime and 0 being neutral). We change the original scale by adding 10 so that 1 represents the most authoritarian regime and 20 the most democratic regime, with 10 being neutral. Here, we use income per capita and fuel export as percentage of total merchandise export as proxies for development level and natural resource abundance. Tables 1&2 reveal that the inflow of FDI into resource-rich developing economies has

increased steadily since 2000, while corruption levels remain almost stable over time. Of course, a higher inflow of FDI may be affected by other factors. However, this observation may convince us to a certain degree that the relationship between FDI and corruption may not necessarily be a negative one as existing literature has suggested.

Table (1): Summary Statistics of Economies with GNIPC < \$5000 & Fuel > 10

Year	2000	2001	2002	2003	2004	2005	2006
Average CPI	7.32	7.35	7.33	7.39	7.32	7.20	7.40
Average Polity	10.46	10.79	11.11	10.94	11.00	12.33	10.93
Average FDI (Mil \$)	515	628	743	1009	1443	2079	1551

Table (2): Summary Statistics of Economies with GNIPC < \$5000 & Fuel > 20

Year	2000	2001	2002	2003	2004	2005	2006
Average CPI	7.51	7.46	7.41	7.41	7.28	7.28	7.33
Average Polity	9.68	9.96	10.44	10.17	9.78	10.64	9.75
Average FDI (Mil \$)	518	751	836	1144	1532	1955	2058

III. What Can We Learn From The New Evidence?

If one were to take a 9000-mile-long drive starting at Africa's northernmost part in Egypt and ending at Africa's southernmost extreme in South Africa, one would be amazed to discover that the road on which one is traveling is no different from the state-of-the-art highway in the U.S. The entire journey will cover 12 countries and take 2 weeks. These newly-built highways were constructed with generous financial and technological assistance from the Government of the People's Republic of China. As this journalistic anecdote illustrates, investment dollars coming from China to the African continent have been exploding, reaching a total of US\$100 billion in 2007. In 2006 alone, China signed a trade pact worth US\$60 billion with African countries; between 2000 and 2005, foreign direct investment coming from China totaled US\$ 30 billion. China's commitment to African countries is enormous; in November 2006, China convened the first Sino-African summit in Beijing in a grandiose scale; almost every African leaders attended the summit: big and small, haves and have-nots, the clean and the corrupt, democratic and authoritarian. In 2005, China pledged that investment amounts would grow to US\$100 billion a year within five years¹. As of today, almost all African nations have economic ties with Beijing. China will soon eclipse all major developed economies as the biggest investor in Africa.²

Evidence available today suggests that investors' perception towards corruption may not be as universal as the current literature assumes. Why do countries like China invest heavily in African economies that have always been synonymous with high corruption, civil unrest, poverty, social problems? As far as China's venture in Africa is concerned, the

¹ All statistics adapted from "Dead Aid" by Dambisa Moyo (2009).

² Cited from "Dead Aid" Dambisa Moyo (2009).

motive is clear – China needs access to resources to fuel its exploding economy and fulfill its insatiable demand for energy; Africa needs China's financial and technological prowess; Africa has what China wants; China has what Africa needs. As such, to fully appreciate the impact of corruption on FDI and vice versa, we have to make a clear distinction between foreign direct investment that is circulating around developed economies and resource-rich developing economies.

The point that we are making is that combining developed and developing economies into a single FDI equation may not be appropriate. In fact, investors' reaction to corruption in host economies varies depending upon the type of economies they are dealing with, nature of regimes, and investors' strategic objectives. Table (3) below shows two groups of economies, namely OECD member countries and non-OECD countries. OECD countries constitute 14% of all observations in our sample. Yet, they receive the lion's share of FDI (68%). On the other hand, non-OECD countries make up 86% of entire observations, while taking in only 32% of world FDI share over 2000 to 2006. There is also a huge discrepancy in the average corruption perception index between the two groups; average CPI in OECD countries is 2.26, whereas it is 6.58 in non-OECD countries.

Table (3): Comparison between OECD and Non-OECD Countries (2000 to 2006)

	OECD	Non-OECD
Share of Foreign Direct Investment	68%	32%
# of Observations	168	1036
Percentage in all observations	14%	86%
Average Corruption Perception Index	2.26	6.58

Table (4): Share of World FDI Stock By Economies

	2000	2001	2002	2003	2004	2005	2006
US	21%	21%	12%	10%	19%	10%	13%
UK	8%	7%	3%	4%	10%	19%	10%
Germany	14%	3%	7%	5%	-1%	3%	3%
Luxembourg	NA	NA	16%	14%	10%	11%	9%
Total	43%	31%	39%	33%	38%	43%	36%

It becomes more striking if we further disaggregate OECD countries and take four countries (namely US, UK, Germany, and Luxembourg as shown in Table 5). In 2000, three countries – US, UK, and Germany – took in 43% of world's FDI³ stock. Luxembourg, a very small country with a population of less than half a million, took in 16% of world FDI stock in 2002. Luxembourg is ranked second only to the U.S. in attracting investment funds in the world. Its financial sector accounts for a hefty 30% of its GDP. For Luxembourg, the ability to attract US\$118 billion worth of investment funds a year is a direct consequence of foreign financial institutions taking advantage of a favorable regulatory environment. The key point is that if we are to combine OECD and non-OECD economies together, and then regress FDI on corruption perception index together with other major determinants of FDI, we will for sure get a very strong negative association between corruption and FDI inflow. We feel that pooling all economies in a single OLS equation is an inappropriate research strategy.

³ According to the World Bank, FDI is defined as net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments.

On the other hand, if we break down economies by income level, regime types, and level of resource endowment, the negative association between FDI and corruption becomes less clear and even becomes positive in some situation as illustrated by figure 1, 2, 3, & 4. Figure (1) shows scatter plot of LnFDI Vs CPI for economies whose income per capita is less than \$5000 and whose fuel exports as percentage of total merchandise export exceed 10 percent ($\text{fuel} > 10$). Preliminary investigation shows that the association between LnFDI and CPI has changed from being negative to positive, suggesting that high corruption is positively associated with high foreign direct investment activities in developing economies rich in natural resource. Figure (2) shows scatter plot of LnFDI Vs CPI for economies managed by authoritarian regime ($\text{Polity} < 10$) and whose fuel exports as percentage of merchandise export exceed 30 percent ($\text{fuel} > 30$). Across the four figures, a positive association between FDI and CPI gradually becomes more pronounced. Even in the absence of natural resources, economies run by extreme authoritarian and dictatorial regimes will still be able to attract foreign investment by offering a favorable regulatory environment, and sharing rents with investors. Figure (3) shows a scatter plot of LnFDI Vs CPI conditional on extreme authoritarian regimes ($\text{Polity} < 5$) and figure (4) is conditional on African countries rich in natural resource. In all of these cases, FDI is positively associated with high corruption level. Of course, the data generating process may also be affected by various other factors which we will control for in a subsequent section. Nevertheless, the positive association between corruption and foreign direct investment is strong enough to convince us that the impacts of corruption can be different for different economies and, in some situations, corruption may well be influenced by FDI inflow and hence endogenous to FDI.

Figure (1)
LnFDI Vs Corruption Perception Index (CPI)
(GNIPC < \$5000 & Fuel > 10)

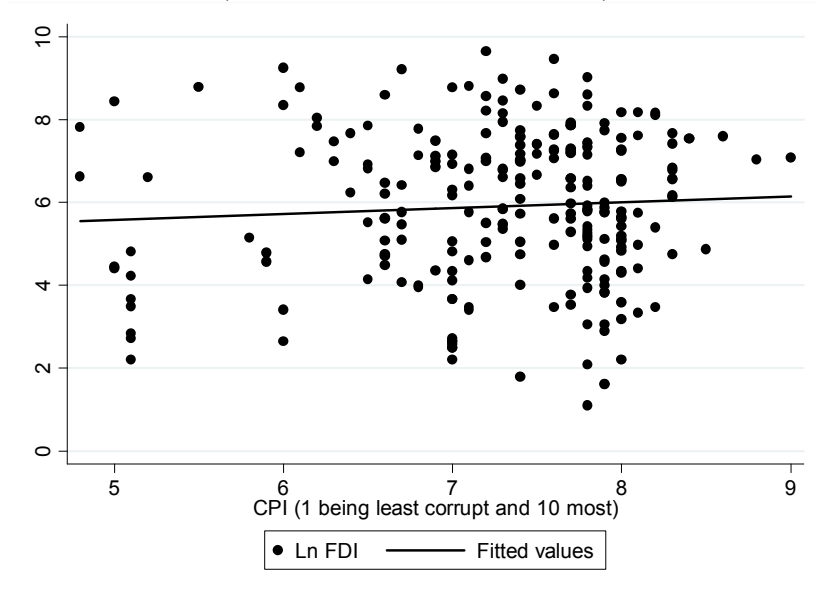


Figure (2)
LnFDI Vs Corruption Perception Index (CPI)
(Fuel > 30 & Polity < 10)

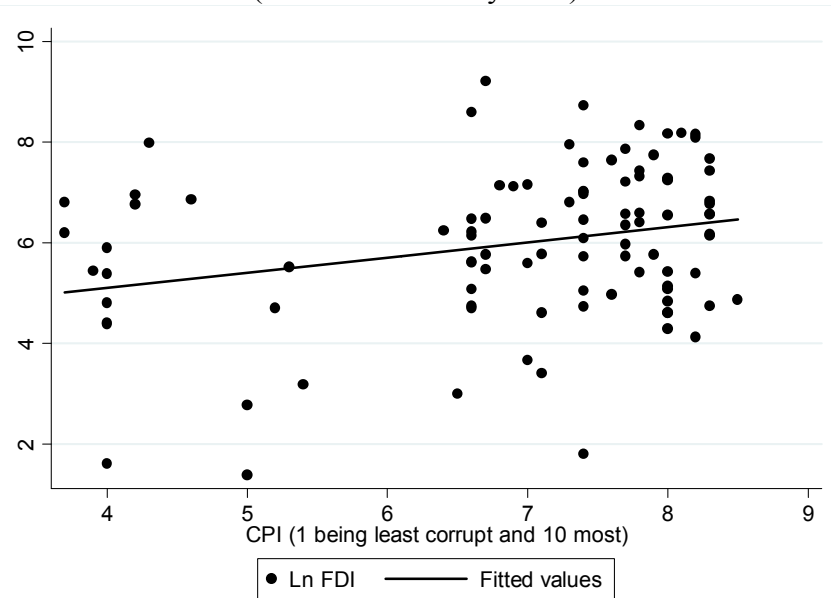


Figure (3)
LnFDI Vs Corruption Perception Index (CPI)
(Polity < 5)

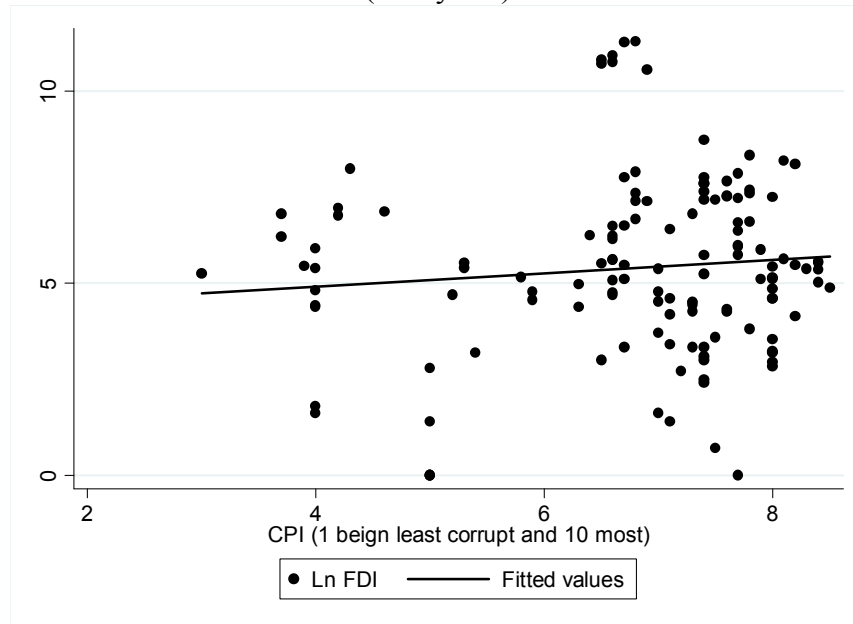
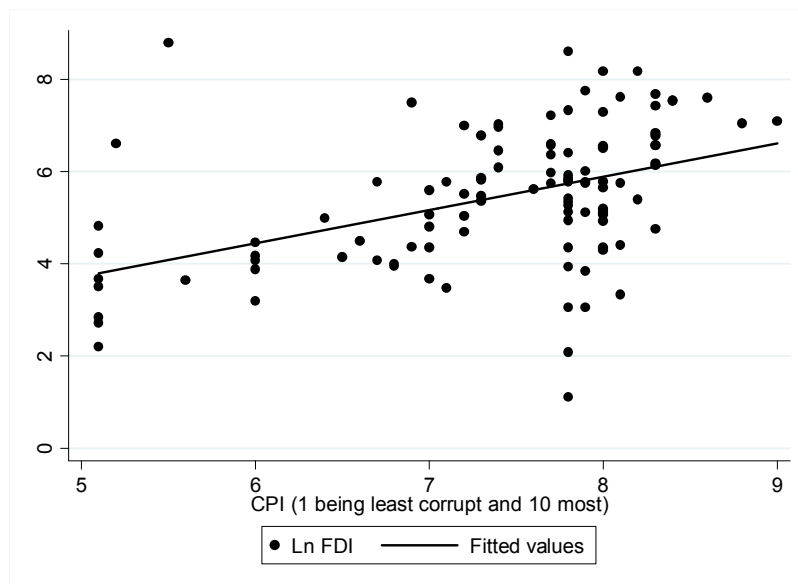


Figure (4)
LnFDI Vs Corruption Perception Index (CPI)
(African Countries with Fuel > 10)



IV. Data

Data from year 2000 to year 2006 are pooled together. The choice of 2000 for the starting to 2006 is inspired by the desire to use latest available data. One hundred seventy two countries with a wide spectrum of development levels, corruption levels, geographical locations, political systems, and economic systems are included. The list of countries is shown in appendix B.

To statistically show that corruption can be endogenous to FDI, we will first regress the corruption variable on FDI using OLS. Then, we will propose a system of simultaneous equation to account for the joint determination of corruption and FDI. Objective measures for corruption are hardly available, as the dealings are taking place in secrecy⁴.

Consequently, subjective measures relying on questionnaire-based surveys become a compromise for this shortcoming. They measure perceived corruption rather than corruption per se. One particular problem with using a subjective measure is that different methodologies used can generate different results and are prone to personal bias. Three subjective indices for corruption are available and are widely used in the political science, economics and sociology literature. The first index is based on opinions and responses provided by experts working in various countries. Such indexes include the Business International (BI) Index and International Country Risk Group (ICRG) Index. Since they rely heavily upon responses given by individuals, it is the most subject to personal biasness and the variations from person to person can be high.

The second type of index is based on the results of survey questionnaires given to firms working at the international level. The index for each country is then obtained by

⁴ For example, it is very difficult to measure how much bribes have been paid. Or, how many bureaucrats have been arrested on charges of fraud or embezzlement.

averaging all responses. Examples of this type of index include the Global Competitiveness Report Index (GCR) compiled by the World Economic Forum and the World Development Report (WDR) by the World Bank. The third type of index relies on averaging all available indexes, experts' opinions, surveys given to local populations and foreigners, and available country information. The main advantage of averaging all available information is that it reduces the amount of variation associated with personal bias. Such example includes the Transparency International's (TI) Corruption Perception Index (CPI) produced by a Berlin-based think-tank group committing to fighting corruption around the world. The CPI index was first published in 1995. Indices for subsequent years are also available until 2008. We use this index in our study as it is available free of charge (other indices are available only commercially⁵). TI ranks countries on a scale of 1 (most corrupt) to 10 (least corrupt). We reverse the order so that 1 represents the least corrupt and 10 the most.

Ades & Di Tella (1999) showed that the incentive to engage in corrupt practices increases with the availability of rents. We use two proxies for rents: fuel export as a percentage of total merchandise export and trade openness measured as total values of export and import as percentage of GDP. Our interpretation of these proxies is that an increase in natural resource exports creates rent seeking opportunities; a domestic market with less foreign competition and, hence, lower export and import volume will increase rents enjoyed by domestic firms, thus fostering corruption.

We introduce a dummy variable for landlocked countries, taking a value of 1 if a country does not have access to international water and 0 otherwise. Sachs and Warner (1997) showed that landlocked African countries tend to grow slowly. We expect, however,

⁵ Fortunately, the correlation between all three indices is very high. The correlation is found to be around 0.9.

that being landlocked will have indirect effect on corruption by affecting the income level. Religion is found to have influence on the perceived cost of engaging in corruption (La Porta et al. 1999, Landes -1998, Putnam - 1993). They argue that societies dominated by religions independent of state influence and non-hierarchical in nature tend to oppose state dominance and, hence, exerts checks and balances on the executive and legislative branches. They found that societies with a high proportion of Protestants in the population have low levels of corruption. On the other hand, when functioning of state and religion affairs are closely aligned, or religious practices follow a hierarchical order, religious opposition to legislative and executive's influence on societies will be weaker. Catholicism and Islam follow hierarchical order. Data on religious affiliation are obtained from La Porta et al (1999).

Easterly and Levine (1997) studied how ethno-linguistic diversification in a country can have negative impact on growth and public policies. They found that slow growth in African countries is attributable to ethno-linguistic fractionalization after controlling for key variables. Ethno-linguistic fractionalization is measured as the probability that two randomly selected people from a given country will not belong to the same ethno-linguistic group. Although originally used in foreign aid and growth literature, we use this data as a proxy for opposing interest which might contribute to corruption. Ethnic and linguistic fractionalization can influence corruption in many ways: ethnically and linguistically diverse groups can have different or opposing intrinsic interests in the allocation of state resource, and their elected officials are likely to pursue policies advantageous to their own people. Thus, we expect ethno-linguistic fractionalization to be positively correlated with the corruption level. Data for ethno-linguistic fractionalization is collected from Easterly (1997).

La Porta et al. (1999) argues that common law systems, mostly found in Britain and its former colonies, differ on this dimension from civil law systems, mostly found in mainland Europe and its former colonies. Common law was first introduced in England as an attempt to restrict state power and its influence on societies, whereas the civil law system was implemented as a tool by the state to control the general welfare and economic life of the people. Democracy and the level of development can have impact on corruption too. The risk of being caught and punished is high in highly developed democratic society with a free press, rigorous civil participations, and competitive elections (Treisman 2000). We use the Polity IV score for regime as a measure of democracy level. This score ranks authoritarian regimes on a scale of -10 to 0, with -10 being the most authoritarian and 0 the least. Likewise, the democracy score ranges from 0 to 10, with 0 being the least democratic and 10 being the most. We rescale this index from 0 to 20, with 0 being the most authoritarian and 20 being the most democratic. Income per capita is taken as a proxy for the development level.

Treisman (2000) argued that countries that have been democratically institutionalized for decades tend to have lower corruption. We include a dummy variable, taking a value of 1 if a country is a democracy throughout as of 1995 and 0 otherwise. Also, Federal states were found to be more corrupt than non-federal states as intense competition between autonomous states result in rent seeking activities (Treisman – 2000). A dummy for federal status is included, taking a value of 1 if a country is federally governed, zero otherwise. Having never been a colony before is found to be negatively associated with corruption. We include a dummy variable *noncol*, and its value is 1 if a country was a colony in the past and zero otherwise. We include continent dummies to control for cultural and geographical differences

not captured by other exogenous variables. We introduce a new variable (tropic) to test if corruption levels in countries located in the tropics are intrinsically higher due to cultural, geographical or historical uniqueness. The data for tropic is obtained from Sachs & Warner (1997), which studies economic impacts of malaria on African countries. Together with all these major determinants of corruption, we include FDI in corruption equation and test for its significance. Data for foreign direct investment, population, GDP, inflation, GDP growth are obtained from the World Bank Development Indicators CD-ROM. Data for the statutory tax rate was obtained from the World Bank's Doing Business web site. Data on illiteracy rates was obtained from UNESCO's database. Variable names, their description, and source are provided in appendix C. Summary statistics of variables used are provided in appendix A.

V. Results

A. Endogeneity of Corruption

We begin by fitting a linear regression of the Corruption Perception Index to $\ln fdi$, together with other major determinants of corruption for all economies. A preliminary investigation of the scatter plot (figure 5) suggests that the relation between corruption and FDI is indeed a negative one. In addition, we can casually observe two distinct groups of economies, namely OECD countries (marked plus sign) and Non-OECD countries (marked hollow circle), except for two distinct outliers Singapore and Hong Kong. Results obtain from OLS estimation (table 1 model 1) does confirm a negative association between corruption and FDI if unconditional sample is used in regression. Coefficient for $\ln fdi$ also survives inclusion of other major determinants of corruption. Standard errors are White-corrected to allow for the possibility of heteroskedasticity and are shown in parenthesis.

Figure (5)
LnFDI Vs Corruption Perception Index (CPI) – All Economies

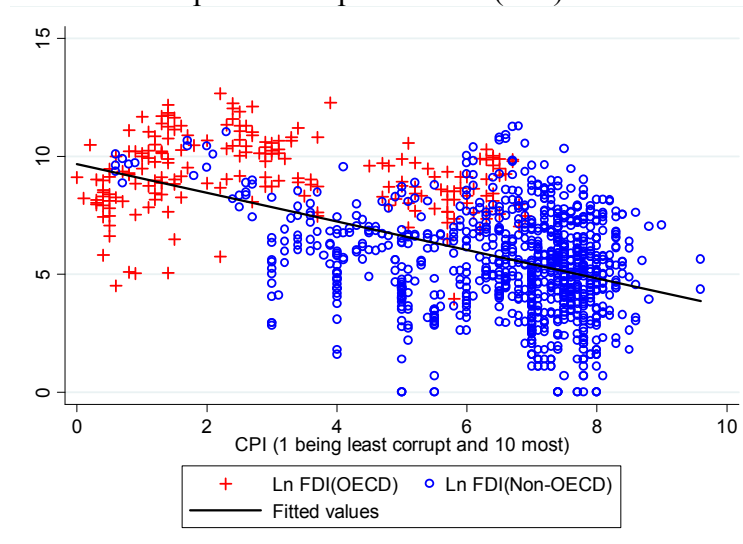


Table 1: Dependent Variable - Corruption Perception Index

	Conditional On					
	1	2	3	4	5	6
	Unconditional	Development Level	Democracy	Fuel > 10 & Non-OECD Economies	Fuel > 10, Non-OECD, & Development Level	Fuel > 10 & Authoritarian Regime (Polity <10)
lnfdi	-0.041 ** (0.020)	0.894 * (0.050)	0.021 (0.038)	0.052 ** (0.028)	0.688 * (0.071)	0.076 *** (0.041)
lngnipc	-1.011 * (0.043)		-0.995 * (0.044)	-0.568 * (0.056)		-0.542 * (0.084)
lnfdi_lngnipc		-0.130 * (0.005)			-0.087 * (0.009)	
lnfdi_polity			-0.005 ** (0.003)			
fuel	0.015 * (0.002)	0.009 * (0.001)	0.015 * (0.002)	0.014 * (0.002)	0.010 * (0.002)	0.020 * (0.006)
lnopen	-0.249 * (0.067)	-0.393 * (0.065)	-0.279 * (0.069)	-0.622 * (0.121)	-0.741 * (0.117)	-1.258 * (0.263)
cath80	0.001 (0.002)	0.003 *** (0.002)	0.002 (0.002)	0.014 * (0.004)	0.014 * (0.004)	0.043 * (0.013)
musl80	-0.002 (0.002)	0.000 (0.002)	-0.003 (0.002)	0.000 (0.003)	0.002 (0.003)	0.001 (0.005)
prot80	-0.010 * (0.003)	-0.009 * (0.003)	-0.010 * (0.003)	0.009 (0.006)	0.012 ** (0.006)	-0.017 (0.026)
ethnic	-0.075 (0.171)	0.004 (0.167)	-0.061 (0.171)	0.032 (0.268)	0.042 (0.270)	-0.608 (0.451)
asia	-0.202 (0.143)	-0.540 * (0.145)	-0.274 *** (0.147)	0.460 (0.346)	0.273 (0.353)	2.042 * (0.674)
africa	-0.487 * (0.180)	-0.710 * (0.180)	-0.557 ** (0.183)	0.362 (0.403)	0.248 (0.409)	3.744 * (0.821)
sam	0.122 (0.159)	-0.547 * (0.164)	0.048 (0.163)	-0.829 ** (0.441)	-0.855 ** (0.443)	(dropped)
meast	-0.301 *** (0.189)	-0.973 * (0.189)	-0.373 ** (0.192)	0.031 (0.425)	-0.297 (0.435)	4.198 * (0.791)
leg_british	-0.605 * (0.171)	-0.438 * (0.170)	-0.562 * (0.172)	-1.206 * (0.382)	-1.091 * (0.389)	-3.964 * (0.741)
leg_french	-0.493 * (0.184)	-0.293 *** (0.183)	-0.459 * (0.184)	-0.969 ** (0.404)	-0.973 * (0.406)	-4.387 * (0.764)
leg_german	-0.645 * (0.230)	-0.459 ** (0.229)	-0.593 * (0.231)	(dropped)	(dropped)	(dropped)
leg_scan	-1.811 * (0.298)	-2.079 * (0.291)	-1.819 * (0.298)	(dropped)	(dropped)	(dropped)
landlock	-0.468 * (0.088)	-0.314 * (0.086)	-0.471 * (0.088)	0.401 ** (0.172)	0.360 ** (0.174)	1.308 * (0.349)
polity	0.014 *** (0.007)	0.005 (0.007)	0.042 * (0.016)	0.045 * (0.012)	0.044 * (0.012)	0.191 * (0.056)
tropic	0.043 (0.106)	0.334 * (0.102)	0.046 (0.106)	-0.066 (0.168)	-0.097 (0.169)	-0.389 (0.309)
alldem95	-0.796 * (0.126)	-0.417 * (0.126)	-0.737 * (0.129)	-0.933 ** (0.413)	-1.255 * (0.410)	(dropped)
_cons	15.656 * (0.417)	9.292 * (0.364)	15.369 * (0.442)	12.715 * (0.609)	9.397 * (0.602)	13.680 * (0.983)
# of Observations	867	867	867	251	251	118
R-squared	0.84	0.85	0.84	0.75	0.74	0.86
Adj R-squared	0.84	0.84	0.84	0.73	0.72	0.84

* represents statistical significance at 1%, ** at 5%, *** at 10%. Standard errors are in parenthesis and are white corrected.

The estimate for $\ln gnp$ is negative and significant at 1%, suggesting that corruption tends to be lower in more developed countries. All else being the same, corruption tends to be more prevalent in economies overlying on the export of fuel and the estimate is significant at 1%. Economies adopting more open policies have lower levels of corruption and the estimate is significant at 1%. Countries with a high proportion of Protestants tend to have lower level of corruption as compared to predominantly Catholic and Muslim countries. Once the policy variable (trade openness) is controlled for, ethno-linguistic fractionalization (ethnic) loses its significance. We also include 4 continent dummy variables (Asia, Africa, South America, and Middle East) to control for intrinsic differences in perception and attitudes towards corruption⁶, and cultural and geographical difference. Estimates for four legal origins are significant at 1%. The claim that countries with British legal origins tend to have lower corruption level is not well supported. The estimate for being a landlocked country (landlock) is significant, but incorrectly signed. The democracy variable (Polity) is significant but incorrectly signed⁷. Consistent with our hypothesis, the corruption level in countries with a tropical climate is found to be higher than in non-tropical countries. Estimate for $alldem95$ – being democracies throughout the period of analysis – is significant at 1%. Some of the estimates are not significant and do not show the signs that we expect. This may be a direct consequence of aggregating all economies.

⁶ Tolerance towards corruption tends to vary from countries to countries. In some countries and societies, paying bribes and loyalties are considered appropriate. By including dummy variables for continent, we are assuming that each continent is different from others in its perception towards corruption, which may not be the case for all countries; perception towards corruption may vary across countries within a continent.

⁷ This may be a result of aggregating all economies, democracy and non-democracy alike, resulting in incorrect sign for democracy. In general, we do expect negative correlation between corruption and democracy. To achieve this, we need to refine our sample. In unconditional sample, there are many democracies where corruption is high. Also, there are semi or non-democratic economies where corruption is low.

We shift our focus from unconditional sample to conditional ones beginning with development level (table 1 model 2), where we interact $\ln fdi$ and $\ln gnipc$. In contrast to the unconditional sample (model 1), the sign of $\ln fdi$ has changed from being negative to being positive, suggesting that FDI is positively associated with corruption when conditional on development level. As argued before, the impact of FDI activities will vary across countries, depending upon the development level. The positive effect of FDI on corruption diminishes gradually with increasing income per capital level. Once income per capita reaches a threshold level of US\$970, an increase in FDI leads to a lower level of corruption in host countries. Estimates for fuel export and trade openness continue to be significant and correctly signed as before. All continent dummies now become significant, suggesting that variations in corruption level across continents are better explained after controlling for development level. The landlock variable continues to be significant but still incorrectly signed. Being a continuous democracy continues to be significant.

To test how regime type and FDI activities combined can affect corruption in host countries, we interact the democracy variable with $\ln fdi$ in model 3. On a priori, we expect that corruption level will be less of a problem in more democratic societies. The estimate for $\ln fdi$ lost its significance once conditional on democracy but is still positive. This may be due to high variations in FDI inflow across democratic and non-democratic countries. An interesting case is the sign of the interacting term between FDI and democracy, which is negative. Though the sign of $\ln fdi$ is positive (meaning positive correlation between FDI and corruption), once democracy index exceeds 5, increased FDI result in lower level of corruption. This can be regarded as a democracy threshold beyond which an increase in FDI will result in lower corruption.

As we have previously highlighted, corruption will increase with increasing availability of rents (Ades & Di Tella – 1999). This suggests that incidents and variation of corruption can be better analyzed and explained by lumping economies by level of resource availability, development level, and type of political institutions. In model 4, we only include non-OECD economies whose fuel exports exceed 10%. In contrast to model 1, the coefficient for $\ln fdi$ has changed sign from negative to positive and is statistically significant at 5%. Income level, fuel abundance, open policies, landlock, democracy, tropic, and being democracy throughout all remain significant. Countries that are democracies throughout have less corruption even in resource rich non-OECD countries. An interesting observation is the coefficient for $\ln gnipc$; when unconditional (model 1), a 1% increase in $gnipc$ leads to a 1 point reduction in CPI index, whereas when conditional on $fuel > 10$ & non-OECD economies, a 1% increase in income level results in only 0.5 point reduction in CPI index.

We again interact $\ln fdi$ with development level ($\ln gnipc$) for resource-rich economies (model 5). The coefficient for $\ln fdi$ is positive and significant at 1%. A striking observation is that the income threshold level beyond which increased FDI activities will lead to lower corruption has increased from US\$970 (when unconditional in model 2) to US\$2720 (when conditional on $fuel > 10$, non-OECD economies in model 5). This change represents an increase of 180 percent as compared to model (2). We further proceed with authoritarian regimes ($polity < 10$) in model 7 to investigate the impact of FDI activities in resource rich economies managed by authoritarian regimes. Not only is the key variable $\ln fdi$ positive and statistically significant, its value has increased from 0.052 in model 4 to 0.076 in model

7, suggesting that everything else being the same, the consumption of more FDI by repressive regimes in resource-rich economies leads to more corruption⁸.

For robustness and comparison purposes, we conduct similar investigation into non-OECD economies with fuel exports exceeding 30% (fuel>30) and 50% (fuel>50). A priori, we expect the effects of lnfdi on CPI to be larger, and the threshold income level becoming larger with increasing availability of natural resource in host countries. Estimated results for fuel >30 and 50 are shown in tables 2 & 3. Compared to fuel>10, the estimate for lnfdi has increased (0.068 for fuel>30 and 0.086 for fuel> 50 as compared to 0.052 for fuel>10). Thus, these results provide support to our hypothesis that the effect of FDI on corruption is greater in resource-rich economies. As dependency on natural resources becomes larger and larger, more rent seeking opportunities are being created. These rent seeking opportunities then may attract the attention of foreign investors who would otherwise not invest. These are real and fundamental challenges facing developing countries that are naturally endowed with resources yet unable to extract the resources due to financial and technological constraints. Foreign currencies provided by investors may further give rise to additional public and private corruption if they are misallocated or misappropriated.

Alleviating corruption may become more and more difficult as more natural resources are exploited. This can be put into perspective by analyzing the threshold income level above which increased FDI activities will lead to lower corruption. At fuel>10, the income threshold is approximately US\$2720. The level, however, jumps to US\$6200 for fuel>30

⁸ We are in no way suggesting that FDI activities are contributing to corruption in host countries. Instead, what we are suggesting here is that authoritarian regimes can make quick decision on the sale of natural resource should there arises a need to do so. As far as authoritarian regimes are concerned, the need to exploit more natural resource can be a direct consequence of domestic macroeconomic mismanagement such as higher inflation, insufficient foreign revenues, and inadequate public service provision. As such, exchanging natural resource for much needed foreign currencies can be a quick fix. If we have a situation like this, then we can see that corruption and FDI are jointly determined.

economies and US\$12,260 for fuel >50 economies, respectively. These represent 127% and 350% increases as compared to fuel>10. Countries such as Nigeria, Russia, and Saudi Arabia offer good casual illustrations. These countries represent economies whose fuel exports exceed 50% (more than 85% for Saudi Arabia and Nigeria).

Table (2) : Dependent Variable - Corruption Perception Index

	Conditional On			
	1	2	3	4
	Fuel > 30 & non-OECD	Fuel > 30, non-OECD & Development Level	Fuel > 30, non-OECD & Democracy	Fuel > 30 & Authoritarian Regime (polity <10)
lnfdi	0.068 *** (0.044)	0.943 * (0.108)	0.155 ** (0.062)	0.102 *** (0.063)
lngnipc	-0.727 * (0.080)		-0.719 * (0.079)	-0.622 * (0.121)
lnfdi_lngnipc		-0.108 * (0.013)		
lnfdi_polity			-0.012 ** (0.006)	
fuel	0.021 * (0.004)	0.018 * (0.004)	0.022 * (0.004)	0.016 (0.011)
lnopen	-0.706 * (0.212)	-1.065 * (0.208)	-0.662 * (0.211)	-1.401 * (0.356)
cath80	0.011 ** (0.005)	0.011 ** (0.006)	0.009 *** (0.005)	0.031 (0.020)
musl80	-0.015 ** (0.006)	-0.015 ** (0.006)	-0.017 * (0.006)	-0.010 (0.011)
prot80	0.018 (0.018)	0.039 ** (0.018)	0.012 (0.018)	0.009 (0.036)
ethnic	-1.458 * (0.489)	-1.983 * (0.521)	-1.448 * (0.483)	-1.801 * (0.594)
asia	(dropped)	(dropped)	(dropped)	(dropped)
africa	1.300 (1.011)	1.934 *** (1.042)	1.390 (1.001)	(dropped)
sam	0.029 (1.108)	0.717 (1.156)	0.142 (1.097)	(dropped)
meast	1.113 (1.044)	1.583 (1.079)	1.200 (1.033)	0.031 (0.575)
leg_british	-0.661 (1.058)	-0.797 (1.089)	-0.859 (1.051)	0.962 (0.655)
leg_french	-0.688 (1.090)	-0.902 (1.121)	-0.825 (1.080)	0.594 (0.711)
leg_german	(dropped)	(dropped)	(dropped)	(dropped)
leg_scan	(dropped)	(dropped)	(dropped)	(dropped)
landlock	0.971 * (0.276)	1.268 * (0.280)	0.825 * (0.284)	1.416 * (0.438)
polity	0.017 (0.019)	0.017 (0.019)	0.091 ** (0.043)	0.102 (0.077)
tropic	-0.725 * (0.337)	-1.146 * (0.360)	-0.690 ** (0.334)	-1.214 * (0.411)
alldem95	(dropped)	(dropped)	(dropped)	(dropped)
_cons	14.761 * (1.053)	10.654 * (0.981)	14.175 * (1.084)	16.364 * (1.279)
# of Observations	135	135	135	84
R-squared	0.82	0.81	0.83	0.86
Adj R-squared	0.79	0.78	0.80	0.83

* represents statistical significance at 1%, ** at 5%, *** at 10%. Standard errors are in parenthesis.

Table (3) : Dependent Variable - Corruption Perception Index

	Conditional On			
	1	2	3	4
	Fuel > 50 & non-OECD	Fuel > 50, non-OECD & Development Level	Fuel > 50, non-OECD & Democracy	Fuel > 50 & Authoritarian Regime (polity <10)
lnfdi	0.086 *** (0.054)	0.819 * (0.128)	0.074 (0.075)	0.108 *** (0.068)
lngnipc	-0.552 * (0.088)		-0.552 * (0.088)	-0.497 * (0.145)
lnfdi_lngnipc		-0.087 * (0.015)		
lnfdi_polity			0.002 (0.009)	
fuel	0.029 * (0.007)	0.024 * (0.007)	0.029 * (0.007)	0.045 * (0.017)
lnopen	-1.562 * (0.301)	-1.767 * (0.293)	-1.570 * (0.305)	-2.092 * (0.486)
cath80	0.014 *** (0.008)	0.015 *** (0.009)	0.014 (0.009)	-0.007 (0.028)
musl80	-0.012 (0.011)	-0.011 (0.012)	-0.012 (0.011)	-0.027 ** (0.017)
prot80	0.048 *** (0.029)	0.063 ** (0.029)	0.048 *** (0.029)	0.086 (0.055)
ethnic	-1.080 (0.721)	-1.570 ** (0.761)	-1.094 (0.728)	-1.679 ** (0.856)
asia	(dropped)	(dropped)	(dropped)	(dropped)
africa	0.729 ** (0.344)	0.751 ** (0.351)	0.633 (0.681)	-0.272 (0.878)
sam	0.125 (0.807)	0.182 (0.822)	(dropped)	(dropped)
meast	(dropped)	(dropped)	-0.104 (0.817)	-0.903 ** (0.564)
leg_british	0.309 (1.193)	0.659 (1.235)	0.500 (0.906)	0.435 (0.277)
leg_french	-0.085 (1.196)	0.279 (1.241)	0.104 (0.927)	(dropped)
leg_german	(dropped)	(dropped)	(dropped)	(dropped)
leg_scan	(dropped)	(dropped)	(dropped)	(dropped)
landlock	1.044 (0.912)	1.312 (0.935)	1.133 (0.999)	(dropped)
polity	-0.004 (0.029)	-0.003 (0.030)	-0.017 (0.063)	-0.056 (0.113)
tropic	-1.849 * (0.431)	-2.041 * (0.442)	-1.862 * (0.438)	-2.321 * (0.602)
alldem95	(dropped)	(dropped)	(dropped)	(dropped)
_cons	16.396 * (1.232)	12.859 * (1.303)	16.449 * (1.261)	19.711 * (2.210)
# of Observations	93	93	93	61
R-squared	0.87	0.86	0.87	0.88
Adj R-squared	0.84	0.84	0.84	0.85

* represents statistical significance at 1%, ** at 5%, *** at 10%. Standard errors are in parenthesis.

Income per capita is found to be stagnant in these resource-rich economies in the past years (a decline is observed in Nigeria). This then suggests that if growth in income per capita fails to keep up with FDI growth, corruption will continue to be a major issue for these economies. This anecdotal evidence seems to be consistent with our findings. Pumping out and exporting more natural resources convey a similar conclusion; at $\text{fuel} > 10$, the estimated coefficient for the fuel variable is 0.014, whereas it is 0.021 for $\text{fuel} > 30$ and 0.029 for $\text{fuel} > 50$, which lead us to conclude that developing countries exceedingly rich in resource are paying higher prices in term of corruption level. On the other hand, the returns (in term of corruption level) for adopting more open and transparent policies are relatively high for economies abundantly endowed with natural resource (-0.622 for $\text{fuel} > 10$, -0.706 for $\text{fuel} > 30$ and -1.562 for $\text{fuel} > 50$). Our result shows that consumption of more FDI results in more corruption in resource-rich developing economies managed by authoritarian regimes. For $\text{fuel} > 10$ economies, the estimate for $\ln \text{fdi}$ is 0.052 if economies are managed by all type of regimes, while it is 0.076 if managed by repressive regimes. For $\text{fuel} > 30$, the estimate is 0.068 if managed by all type of regimes, whereas it is 0.102 if managed by repressive regimes. For $\text{fuel} > 50$ economies, the estimate for $\ln \text{fdi}$ is 0.086 if managed by all type of regimes, and it is 0.108 if managed by repressive regimes. These findings lead us to conclude that when elected officials in resource-rich economies are not accountable to their constituents, increased inflow of FDI will result in higher corruption. Countries like Burma, Sudan, and Angola fit well into this prediction.

For additional robust evidence that corruption is endogenous to FDI, we conduct similar regression analysis conditional on non-OECD economies whose income per capita is less than US\$10000 and fuel export exceed 10%, Asian economies, and African economies

respectively. Estimated results are shown in tables 4 & 5. Conditional on income per capita less than US\$ 10000 only, *lnfdi* lost its significance. On the other had, if conditional on income per capita less than US\$10000, *fuel*>10, and *fuel*>30, the estimated coefficient for *lnfdi* becomes not only positive but significant (table 4, model 1 & 2), implying that the relationship between FDI and corruption level is highly correlated and significant in resource-rich developing economies. Even in the absence of abundant natural resources in host countries, FDI activities are positively correlated with corruption in low income economies managed by authoritarian regimes⁹ (table 4, model 3). To compare and contrast the results between resource-rich non-OECD economies with OECD economies, we also include a regression model for OECD economies (table 5, model 1). The sign of coefficient for *lnfdi* becomes negative and significant for OECD countries. In addition, if conditional on OECD economies with *fuel*>10, the sign of the coefficient for *lnfdi* still remains negative and significant (not included in table5), which suggests that, unlike what occurs in resource-rich developing economies, availability of abundant natural resource offers no explanation for the incident of higher corruption in developed economies.

Unlike OECD economies, Asian economies display a paradox. Conditional on all Asian economies (table 5 model 2), the sign of the coefficient for *lnfdi* has now become positive and is highly significant, a situation that seems to be consistent with our hypothesis that all investors do not necessarily eschew countries where corruption is persistent. Barring advanced Asian and Australian economies such as Singapore, Hong Kong, New Zealand, Japan, and South Korea, corruption is considered to be highly prevalent in this region. Yet,

⁹ Again we are not implying that FDI is ennobling repressive regimes and hence contributing to corruption. If we combine all type of economies with all kind of regimes, the sign may reverse and become negative. Indeed, there is a strand of literature that has proved that FDI in general tend to avoid economies where human right abuses and rule of law are disregarded (see Harms & Ursprung 2002 for details). Our goal of doing this analysis is to show that FDI and corruption can be jointly determined in some situations.

investors don't seem to be deterred by this. Consider a few Asian economies: China, Vietnam, Burma, Indonesia and India (just to name a few). Despite being consistently ranked high on corruption perception indices, these countries have remained favorite destinations for most international investors. Unlike their Asian counterparts, African economies display two distinct trends in their association with FDI activities. There are a total of 343 observations for all African economies. Of which, there are 113 observations with fuel exports exceeding 10%. Despite their small sample size (32%) relative to entire African economies, African economies whose fuel exports exceed 10% take in the lion share of investment dollars flowing into the African continent (64%). These casual observations may suggest that there exist two distinct groups of investors pursuing two distinct goals. Although we have no information regarding which industries FDI are investing, we have strong evidence that FDI inflows into resource-rich African economies is disproportionately high. A preliminary visual inspection of scatter plots (figure 6 & 7 & 8) confirms our observation. If we combine all African economies, the relationship between FDI and corruption is unclear (figure 6). However, if conditional on fuel<10 African economies, FDI activities are negatively associated with corruption (figure 8). On the other hand, FDI activities in fuel>10 African economies is positively associated with corruption (figure 7). This impression is further confirmed by the regression results shown in table 5 model 3; estimate for $\ln fdi$ is negative and significant if all African economies are combined together; the sign, however, reverses and becomes positive and is highly significant (1% alpha value) if we are to include only African economies whose fuel exports exceed 10% (model 4).

Figure (6)
LnFDI Vs CPI – All African Economies

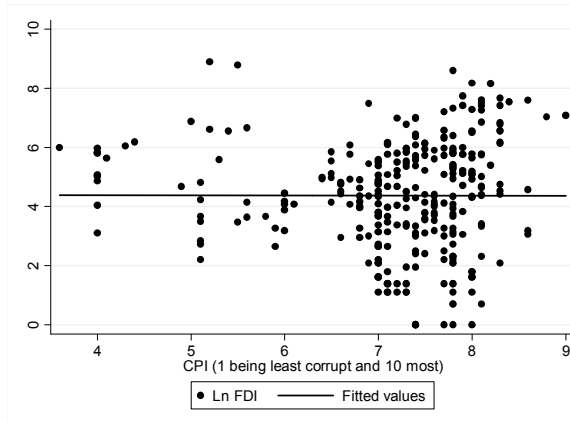


Figure (7)
LnFDI Vs CPI – African Economies with fuel >10
(Account for 64% of all FDI in Africa)

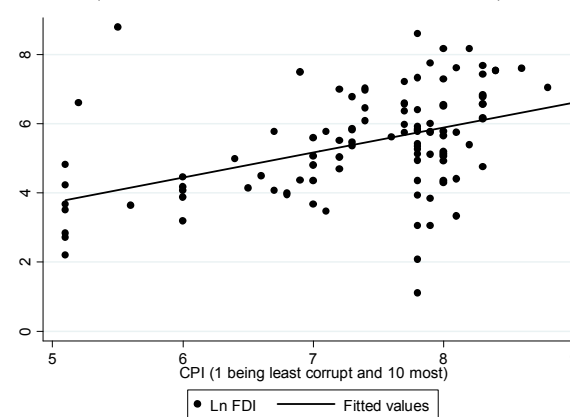


Figure (8)
LnFDI Vs CPI – African Economies with fuel <10
(Account for 36% of all FDI in Africa)

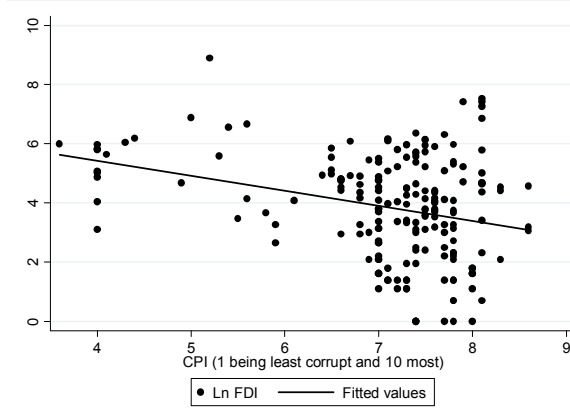


Table (4) : Dependent Variable - Corruption Perception Index

	Conditional On		
	1	2	3
	Fuel > 10 & GNI Per Capita < 10000	Fuel > 30 & GNI Per Capita < 10000	GNI Per Capita < 10000 & Authoritarian Regime (Polity < 10)
Infdi	0.072 *	0.083 ***	0.038 ***
	(0.026)	(0.044)	(0.022)
Ingipc	-0.562 *	-0.779 *	-0.472 *
	(0.053)	(0.089)	(0.061)
fuel	0.013 *	0.017 *	0.008 *
	(0.002)	(0.004)	(0.002)
lnopen	-0.456 *	-0.542 *	-0.158 ***
	(0.110)	(0.198)	(0.094)
cath80	0.015 *	0.014 *	-0.006 ***
	(0.004)	(0.006)	(0.004)
musl80	-0.001	-0.012 **	0.001
	(0.002)	(0.006)	(0.002)
prot80	0.004	0.012	0.021 *
	(0.005)	(0.017)	(0.006)
ethnic	0.140	-1.262 *	0.444 **
	(0.247)	(0.510)	(0.200)
asia	0.396	0.292	-0.291
	(0.280)	(1.048)	(0.260)
africa	0.099	1.384 *	-0.438
	(0.313)	(0.412)	(0.368)
sam	-1.120 *	(dropped)	0.621
	(0.289)		(0.525)
meast	-0.314	1.097 **	-1.351 *
	(0.364)	(0.478)	(0.342)
leg_british	-0.751 **	-0.726	-0.023
	(0.325)	(0.616)	(0.278)
leg_french	-0.529	-0.827	-0.102
	(0.353)	(0.599)	(0.327)
leg_german	(dropped)	(dropped)	(dropped)
leg_scan	(dropped)	(dropped)	(dropped)
landlock	0.363 **	0.766 *	-0.101
	(0.151)	(0.271)	(0.126)
polity	0.038 *	0.021	0.016
	(0.010)	(0.017)	(0.023)
tropic	-0.173	-0.849 **	0.090
	(0.147)	(0.358)	(0.151)
alldem95	-0.971 *	(dropped)	(dropped)
	(0.284)		
_cons	11.901 *	14.464 *	10.754 *
	(0.589)	(1.053)	(0.654)
# of Observations	241	122	218
R-squared	0.70	0.79	0.73
Adj R-squared	0.68	0.76	0.70

* represents statistical significance at 1%, ** at 5%, *** at 10%. Standard errors are in parenthesis.

Table (5) : Dependent Variable - Corruption Perception Index

	Conditional On			
	1	2	3	4
	OECD Countries	Asian Countries	African Countries	African Countries with Fuel>10
lnfdi	-0.108 ** (0.046)	0.178 * (0.051)	-0.060 ** (0.025)	0.109 * (0.038)
lngnipc	-0.227 (0.172)	-1.742 * (0.074)	-0.461 * (0.046)	-0.161 * (0.065)
fuel	0.015 * (0.004)	-0.002 (0.008)	0.012 * (0.002)	0.007 ** (0.003)
lnopen	-0.912 * (0.129)	-0.266 ** (0.141)	0.174 ** (0.095)	0.055 (0.149)
cath80	-0.022 * (0.003)	0.001 (0.006)	0.003 (0.003)	-0.004 (0.005)
musl80	-0.819 * (0.107)	0.005 (0.004)	0.001 (0.002)	-0.003 (0.005)
prot80	-0.045 * (0.005)	0.006 (0.007)	0.005 (0.004)	0.007 (0.008)
ethnic	-0.500 *** (0.316)	0.346 (0.436)	1.223 * (0.285)	2.151 *** (1.141)
asia	-2.372 * (0.279)	(dropped)	(dropped)	(dropped)
africa	(dropped)	(dropped)	(dropped)	(dropped)
sam	(dropped)	(dropped)	(dropped)	(dropped)
meast	77.249 * (10.392)	(dropped)	(dropped)	(dropped)
leg_british	-2.875 * (0.347)	0.164 (0.267)	-0.146 ** (0.076)	-0.038 (0.187)
leg_french	-1.766 * (0.296)	0.382 (0.499)	(dropped)	(dropped)
leg_german	-2.414 * (0.333)	2.665 * (0.391)	(dropped)	(dropped)
leg_scandi~n	-3.173 * (0.446)	(dropped)	(dropped)	(dropped)
landlock	-0.108 (0.248)	-0.127 (0.335)	-0.170 ** (0.084)	0.200 (0.153)
polity	-1.401 * (0.153)	0.045 * (0.013)	-0.048 * (0.007)	-0.009 (0.012)
tropic	-0.651 ** (0.313)	0.692 * (0.239)	-0.178 (0.217)	-0.583 (0.774)
alldem95	0.475 * (0.192)	-1.121 * (0.239)	-0.713 ** (0.315)	-2.757 * (0.776)
_cons	42.544 * (2.507)	17.561 * (0.576)	9.291 * (0.527)	6.657 * (0.910)
# of Observations	180	135	254	92
R-squared	0.92	0.94	0.69	0.77
Adj R-squared	0.91	0.93	0.67	0.73

* represents statistical significance at 1%, ** at 5%, *** at 10%. Standard errors are in parenthesis.

So far, we have shown that investors' response to corruption may not be uniform across economies as the existing literature assumes. If we randomly take a sample of economies and run a regression, we are likely to observe a negative relationship between FDI and corruption. However, as has been shown, this may not be the case for all economies. Depending on the investors' strategic goals, economic and political situations, and available resource levels in host economies, corruption can be endogenous to FDI and the relationship can be a positive one. These findings suggest that the simultaneity between FDI and corruption can not be discounted. As a result, estimates obtained from OLS estimation will be inconsistent and biased.

B. Joint Determination of Corruption and FDI

In the preceding section, we discussed the potential endogeneity of the corruption variable in the FDI single equation model. Taking this issue into consideration, let us consider the following two-equation model in which corruption and FDI are jointly determined. Equation (1) represents the behavioral equation confronting investors, whereas equation (2) represents the behavioral equation confronting host economies. In both equations, FDI and corruption variables are considered endogenous. Corruption can affect FDI via equation 1, whereas FDI can affect corruption via equation 2. In each equation 1 & 2, the number of excluded exogenous variables is larger than the number of included endogenous variable in the right hand side of each equation, and at least one of the excluded exogenous variables is statistically different from zero (results shown in tables 6 & 7 & 8), each equation is identified (in our case, the model is over-identified).

$$\begin{aligned}
 (1) \quad \ln fdi = & a_0 + a_1 cpi + a_2 \ln pop + a_3 \ln gdp + a_4 \ln gnipc + a_5 \ln f + a_6 gdpgr + a_7 tax + \\
 & a_8 openness + a_9 fuel + a_{10} illit + a_{11} polity + a_{12} asia + a_{13} africa + \\
 & a_{14} meast + a_{15} sam + a_{16} yr2001 + a_{17} yr2002 + a_{18} yr2003 + a_{19} yr2004 \\
 & + a_{20} yr2005 + a_{21} yr2006 + \mu_1
 \end{aligned}$$

$$\begin{aligned}
 (2) \quad cpi = & b_0 + b_1 \ln fdi + b_2 \ln gnipc + b_3 \ln f + b_4 openness + b_5 fuel + b_6 polity + \\
 & b_7 asia + b_8 africa + b_9 meast + b_{10} sam + b_{11} leg_british + b_{12} leg_french + \\
 & b_{13} leg_german + b_{14} leg_scan + b_{15} prot80 + b_{16} cath80 + b_{17} musl80 + \\
 & b_{18} alldem95 + b_{19} federal + b_{20} noncol + b_{21} ethnic + \mu_2
 \end{aligned}$$

In the FDI equation, we include exogenous variables considered to be major determinants of FDI. Population, GDP, and income per capita measure market size, development level and purchasing power. Inflation and GDP growth represent macroeconomic indicators and tax represents corporate statutory tax rate. Though it is assumed that investors tend to invest in economies where the tax rate is low, our results do not reflect this notion. As before, openness measures the degree to which host economies are open to the rest of the world. We include a fuel variable in the FDI equation to account for the fact that some investors tend to invest in fuel exporting economies to lower fuel costs. The variable illit is a measure for the illiteracy rate which reflects productivity of labor force in host economies. To avoid omitted variable bias, the democracy variable polity is included as it has been argued in some literature that investors tend to invest in economies where freedom and human rights are respected. Finally, we include year dummies to adjust for business cycle fluctuations from year 2000 to 2006.

We first estimate equations 1&2 using 2sls, conditional on non-OECD economies with fuel >10. Results shown in table (6) reveal that the worsening of corruption in host economies leads to a reduced inflow of FDI. On the flip side of the coin, in the corruption equation, increased inflow of FDI also results in a higher level of corruption in host economies. More importantly, the coefficients for the $\ln fdi$ and corruption variable are statistically significant from zero confirms the existence of a simultaneity problem. Moreover, in both equations, the exogenous variables considered to be major determinants of FDI (population, GDP, income per capita, openness, fuel, democracy, illiteracy rate) and corruption (income per capita, openness, fuel, legal origins, protestant population, catholic population, muslim population, all-time democracy, never a colony, and ethnic-linguistic fractionalization) are robust, highly significant and correctly signed.

Next, we also would like to test if the impacts are different in resource-rich African economies as compared to other region. We estimate equations 1&2 including only African economies with fuel exports exceeding 10% and the results are shown in table (7). The coefficients for the corruption variable and $\ln fdi$ are highly significance, confirming that simultaneity is an issue. Coefficients for major determinants of FDI and corruption are also robust and significant.

There are a number of interesting observations to be made from table 7. First, the coefficients for $\ln fdi$ and corruption variables remain almost the same as compared to previous results shown in table 6. On the other hand, the coefficients for other major exogenous variables have changed significantly, notably coefficients for population, GDP, income per capita, legal origins, and religious population. This is, however, expected since African economies are fundamentally different from other economies in term of their legal

origins, colonial history, development level, and religious practices. Finally, we estimate equations 1&2 again but including only Middle Eastern oil exporting economies to see if the impacts are different. Estimated results are shown in table (8). The existence of simultaneity is again confirmed by the fact that both coefficients of corruption variable and $\ln fdi$ are significant. There is one striking observation that distinguishes Middle Eastern economies from others. First, the sign of the corruption variable in FDI equation has changed from being negative to being positive. This result seems unexpected and may look strange at first glance. However, if we consider the strategic importance of Middle Eastern economies economically to the rest of the world, this result seems to make economic sense: Middle Eastern oil exporting economies account for more than 60% of the world's proven oil reserves; despite high perceived corruption level in these economies, FDI will continue to flow into this region given their economic and strategic importance to the rest of the world. Hence, corruption doesn't matter much to investors investing in resource-rich Middle Eastern economies. The coefficients for $\ln pop$, $\ln gdp$, and $\ln gnipc$ have changed significantly. In the corruption equation, the coefficient for $\ln fdi$ has halved for Middle Eastern economies (from 0.2 in previous results to 0.1). This implies that, given the same amount of FDI flowing into both regions (Africa and Middle East), the consumption of FDI in resource-rich Middle Eastern economies results in lower corruption than it is in resource-rich African economies.

Table 6: non-OECD economies with fuel >10

	FDI equation		Corruption Equation	
	Coef.	Std. Err.	Coef.	Std. Err.
constant	30.721	7.277	9.854	0.521
cpi	-0.760 *	0.245		
lnfdi			0.222 *	0.044
lnpop	-3.654 *	0.795		
lngdp	4.677 *	0.820		
lngnipc	-4.368 *	0.897	-0.550 *	0.053
inf	-0.002	0.002	-0.002 ***	0.001
gdpgr	-0.009	0.015		
tax	0.031 *	0.009		
openess	0.006 **	0.003	-0.009 *	0.001
fuel	0.010 **	0.004	0.006 *	0.002
illit	0.016 **	0.007		
polity	-0.058 *	0.017	0.012	0.011
asia	-1.252 *	0.328	0.162	0.286
africa	-1.301 *	0.354	-0.202	0.345
meast	-2.747 *	0.453	-0.640 ***	0.375
sam	0.860 *	0.307	-1.120 *	0.427
yr2001	-0.399	0.258		
yr2002	-0.063	0.255		
yr2003	0.207	0.263		
yr2004	0.301	0.269		
yr2005	0.284	0.261		
yr2006	0.297	0.300		
leg_british			-1.001 *	0.367
leg_french			-0.864 **	0.383
leg_german			(dropped)	
leg_scan			(dropped)	
prot80			0.022 *	0.006
cath80			0.018 *	0.004
musl80			0.007 *	0.003
alldem95			-1.315 *	0.397
federal			-0.070	0.149
noncol			0.434 *	0.153
ethnic			0.535 *	0.261
# of observations	250		250	
R-squared	0.64		0.74	

* represents statistical significance at 1%, ** at 5%, *** at 10%.

Table 7: non-OECD African Economies with fuel >10

	FDI equation		Corruption Equation	
	Coef.	Std. Err.	Coef.	Std. Err.
constant	20.572	6.967	6.037	0.801
cpi	-0.958 *	0.276		
lnfdi			0.202 *	0.062
lnpop	-1.978 **	0.918		
lngdp	3.021 *	0.974		
lngnipc	-2.912 *	0.963	-0.180 *	0.064
inf	-0.002 ***	0.001	0.001	0.001
gdpgr	-0.020	0.014		
tax	0.008	0.017		
openess	0.027 *	0.004	0.000	0.002
fuel	0.014 *	0.005	0.009 **	0.004
illit	0.017 *	0.006		
polity	-0.137 *	0.023	0.008	0.015
asia	(dropped)			
africa	(dropped)			
meast	(dropped)			
sam	(dropped)			
yr2001	-0.151	0.306		
yr2002	0.008	0.304		
yr2003	0.421	0.310		
yr2004	0.332	0.313		
yr2005	0.385	0.314		
yr2006	0.133	0.332		
Leg_british			(dropped)	
Leg_french			0.228 ***	0.127
leg_german			(dropped)	
leg_scan			(dropped)	
prot80			0.017 **	0.008
cath80			-0.017 *	0.005
musl80			-0.008 *	0.003
alldem95			-2.990 *	0.507
federal			-0.488 ***	0.277
noncol			-0.406 ***	0.219
ethnic			1.968 *	0.482
# of observations	92		92	
R-squared	0.72		0.76	

* represents statistical significance at 1%, ** at 5%, *** at 10%.

Table 8: Non-OECD Middle Eastern Economies with fuel >10

	FDI equation		Corruption Equation	
	Coef.	Std. Err.	Coef.	Std. Err.
constant	70.032	20.157	13.899	2.956
cpi	1.333 *	0.414		
lnfdi			0.107 *	0.027
lnpop	-12.193 *	3.457		
lngdp	10.927 *	3.408		
lngnipc	-9.643 *	2.929	-0.475 *	0.051
inf	0.008	0.044	0.001	0.011
gdpgr	-0.114	0.083		
tax	0.033	0.035		
openess	0.000	0.013	-0.004	0.004
fuel	-0.040 *	0.016	0.006	0.007
illit	0.279 *	0.071		
polity	0.193 *	0.054	-0.052 *	0.015
asia	(dropped)			
africa	(dropped)			
meast	(dropped)			
sam	(dropped)			
yr2001	-0.577	0.456		
yr2002	0.488	0.470		
yr2003	1.185 **	0.511		
yr2004	1.490 *	0.508		
yr2005	1.715 *	0.436		
yr2006	2.060 *	0.545		
Leg_british			(dropped)	
Leg_french			1.163	1.083
leg_german			(dropped)	
leg_scan			Dropped)	
prot80			1.063	1.492
cath80			1.065 *	0.207
musl80			-0.068 *	0.023
alldem95			(dropped)	
federal			(dropped)	
noncol			3.261 *	0.641
ethnic			-2.104	1.665
# of observations	40		40	
R-squared	0.85		0.98	

* represents statistical significance at 1%, ** at 5%, *** at 10%.

V. Conclusion

This study is primarily motivated by observing idiosyncratic behavior of some investors operating in resource-rich developing economies. We depart from the existing literature and conventional assumption that investors will react pessimistically towards worsening corruption in host countries and that corruption is taken exogenously. Instead, conditional on economic and political dimensions, we show that the relationship between corruption and FDI can be two-way causal one and investors will react differently depending upon their strategic goals, economic and political conditions prevailing in host countries. We find that the impact of FDI on corruption is different for different continental regions. Asian economies show a different pattern as compared to other regions. The relationship between $\ln fdi$ and corruption is found to be positively and highly significant for Asian economies. We also notice two different distributional patterns of FDI in African economies if we break down the economies by resource availability. The minimum threshold level of income beyond which increased inflow of FDI will result in lower corruption increases with the increased availability of resources. The impact is much greater for resource-rich economies managed by authoritarian regimes. Finally, to account for simultaneity between corruption and FDI, we use a simultaneous equation model to estimate the parameters. We estimate a system of simultaneous equations for three disaggregated samples (non-OECD economies with $fuel > 10$, African economies with $fuel > 10$, and Middle Eastern economies with $fuel > 10$). In all three disaggregated samples, our results obtained from 2sls estimations confirm that there is a simultaneity issue as the coefficients for both corruption variable and FDI are highly significant. The coefficients of other major determinants of corruption and FDI are also robust and strong.

Appendix A

Summary Statistics for OECD Countries

Variable	Obs	Mean	Std. Dev.	Min	Max
fdi	187	25942	44437.37	-35601.00	321274
cpi	187	3	2.02	0.00	6.90
pop	187	39916	56023	281.00	296507
gdp	187	1027369	2022652	7901.00	12400000
gnipc	187	26266	13734	3250.00	70330
inf	187	3.86	6.93	-0.90	54.92
gdpgr	187	2.98	2.01	-5.70	9.37
tax	187	28.42	7.14	8.50	39.00
openess	187	81.62	48.04	20.48	326.60
fuel	187	7.06	12.17	0.23	67.69
illit	187	2.82	2.44	0.71	12.63
polity	187	19.69	0.77	17.00	20.00
prot80	187	28.46	33.77	0.00	97.80
cath80	187	43.03	37.91	0.10	96.90
musl80	187	4.11	18.81	0.00	99.20
ethnic	187	0.22	0.20	0.00	0.71

Summary Statistics for non-OECD Countries

Variable	Obs	Mean	Std. Dev.	Min	Max
fdi	747	1795	6341	-4550	79127
cpi	747	6.86	1.30	0.60	9.60
pop	747	45729	161786	107	1311798
gdp	747	64552	208743	199	2657875
gnipc	747	2295	3825	80.00	31640
inf	747	10.72	30.39	-9.62	550.01
gdpgr	747	4.98	5.13	-31.30	62.32
tax	747	27.81	9.01	0.00	54.00
openess	747	85.81	48.69	19.35	462.46
fuel	747	17.64	26.41	0.00	99.66
illit	747	21.91	20.33	0.21	90.61
polity	747	12.35	6.09	0.00	20.00
prot80	747	8.50	13.96	0.00	66.00
cath80	747	26.78	33.95	0.00	96.60
musl80	747	27.73	36.48	0.00	99.70
ethnic	747	0.51	0.24	0.00	0.93

Summary Statistics for non-OECD Countries (fuel>10)

Variable	Obs	Mean	Std. Dev.	Min	Max
fdi	268	1389	2963	-4550	30827
cpi	268	7.11	1.14	0.6	9
pop	268	36452	78737	650.08	1094583
gdp	268	64810	119039	410	990577
gnipc	268	2771	4383	80	31640
inf	268	15.75	47.69	-5.36	550.01
gdpgr	268	5.56	5.55	-31.3	34.5
tax	268	27.97	10.38	0	54
openess	268	85.01	41.92	21.74	447.3
fuel	268	44.17	28.83	10.12	99.66
illit	268	20.3	19.1	0.3	76.8
polity	268	10.66	6.28	0.00	20.00
prot80	268	7.78	12.39	0.00	58.40
cath80	268	27.88	34.62	0.00	96.60
musl80	268	37.47	39.05	0.00	99.40
ethnic	268	0.58	0.23	0.04	0.91

Summary Statistics for African Countries(fuel>10)

Variable	Obs	Mean	Std. Dev.	Min	Max
fdi	98	635.57	1063.09	-1304.0	6522.00
cpi	98	7.67	0.60	5.20	9.00
pop	98	27919.62	33379.88	1182.28	144720.00
gdp	98	21806.08	35640.36	410.00	242059.00
gnipc	98	905.51	1119.65	80.00	5360.00
inf	98	25.16	74.83	-5.36	550.01
gdpgr	98	4.94	6.66	-31.30	33.63
tax	98	32.91	7.03	15.00	40.00
openess	98	77.67	29.81	32.85	152.45
fuel	98	41.36	30.51	10.34	99.66
illit	98	38.38	17.24	12.45	76.82
polity	98	10.62	4.72	3.00	19.00
prot80	98	14.00	9.97	0.00	39.00
cath80	98	27.62	22.75	0.50	68.70
musl80	98	31.23	32.87	0.00	99.10
ethnic	98	0.78	0.13	0.34	0.91

Summary Statistics for Middle Eastern Countries (fuel>10)

Variable	Obs	Mean	Std. Dev.	Min	Max
fdi	45	630.56	1673.08	-614.00	10043.00
cpi	45	5.78	1.23	3.70	7.30
pop	45	28062.32	28647.29	650.08	74166.50
gdp	45	86233.27	85800.62	7929.00	356630.00
gnipc	45	7710.67	7464.53	960.00	31640.00
inf	45	3.80	5.43	-3.85	16.47
gdpgr	45	5.07	2.78	0.13	16.50
tax	45	18.47	17.10	0.00	54.00
openess	45	79.55	29.05	39.02	153.83
fuel	45	73.47	19.10	12.09	93.51
illit	45	17.31	6.44	5.84	28.60
polity	45	3.69	3.39	0.00	13.00
prot80	45	0.20	0.26	0.00	0.90
cath80	45	0.65	0.73	0.10	2.10
musl80	45	93.70	6.04	81.80	99.40
ethnic	45	0.44	0.20	0.04	0.67

Appendix B (Country List)

OECD	Non-OECD			
Australia	Albania	Costa Rica	Kazakhstan	Peru
Austria	Algeria	Cote d'Ivoire	Kenya	Philippines
Belgium	Angola	Djibouti	Kuwait	Romania
Canada	Argentina	Dominican Republic	Kyrgyz Republic	Russian Federation
Denmark	Armenia	Ecuador	Lao PDR	Rwanda
Finland	Azerbaijan	Egypt, Arab Rep.	Latvia	Saudi Arabia
France	Bahrain	El Salvador	Lesotho	Senegal
Germany	Bangladesh	Equatorial Guinea	Liberia	Singapore
Greece	Belarus	Estonia	Madagascar	Solomon Islands
Hungary	Benin	Ethiopia	Malawi	South Africa
Iceland	Bhutan	Fiji	Malaysia	Sri Lanka
Ireland	Bolivia	Gabon	Mali	Sudan
Italy	Botswana	Gambia, The	Mauritania	Swaziland
Japan	Brazil	Georgia	Mauritius	Syrian Arab Republic
Korea, Rep.	Bulgaria	Ghana	Moldova	Tajikistan
Mexico	Burkina Faso	Guatemala	Mongolia	Tanzania
Netherlands	Burundi	Guinea	Morocco	Thailand
New Zealand	Cambodia	Guinea-Bissau	Mozambique	Togo
Norway	Cameroon	Guyana	Nepal	Trinidad and Tobago
Poland	Central African Rep.	Haiti	Nicaragua	Tunisia
Portugal	Chad	Honduras	Niger	Uganda
Spain	Chile	India	Nigeria	Ukraine
Sweden	China	Indonesia	Oman	Uruguay
Switzerland	Colombia	Iran, Islamic Rep.	Pakistan	Uzbekistan
Turkey	Comoros	Israel	Panama	Venezuela, RB
United Kingdom	Congo, Dem. Rep.	Jamaica	Papua New Guinea	Vietnam
United States	Congo, Rep.	Jordan	Paraguay	Zambia
				Zimbabwe
African Economies (fuel>10)		Middle Eastern Economies (fuel>10)		
Algeria		Bahrain		
Angola		Egypt, Arab Rep.		
Cameroon		Iran, Islamic Rep.		
Chad		Kuwait		
Congo, Dem. Rep.		Oman		
Congo, Rep.		Saudi Arabia		
Cote d'Ivoire		Syrian Arab Republic		
Gabon		Tunisia		
Ghana				
Kenya		Asian Economies (fuel>10)		
Liberia		Indonesia		
Mali		Papua New Guinea		
Mozambique		Vietnam		
Nigeria				
Senegal				
South Africa				
Sudan				

Appendix C (Variable List)

Variable Name	Description and Source
fdi	Foreign Direct Investment in Million Dollar. Source: World Development Indicators CD-ROM (2008)
cpi	Transparency International Corruption Perceptions Index obtained from http://www.transparency.org/
gdp	GDP in Million Dollar. Source: World Development Indicators CD-ROM (2008)
pop	Population in thousand unit. Source: World Development Indicators CD-ROM (2008)
gnipc	Income Per Capita in Dollar Unit. Source: World Development Indicators CD-ROM (2008)
inf	Consumer Price Index. Source: World Development Indicators CD-ROM (2008)
gdpg	Annual GDP Growth (%). Source: World Development Indicators CD-ROM (2008)
tax	Statutory Corporate Tax Rate. Source: World Bank Doing Business. http://www.doingbusiness.org/
openess	Import and Export Values as % of GDP. Source: World Development Indicators CD-ROM (2008)
fuel	Fuel Export as % of Total Merchandise Export (%). Source: World Development Indicators CD-ROM (2008)
noncol	Never a colony, mostly from Treisman, "The Causes of Corruption: A Cross-National Study," Journal of Public Economics, June 2000.
illit	Illiteracy Rate. Source: UNESCO
polity	Democracy Index. Source: Polity IV Web Site. http://www.systemicpeace.org/polity/polity4.htm
africa,asia,meast,sam	Regional Dummies
yr200x	Year Dummies
leg_british	legal origin: British. Source: La Porta (1999) http://mba.tuck.dartmouth.edu/pages/faculty/rafael.laporta/publications.html
leg_french	legal origin: French. Source: La Porta (1999) http://mba.tuck.dartmouth.edu/pages/faculty/rafael.laporta/publications.html
leg_german	legal origin: German. Source: La Porta (1999) http://mba.tuck.dartmouth.edu/pages/faculty/rafael.laporta/publications.html
leg_scan	legal origin: Scandinavian. Source: La Porta (1999) http://mba.tuck.dartmouth.edu/pages/faculty/rafael.laporta/publications.html
cath80	Catholics as % of population 1980, from La Porta et al. 1999. "The Quality of Government," Journal of Law, Economics, and Organization, downloaded from Quality of Government Database, at Quality of Government Institute, Goteborg University.
prot80	Protestants as % of population 1980, from La Porta et al. 1999. "The Quality of Government," Journal of Law, Economics, and Organization, downloaded from Quality of Government Database, at Quality of Government Institute, Goteborg University.
musl80	Muslims as % of population 1980, from La Porta et al. 1999. "The Quality of Government," Journal of Law, Economics, and Organization, downloaded from Quality of Government Database, at Quality of Government Institute, Goteborg University.
alldem95	Democratic all years from 1930 to 1995. Source: Treisman (2000)

federal	Classified as a federation by Elazar (Elazar, Daniel J. 1995. "From Statism to Federalism: A Paradigm Shift," Publius, 25, 2, spring, pp.5-18.); plus Ethiopia, Serbia-Montenegro, Bosnia-Herzegovina, which became federal after the article.
ethnic	Ethnolinguistic fractionalization, 1961, = probability that two randomly selected individuals from a given country will not be from same ethnolinguistic group. Source: Easterly and Levine (1997) http://www.nyu.edu/fas/institute/dri/Easterly/Research.html#Publications
landlock	dummy for landlocked countries. Source Sachs and Warner (1997) http://www.earth.columbia.edu/articles/view/1582
tropic	Index for Tropical Countries. Source: Sachs and Warner (1997)

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