

Does corruption ‘grease the wheel’ of economic growth in developing countries?

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Abstract

Corruption occurs in every political system worldwide however acts of corruption are more prevalent and sever in developing countries. Economic development has been an uphill battle for many developing countries. Thus, I examined the following hypothesis: An increase in the levels of corruption for a country in developing countries will be associated with a decrease in GDP per capita. This paper examined if corruption greases the wheel of economic growth in developing countries with the use of a pooled time-series cross-sectional ordinary least square [OLS] regression for 62 developing countries. In both the direct and the indirect models, it was evident that corruption played a significant factor in the economy. Thus, the empirical tests in this paper support my hypothesis that an increase in the levels of corruption for a developing will be associated with a decrease in GDP per capita. This was evident in the case of Ukraine and Estonia for the period of 1996-2006, where Estonia had significantly higher control of corruption than Ukraine, which corresponded to higher GDP per capita for Ukraine. The indirect effects of corruption through the recursive models also indicated a negative relationship between corruption and GDP per capita for developing countries.

Keywords: corruption, economic growth, FDI inflows, political rights and civil liberties

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1 INTRODUCTION

Acts of corruption can range from grand to petty acts by political agents or private agents. Corrupt practices occur at both the private as well as the public sector, in other words corruption is not solely restricted to government agents or institutions. The most commonly used definition of corruption is the "...misuse of public power for private gain" (Karklins, 2005: 4). Acts of corruption can fall into various categories such as bribery by public or private individuals, predatory regulations for personal gains, manipulation of government institution for personal gains, and extortion by bureaucrats. Sajo emphasizes that "...public office can also be abused for personal benefits even if no bribery occurs, through patronage and nepotism, the theft of state assets, or the diversion of state revenues" (2003: 175). In accordance with the World Bank corruption can be categorized into two types 'state capture' and 'administrative corruption'. State capture refers to corruption in the legislative process, where public or private agents attempt to influence the formulation of laws and government policies to their advantage. State capture, for example, can be perceived as the sale of government decrees, civil services, as well as criminal court decisions to the private sector. Such corruption can also include government officials using their position to channel state funds to their own benefits. In such case political agents or state agents manipulate or modify the institution of government, as well as the political and legal system in order to maintain their hold on power as well as to obtain material and/or financial benefits. In this sense institutions and laws are at the whim of corrupt agents in government, where such agents continuously abuse the system for their own interest. In a notable case, President Ferdinand Marcos of the Philippines had rewritten sections of the constitution in order to legalize his actions (Amundsen, 1999: 3). On the other hand, administrative corruption refers to the measures taken by citizens to influence public officials to implement certain laws or regulations; this is more commonly evident in bribes (Gray, Hellman and Ryterman, 2004: 10). In the case of Romania, for example, 42 percent of households noted in a 2000 survey that they paid for a bribe (Karklins: 40). What is more interesting about this survey is that two-thirds of the respondents noted that political corruption is widespread in the country.

Corruption is not a phenomena limited only to developing countries, rather corruption occurs in every political system worldwide however acts of corruption are more prevalent and severe in developing countries as evident in Transparency International's Corruption Perception Index¹ [CPI thereafter]. Examining Transparency International's CPI index, it becomes apparent that the majority of developing countries on average have lower CPI scores than their counterparts, thereby indicating higher levels of corruption in developing countries. In developing countries, the underlying factor contributing to higher levels of corruption is the lack of transparency in laws, regulations, and practices. A great deal of these problems have there origin in a countries "...historical legacies, economic structure, and transition paths" (A World Free of Poverty, 2000: xxxi).

¹ CPI index range from 10 – 0, where 10 (highly clean) and 0 (highly corrupt).

Tanzi (1998) posits several contributing factors of corruption in countries. First, the existences of regulations and authorizations can lead to corruption because bureaucratic officials will have monopoly power over these procedures. Bureaucratic officials, for example, will accept bribes for providing speedy permit to individuals as well as blocking access to competitors. In post-communist countries deliberate over regulations by bureaucrats occurs in order to elicit bribes by citizens. Second, when tax laws are unclear in a country this leads to corruption, particularly in developing countries. Tanzi suggest that the potential for corruption are much higher when the wages of tax administrators are low, tax laws are difficult to understand the state ignores acts of corruption by tax administrators (567). Third, spending decisions by political officials have lent themselves to corruption; this is most evident in investment projects. Finally, goods and services that fall below-market price such as public housing, public education, social services, and foreign exchange tend to lead to corruption; this is especially true in developing countries. Corruption occurs in this situation because demand exceeds supply thereby leading to the use of bribery to get the limited supply of goods and services (p. 569). Rose-Ackerman maintains, "...bureaucrats tend to behave like monopolists, who profit from increasing prices created by scarcity" (Karklins, p. 22). Tanzi's factors contributing to corruption were evident in post-communist countries, especially in Romania. In the next subsection, I will discuss the relationship between corruption and economic growth.

2 IMPLICATION ON ECONOMIC GROWTH

Much of the literature on corruption has investigated the implication it has on economic growth for countries, however no conclusive agreement was reached on the effect corruption has on growth (Brunetti and Weder, 1998; Huntington 1968, Acemoglu and Verdier 1998; Jensen, 2003; Karkums, 2005; Leff 1964; Mauro 1995; Meon and Sekkart, 2003, and Mo, 2001). The debate on corruption offers two effects on economic growth. The first suggest that corruption hinders economic growth, in which corruption creates undesirable environment for investment, ineffective allocation of resources, as well as creates inefficient government institutions. This conclusion follows in line with the 'sand the wheels' hypothesis, in that corruption hinders economic growth (Meon and Sekkart, p. 73 - 74). On the other hand, it has been argued that corruption 'greases the wheel' of growth, in that corruption counterbalances for ineffective government and bureaucratic institutions (Ibid p. 73). Firms, for example, will use bribes in order to cut through bureaucratic red tape either to obtain licenses, permits, or bypass government regulations. Meon and Sekkart (2003) completed an empirical study to test the 'grease the wheel' hypothesis, in which the authors confirmed a negative relationship between corruption and economic growth. Essentially, the data supported the 'sand the wheel' hypothesis and equally important the authors noted the corruption was more detrimental on economic growth when ineffective governments existed. On a similar note, Mauro study confirmed a negative relationship between corruption and investment as well as corruption and economic growth (1995, p. 705).

Mo (2001) completed an empirical study on the role of corruption on economic growth. In this study Mo conducted two types of test, first the total effect of corruption and second the effect of the transmission channels². The author maintains that corruption does have a negative effect on economic growth but that the effect is more widespread when there is a weak legislative and judiciary system in the country (p. 76-77). In this study, the author notes "...a one unit increase in the corruption index reduces the growth rate by 0.545 percentage point" (p. 76). North (1990) asserted that effective institutions are a necessary condition for economic growth because institutions help to reduce uncertainty. Correspondingly Mauro (1995) maintains that when red tap is reduced, then bureaucracies will function more efficiently thereby leading to higher levels of investment and economic growth. Given the high level of corruption in most post-communist countries, domestic and foreign firms will be less inclined to invest capital because of the increased uncertainty in the economy caused by corruption. In that light corruption raises the cost of investment for both domestic and foreign firms in post-communist countries. For that reason foreign direct investment [FDI] will tend to go to more stable democracies, like the United States, Canada, or Western Europe, where corruption levels are significantly low. Jenson (2003) notes that stable democracies tend to have higher levels of FDI due to the fact that corruption is much lower than in transition countries. In accordance with Karklins "...it is estimated that globally the money lost to corruption adds up to approximately 5 percent of the world economy, and an even higher percentage in countries with high levels of corruption" (2005, p. 8).

Several studies have conducted path analysis models to test the transmission channels, which was the indirect affect of corruption on economic growth. Pellegrini and Gerlagh (2004) implemented the indirect channels in their study on corruption and economic growth. In Pellegrini and Gerlagh model they used investment, schooling, trade openness, and political stability transmission channels. In the transmission channels the authors noted that the channels accounted for 60% of the effect on economic growth (2004: p. 440). In the transmission model conducted by Mo, the author noted that political instability accounted for 64% of the effect on the corruption growth process (p. 74-75). Thus, from this brief literature review on corruption and economic growth, it is evident that corruption does have an impact on a countries level of economic growth.

3 THEORETICAL ARGUMENTS

The above analysis indicates that corruption will have a negative implication on the level of economic growth for countries. One can argue that high to medium levels of corruption will make it more difficult for firms to operate. As noted in several of the literature, corruption negatively affects productivity levels as well as investment levels (Brown and Shackman, 2007; Gyimah-Brempong, 2001). Red tape, for example, caused by corruption will reduce productivity levels, in turn reducing economic growth for a country. Additionally, firms will be reluctant to invest capital in a country with a significant amount of corruption because of the increased uncertainty in the economy

² The transmission channels were completed in order to test the indirect effects on economic growth.

caused by corruption. Thus, I will test the following hypothesis: *An increase in the levels of corruption for a country will be associated with a decrease in GDP per capita.* This paper will seek to test the 'grease the wheel' hypothesis established in economic literature regarding corruption.

Turning to other aspects that may affect the level of economic growth in developing countries, therefore I included the following control variables political rights, civil liberties, FDI inflows, political stability, official assistance and foreign aid, as well as population growth. Much of the literature on institutions point out that democratic regime consists of mechanisms that lessen political risk in contrast to authoritarian regimes. Olson (1993), for example, maintains that democratic regimes guarantee property rights, which is an essential factor for economic growth and development. In the context of autocratic regimes, property rights and social contracts are not guaranteed over the long run; rather such regimes have a short-time horizon. This predicament significantly differs from democratic regimes, where democracies offer potential investors a longer-time horizon on policies. Additionally, democratic regimes consist of institutional constraints, in turn, making policy reversal very difficult (Jensen: 595). This institutional constraint improves the credibility of democratic regimes in the eyes of foreign investors. Li notes that "...democratic countries tend to have more credible rule of law in the eyes of the private sector, they are expected to be more likely to comply with the agreements they make" (64). Thus, according to Olson democratic countries would offer foreign investors a more optimal environment to invest in, than autocratic countries. Following from the logic of Olson, partial democracies or transitional economies will offer foreign investors a less than optimal environment to invest in than strong democratic countries. Therefore, it is feasible to control for democracy in order to assess the effect of corruption on economic growth. In the context of this paper, democracy will be measured through political rights and civil liberties variables.

Another important control variable is FDI inflows. Much of the literature has empirically confirmed a positive relationship between FDI and economic growth, in which an increase in FDI inflows contributes to an increase in economic growth (Balasubramanyam, 1996; Borensztein et al., 1998; Bengoa et al., 2002; DeMello, 1997, 1999). FDI are associated with the transfer of technology and capital to recipient countries, which are indispensable factors for economic growth. Borensztein et al notes "...FDI may be the main channel through which advanced technology is transferred to developing countries" (p. 133). Therefore, it is feasible to control for FDI inflows in order to assess the effect of corruption on economic growth. Another, important control variable is political stability. It is acknowledged that political stability affects the level of economic growth in country, in that higher political stability is associated with higher levels of economic growth. Therefore, it is feasible to control for political stability in order to assess the effect of corruption on economic growth.

This study will also control for foreign aid in order to better assess the influence corruption has on economic growth. The foreign aid literature has mainly focused on economic growth on recipient countries (Easterly, 2003, Mosley et al 1987, Hudson and Mosley 2001, Chenery and Strout 1966, Reichel 1995, Hadjimichael 1995, Burnside and Dollar 2000). The main focus of these studies was the impact of aid flows on Gross Domestic Product [GDP] and other macroeconomic variables such as investment or

public consumption. One of the most influential aid effectiveness study stems from Chenery and Srtout (1966) two-gap model, which focuses on aid-growth and aid-savings relationship. In the two-gap model, the first gap exists between investment and domestic savings; the second gap exists between foreign exchange earnings and imports. Chenery and Strout maintained that foreign aid flows are intended to fill this gap, thereby leading to economic growth. Despite Chenery and Srtout's bold assertion, most authors have concluded that aid had no significant impact on growth, savings, or investment. Mosely et al (1992) illustrated that aid increased unproductive public consumption as well as failed to promote investment in recipient countries. Despite the debate on the effectiveness of aid on economic growth, it is essential to control for foreign aid in the study. A final important control variable is population growth. In essences population growth rates can have a dual effect on economic growth for respective country. The first effect can occur when a decline in fertilele rates can be associated with poverty alleviation, thereby improving the macroeconomic indicators of a country. The second effect can occur when a rise in fertilele rate can be associated with increasing the number of individuals in the labor force as well as increase consumption. In the next section, I will discuss the research design for the study.

4 RESEARCH DESIGN

In this section, I will discuss the research design for the empirical test of the hypotheses. The temporal scope of the study will between 1996 and 2006. In the periods before 1996, some essential variables have a large number of missing observations. Hence, meaningful estimations can start only from 1996. In this study I explore the relationship between corruption and economic growth in 3 sets of empirical tests. The first set of tests estimates the effect of corruption and economic growth in a time-series cross section of countries from 1996-2006. These tests seek to examine the relationship between corruption and economic growth with control variables through 9 models. These empirical tests will evoke the use of a pooled time-series cross-sectional ordinary least square [OLS] regression for 62 developing countries³. The pooled time-series cross-sectional OLS equation is:

$$\text{GDP per capita} = d_0 + \beta_1 \text{CPI} + \beta_2 \text{Political rights} + \beta_3 \text{Civil Liberties} + \beta_4 \text{FDI Inflows} + \beta_5 \text{Political Stability} + \beta_6 \text{Assistance/Foreign Aid} + \beta_7 \text{Assistance/Foreign Aid}_{t-1} + \beta_8 \text{Assistance/Foreign Aid}_{t-2} + \beta_9 \text{Assistance/Foreign Aid}_{t-3} + \beta_{10} \text{population growth} + \epsilon_i$$

The second set of tests uses robust regression analysis in order to examine the robustness of the time-series cross-section model. The third set of tests examines the indirect effect on economic growth through path analysis of developing countries from 1996-2006. First, I will examine whether political rights and civil liberties influence corruption,

³ Original this study began with a 112 developing countries, however due to several missing data the sample size was reduced to 62 in order to maintain the efficiency of the coefficients and assumptions of OLS regression.

which will indirectly affect economic growth in developing countries. Second, I will examine whether corruption influences FDI inflows, which will indirectly affect economic growth. In the final recursive causal model I will examine whether political stability influences corruption, which will indirectly affect economic growth. This recursive causal model is similar to the one used by Pellegrini and Gerlaghin (2004) and Mo (2001) in their study on corruption and economic growth. The recursive causal model (path analysis) time-series cross-sectional equation is:

$$\text{CPI} = d_0 + \beta_1 \text{Political rights} + \beta_2 \text{Civil Liberties} + \varepsilon_i \quad (1)$$

$$\text{FDI Inflows} = d_0 + \beta_1 \text{CPI} + \varepsilon_i \quad (2)$$

$$\text{CPI} = d_0 + \beta_1 \text{Political Stability} + \varepsilon_i^4 \quad (3)$$

The dependent variable in this study will be economic growth, which will be measured through Gross Domestic Product [GDP] per capita for the period of 1996 to 2006. The dependent variable is similar to the dependent variable used by several scholars in analyzing the role of corruption on economic growth. For this variable, I will use the Groningen Growth and Development Center-Total Economy Dataset.

The independent variable in this study will be corruption in developing countries, which will be measured by using Transparency International's Corruption Perception Index [CPI hereafter]. The CPI is a composite of the perceived level of corruption in public and private sector, which examines the extent of corruption among public officials and politicians. Transparency International's working definition of corruption is the "misuse of public power for private benefit, for example bribing of public officials, kickbacks in public procurement, or embezzlement of public funds" (Lambsdorff, 2008: 4). The CPI ranges from 10 to 0, where 10 correspond to the lowest level of corruption and 0 correspond to the highest level of corruption. The cases selected in the study offer a good explanation for the research question at hand. The sample-selected level of corruption varies from high to low, with respect to the state capture and administrative corruption. By having cases with varying levels of corruption, I will be better able to assess the effects of corruption on economic growth. This approach will also improve the essay's internal validity as well as rule out possible extraneous variables effecting economic growth.

The control variables in this study include political rights, civil liberties, FDI inflows, political stability, assistance/foreign aid, and population growth. For the political rights and civil liberties variables, I will utilize Freedom House world indexes. Political rights index, measures the degree of freedom in the electoral process, political pluralism, and participation in a country as well as the functioning of government (Freedom House report, 2005). On the other hand, civil liberties index measures freedom of expression, assembly, association, and religion (Ibid. 2005). Both political rights and

⁴ Std. Deviation * β (Independent variable)=X1, X1* β (Dependent variable) – equation for path analysis (figure 1).

civil liberties index range from 1 to 7, where 1 corresponds to country most free and 7 to country least free. For the political rights index, countries with a rating of 1 have free and fair elections, political competition, and autonomy of citizens. While countries with a rating of 2, are less free, where violence and political discrimination occurs. A rating between 3-5 indicates that citizens have some rights, but that freedom to organize is limited and one-party dominance exists (Ibid, 2005). A rating of 6 indicates a severe limitation on political rights and restricted political competition. With this rating one party dictatorship or autocracy exists in the country and local elections are limited. Finally, a rating of 7 refers to a country with no freedom, where political rights are absent. In such cases repression occurs, where extreme use of violence is used to rule by the regime (Freedom House, 2005). In the civil liberties index, countries with a rating of 1 have established rule of law, equality, personal as well as economic freedoms, essential such countries are considered to be free according to Freedom House. While a rating of 2, indicates a slightly lower level of civil liberties, however such countries are still considered to be relatively free. A rating between 3-5 indicates partial compliance to civil liberties, where inequality, political terror, censorship and limitation on associations occur. A rating of 6 indicates a severe limitation on associations and restricted expression. Finally, a rating of 7 refers to a country with no freedom.

In terms of FDI inflows variable, I will utilize World Bank datasets on FDI net inflows (current US\$). For the political stability variable I will utilize the Worldwide Governance indicators. The political stability indicator measures the “perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism” (Worldwide Governance 2006, codebook). The political stability indicator ranges from 2.54 to -2.54, where 2.54 correspond to the highest level of political stability and -2.54 corresponds to the lowest level of political stability. For the assistance/foreign aid variable, I will utilize World Bank dataset on developing assistance/aid (Official Development Assistance [ODA]/Net Official Aid)⁵. In order to get an efficient influence of assistants/aid on economic growth, a lagged assistant/aid will be included in the model. For this variable I will lag for 1, 2 and 3 years in order to better control for the effects of assistant/aid on recipient country because the benefits of assistant/aid are more evident in the long run. Finally, for population growth rate I will use World Bank data on annual growth rate for a country. The next section of this paper will discuss the empirical evidence on the affect of corruption on economic growth.

⁵ “Official development assistance (ODA) consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients. It includes loans with a grant element of at least 25 percent (calculated at a rate of discount of 10 percent). Net official aid refers to aid flows (net of repayments) from official donors to countries and territories in part II of the DAC list of recipients: more advanced countries of Central and Eastern Europe, the countries of the former Soviet Union, and certain advanced developing countries and territories. Official aid is provided under terms and conditions similar to those for ODA. Part II of the DAC List was abolished in 2005. The collection of data on official aid and other resource flows to Part II countries ended with 2004 data. Data are in current U.S. dollars”. (World Bank, 2009)

5 EMPIRICAL FINDINGS⁶

The purpose of my empirical investigation is to estimate the affects of corruption on GDP growth rate. The OLS regression reported in table 1, reveal the estimated effect of corruption on GDP per capita.

Table 1: OLS Analyses Predicting Economic growth, in developing countries 1996-2006.

Independent and Control Variables	Model 1 Coefficient (SE)	Model 2 Coefficient (SE)	Model 3 Coefficient (SE)
CPI	.521(.061)***	.708(.058)***	
Political Rights	-.067(.071)	-.072(.079)	
Civil Liberties	-.370(.100)***	-.443(.109)***	
FDI Inflows	4.38(7.22)***		3.33(1.02)**
Political Stability	.202(.109)*		
Assistance/Foreign Aid	-3.64(1.02)***		
Assistance/Foreign Aid _{t-1}	-8.54(1.20)		
Assistance/Foreign Aid _{t-2}	-1.19(1.20)		
Assistance/Foreign Aid _{t-3}	-1.68(1.01)*		
Population Growth	-.192(.059)**		
Constant	2.56(.321)***	1.71(.340)***	1.71(.340)***
Number of Observations	589	592	592
R ²	0.5733	0.4760	0.4760

*p ≤ 0.10; ** p ≤ 0.05; *** p ≤ 0.01

Models were estimated with Stata Release 9.2 (Stata, 2007). Standard errors (in parentheses) . All significance levels (p-values) are based on two-tailed tests.

In model 1, it indicates that a one-unit increase in CPI (meaning a reduction in corruption for a country) is associated with a 0.521 increase in GDP per capita for developing countries. Controlling for other determinants in GDP per capita, the relationship between corruption and GDP per capita was significant. In this model, 57.33% of the variations in GDP per capita are accounted for by the variations in the corruption index. In this model, a one-unit increase in the CPI, in which GDP per capita increases by 0.521 with an error of 0.061. Ukraine, for example had the lowest CPI for East Central Europe at 2.6 and 2.8 for the periods of 2005 - 2006, which lead to a 1.36 and 1.45 change in GDP per capita for the periods of 2005-2006 respectively. As the level of corruption decreased in Ukraine by 0.2, GDP per capita increased by 0.09 from 2005 to 2006. On the other hand, Estonia had one of the highest CPI in East Central Europe at 6.4 and 6.7 for the periods of 2005-2006, in which GDP per capita increased by 3.33 and 3.49 for the periods of 2005-2006 respectively. As CPI increased by 0.3, GDP per capita increased by 0.16 from 2005 to 2006. The case of Ukraine and Estonia, illustrate that higher levels of corruption are associated with lower levels of GDP per capita. In Estonia corruption levels are significantly low in comparison to Ukraine. According to the World Bank corruption in Estonia has remained static over the years, but rather in the Ukraine corruption levels have increased. The static levels of corruption

⁶ Refer to appendix 1 and 2 for descriptive statistics and correlations, respectively.

in Estonia can be attributed but not limited to anti-corruption policies implemented with respect to judicial reforms. Legal accountability, for example, in Estonia has improved the amount of cases brought before the court as well as the advancement of the rule of law (Karklins, 2005: 133). Such findings are consistent with the literature that corruption is negatively associated with economic growth. The notion of ‘grease the wheel’ of growth was inconclusive for Ukraine and Estonia as well as several developing countries in this study, in that corruption boosts economic growth.

Table 2: OLS Analyses predicting economic growth, in developing countries 1996-2006.

Independent and Control Variables	Model 4 Coefficient (SE)	Model 5 Coefficient (SE)	Model 6 Coefficient (SE)
CPI	.689(.068)***	1.02(.054)***	.899(.054)***
Political Rights			
Civil Liberties			
FDI Inflows			
Political Stability	.834(.109)***		
Assistance/Foreign Aid			-4.47(1.15)***
Assistance/Foreign Aid _{t-1}			-6.75(1.37)
Assistance/Foreign Aid _{t-2}			-1.48(1.37)*
Assistance/Foreign Aid _{t-3}			-1.95(1.15)
Constant	.231(.262)	-1.12(.201)***	-.299(.224)
Number of Observations	592	592	589
R ²	0.4310	0.3747	0.4408

*p ≤ 0.10; ** p ≤ 0.05; *** p ≤ 0.01

Models were estimated with Stata Release 9.2 (Stata, 2007). Standard errors (in parentheses) . All significance levels (p-values) are based on two-tailed tests.

When comparing model 2 and 5 it offers a good insight into the corruption-GDP per capita relationship. It is important to note that the political rights and civil liberties variables are a measure for democracy. In model 2, a one-unit increase in CPI (meaning a reduction in corruption for a country) is associated with a 0.708 increase in GDP per capita. In this model, 47.60% of the variations in GDP per capita are accounted for by the variations in corruption index. When compared to model 5, which does not include political rights and civil liberties, the findings are significantly different. In model 5, a one-unit increase in the CPI is associated with a 1.02 increase in GDP per capita in developing countries. This suggests that controlling for political rights and civil liberties is essential in understanding the corruption-GDP per capita relationship.

With respect to political stability, the findings in this study were consistent with the literature that political stability plays a role in economic growth. In model 1 and 4, political stability reveals its estimated effect on GDP per capita. In model 1, a one-unit increase in political stability is associated with a 0.202 increase in GDP per capita for developing countries. In this model, 57.33% of the variations in GDP per capita are accounted for by the variations in political stability. Controlling for other determinants in GDP per capita, the relationship between political stability and GDP per capita was significant. In model 4, a one-unit increase in political stability is associated with a 0.834 increase in GDP per capita in developing. In this model, 43.10% of the variations in GDP per capita are accounted for by the variations in political stability. With this model

the relationship between political stability and GDP per capita was significant, despite the lack of controlling variables. Nonetheless, both models suggest that political stability plays a significant factor in growth, signifying that firms would be reluctant to invest in a country with political instability, especially when firms are risk averse. Thus, firms will be less inclined to invest in countries where the likelihood that the government will be destabilized by political unrest or violence.

Table 3: OLS Analyses predicting economic growth, in developing countries 1996-2006.

Independent and Control Variables	Model 7 Coefficient (SE)	Model 8 Coefficient (SE)	Model 9 Coefficient (SE)
CPI		.935(.053)***	
Political Rights			
Civil Liberties			
FDI Inflows			
Political Stability			1.55(.085)***
Assistance/Foreign Aid	-7.00(1.34)***		
Assistance/Foreign Aid _{t-1}	-2.39(1.58)		
Assistance/Foreign Aid _{t-2}	-2.17(1.58)		
Assistance/Foreign Aid _{t-3}	-3.15(1.35)**		
Population Growth		-.450	
Constant		-.290(.223)	2.70(.067)***
Number of Observations	679	592	682
R ²	0.1538	0.4276	0.3275

*p ≤ 0.10; ** p ≤ 0.05; *** p ≤ 0.01

Models were estimated with Stata Release 9.2 (Stata, 2007). Standard errors (in parentheses) . All significance levels (p-values) are based on two-tailed tests.

The following set of tests use robust regression analysis in order to examine the robustness of the time-series cross-section model. Robust regression was conducted for model 1, 2, and 8 of the OLS regression models.

Table 5: Robust regression analyses predicting economic growth, in developing countries 1996-2006.

Independent and Control Variables	Model 10 Coefficient (SE)	Model 11 Coefficient (SE)	Model 12 Coefficient (SE)
Corruption	.568(.048)***	.729(.043)***	.960(.041)***
Political Rights	-.058(.055)	-.0007(.059)	
Civil Liberties	-.262(.078)***	-.403(.081)***	
FDI Inflows	3.31(5.53)***		
Political Stability	.161(.084)		
Assistance/Foreign Aid	-2.31(1.15)*		
Assistance/Foreign Aid _{t-1}	-2.82(1.71)		
Assistance/Foreign Aid _{t-2}	-1.63(1.80)		
Assistance/Foreign Aid _{t-3}	-4.09(1.45)		
Population Growth	-.188(.045)***		
Constant	1.77(.254)***	.975(.252)***	-1.26(.151)***
Number of Observations	547	605	605

*p ≤ 0.10; ** p ≤ 0.05; *** p ≤ 0.01 Models were estimated with Stata Release 9.2 (Stata, 2007). Standard errors (in parentheses). All significance levels (p-values) are based on two-tailed tests

Table 5 examined the robust regression for the study, where model 10 contains all of the variables and model 11-12 some control variables were dropped. A robust regression was utilized in order to examine the robustness of the corruption-GDP per capita relationship. Like the OLS regression models 1-2 and 5 the empirical results on the corruption-GDP per capita relationship in the robust models were unaffected. The robust model also indicates that when a country reduces corruption levels, GDP per capita increases. The results of the robust model offer a more efficient coefficients and standard error than the OLS regression model.

The recursive causal model reported in table 5, reveal the estimated effect of political rights and civil liberties on corruption index, which will indirectly affect GDP per capita.

Table 5: Recursive causal model (path analysis).

Independent and Control Variables	CPI Model Coefficient (SE)
Political Rights	.037(.056)
Civil Liberties	-.486 (.074)***
Constant	.503 (.124)***
Number of Observations	592
R ²	0.2636

*P ≤ 0.10; ** p ≤ 0.05; *** p ≤ 0.01

Standard errors (in parentheses). All significance levels (p-values) are based on two-tailed tests.

Table 6 suggests that a one-unit increase in political rights (country less free) is associated with a 0.037 decrease in corruption index (increase in corruption) in developing countries. In this model, 26.36% of the variations in corruption index are accounted for by the variations in political rights. From this recursive causal model, a one standard deviation increase in political rights (country less free) decreases corruption index (increase in corruption) by 0.071, which in turn decreases GDP per capita by 0.037⁷. In the case of civil liberties, a one standard deviation increase in civil liberties decreases corruption index by 5.55, which in turn decreases GDP per capita by 2.89. Such findings are consistent with the literature about the indirect effect of political rights and civil liberties. From the above empirical results, a country with free and fair elections, political competition as well as rule of law, leads to transparency in government thereby reducing corruption.

The recursive causal model reported in table 7, reveal the estimated effect of corruption on FDI inflows, which will indirectly affect GDP per capita.

⁷ Std. Deviation * β(Independent variable)=X1, X1*β(Dependent variable)—(1.93)(0.37)=0.071, (0.071)(0.521)=0.037. This was the same method used by Pellegrini and Gerlaghin (2004).

Table 7: Recursive causal model (path analysis).

Independent and Control Variables	FDI Inflows⁸ Model Coefficient (SE)
CPI	235.26(269.10)
Constant	2635.84(998.42)
Number of Observations	592
R ²	0.0013

*p ≤ 0.10; ** p ≤ 0.05; *** p ≤ 0.01

Standard errors (in parentheses). All significance levels (p-values) are based on two-tailed tests.

Table 7 suggests that a one-unit increase in corruption index (a reduction in corruption) is associated with a 235.26 increase in FDI inflows in developing countries. In this model, 0.0013% of the variations in FDI inflows are accounted for by the variations in corruption index. Given the high level of corruption in most developing countries, foreign firms will be less inclined to invest capital because of the increased uncertainty in the economy caused by corruption. In that light corruption raises the cost of investment for foreign firms in developing countries. For that reason FDI will tend to go to more stable democracies, like the United States, Canada, or Western Europe, where corruption levels are significantly low. Jenson (2003) notes that stable democracies tend to have higher levels of FDI due to the fact that corruption is much lower than in transition countries.

Despite the weak relationship between corruption index and FDI inflows, an indirect effect still exists in this recursive causal model. A one standard deviation increase in corruption index (reduction in corruption) increases FDI inflows by 294.10, which in turn increases GDP per capita by 1288.10. Such findings are inconsistent with the ‘grease the wheel’ hypothesis in that corruption is good for the economy (Leff 1964, Huntington, 1968; Acemoglu and Verdier 1998). Rather the recursive model suggests that when corruptions levels are reduced than MNC’s are willing to invest in country. Following economic logic, since firms are profit-maximizing agents, they will than prefer to conduct business in countries that have lower levels of corruption because corruption such as bribes, excessive regulations, and fines tend to inflate the operating costs for firms (Krugman and Obstfeld, 2003: p. 670).

The final recursive causal model reported in table 6, reveal the estimated effect of political stability on corruption index, which will indirectly affect GDP per capita.

Table 8: Recursive causal model (path analysis)

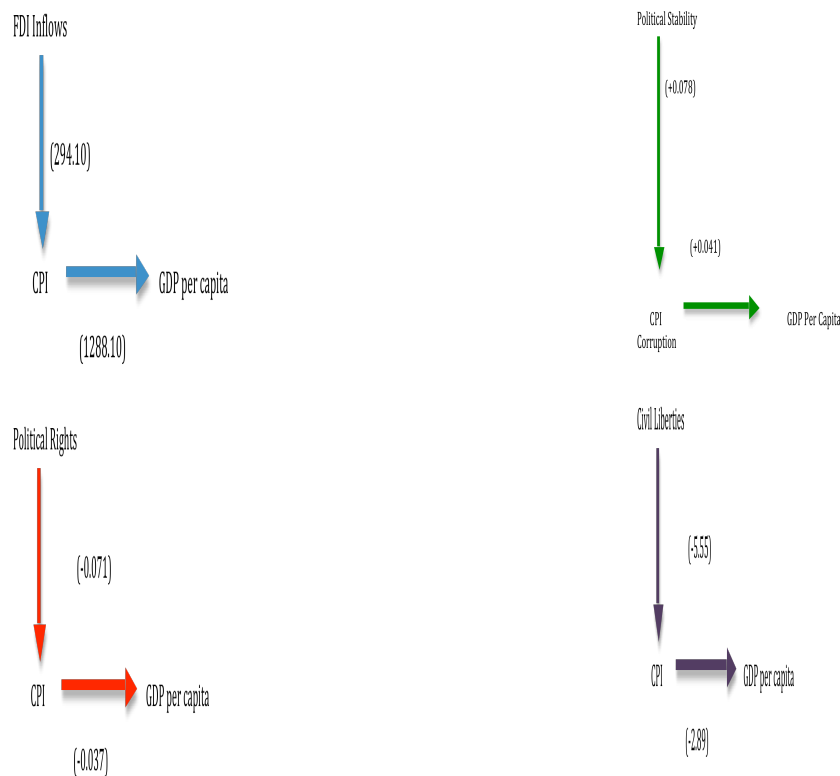
Independent and Control Variables	CPI Model Coefficient (SE)
Political Stability	0.103(0.05)***
Constant	3.73 (.041)***
Number of Observations	592
R ²	0.4143

*p ≤ 0.10; ** p ≤ 0.05; *** p ≤ 0.01. Models were estimated with Stata Release 9.2 (Stata, 2007). Standard errors (in parentheses). All significance levels (p-values) are based on two-tailed tests.

⁸ FDI Inflow/1000

Table 8 suggests that a one-unit increase in political stability is associated with a 0.103 increase in corruption index (reduction in corruption) in developing countries. In this model, 41.43% of the variations in corruption index are accounted for by the variations in political stability. The relationship between political stability and corruption index was significant. A one standard deviation increase in political stability increases corruption index by 0.078, which in turn increases GDP per capita by 0.041. The estimated effect of political stability on GDP per capita was greater in the recursive model, than the direct model, thereby suggesting that corruption does influence GDP per capita in developing countries. This suggests that political stability plays a significant indirect affect on GDP per capita, than in the direct effect model. This finding was consistent with the literature in that political stability has indirect effect on GDP per capita. When a country faces political turmoil, corruption is likely to increase and as suggested from the direct effect model as well as the literature on corruption, economic growth will decline. In sum both the direct model and the recursive model indicate a negative effect of corruption on GDP per capita, which was consistent with the ‘sand the wheels’ of growth hypothesis.

Figure 1: Path analysis of all three models.



6 CONCLUDING REMARKS

As evident from the above analysis corruption in developing countries has had a negative effect on GDP per capita for developing countries in this study. In both the direct and the indirect models, it was evident that corruption played a significant factor in the economy. Thus, the empirical tests in this paper support my hypothesis that an increase in the levels of corruption for a country will be associated with a decrease in GDP per capita. The indirect effects of corruption through the recursive models also indicated a negative relationship between corruption and GDP per capita for developing countries. Thus, corruption plays a significant effect on the economic development prospects for this region.

The empirical examination of the grease the wheel of growth hypothesis indicates that corruption in fact has a negative relationship with economic growth. As the level of corruption decreased than GDP per capita tended to improve for a country. However, the reduction of corruption alone does not lead to economic growth as was evident with the models in this study. The control variables used in this study to a certain extent affected the level of growth for countries, such as FDI inflows, political rights, and civil liberties. Thus, it is evident that acts of corruption will ‘sand the wheel’ of growth for a country, whereby inefficiency and gridlock will be persistent in the system. These conditions create an undesirable environment for investment by local or foreign firms. FDI, for example, tend to flow more towards stable democracies with low level of corruption, than to countries with higher levels corruption. Inefficiency due to corruption, not only deters investment but also lead to the ineffective allocation of resources by government agents, which in turn could have been allocated towards improving social service or towards economic development. In a notable case, President Ferdinand Marcos of the Philippines had significantly increased the country’s debt through his miss-allocation of resources from US economic aid programs and other foreign loans (28 billion USD\$). President Ferdinand Marcos, for example, redistributed the resources to family and friends under the terms of behest loans. Such action contributed to the negative economic growth for the Philippines during the President Ferdinand Marcos regime⁹.

⁹ Prior to President Ferdinand Marcos regime (1966 to 1986), the Philippines had experienced positive economic growth.

APPENDIX 1: Descriptive statistics

Statistics	GDP per capita	CPI	Political Rights	Civil Liberties	FDI Inflows	Political Stability	Assistant/Aid	Assistant/Aid _{t-1}
Mean	2.36	3.49	3.28	3.44	3071924	-.221	477467	475457
Standard Deviation	2.06	1.25	1.93	1.43	7719561	.757	690542	689049
N	682	592	682	682	682	682	682	681

Statistics	Assistant/Aid _{t-2}	Assistant/Aid _{t-3}	Population Growth
Mean	473351	471338	1051.1
Standard Deviation	687362	685859	1.16
N	680	679	682

Models were estimated with Stata Release 9.2 (Stata, 2007).

APPENDIX 2: Correlations

	GDP Per Cap	CPI	Political Rights	Civil Liberties	FDI Inflows	Political Stability	Assist./Aid	Assist./Aid _{t-1}	Assist./Aid _{t-2}	Assist./Aid _{t-3}	Pop. Growth
GDP Per Cap	1.00										
CPI	.609	1.00									
Political Rights	-.553	-.450	1.00								
Civil Liberties	-.583	-.500	.916	1.00							
FDI Inflows	.117	.049	.136	0.140	1.00						
Political Stability	.561	.647	-0.500	-.544	.027	1.00					
Assist./Aid	-.349	-.260	.242	.244	.184	-.268	1.00				
Assist./Aid_{t-1}	-.327	-.266	.231	.246	.175	-.249	.628	1.00			
Assist./Aid_{t-2}	-.305	-.233	.212	.229	.148	-.227	.369	.621	1.00		
Assist./Aid_{t-3}	-.279	-.201	.168	.185	.129	-.224	.312	.347	.607	1.00	
Pop. Growth	-.359	-.237	.246	.265	-.095	-.454	.186	.178	.177	.158	1.00

Models were estimated with Stata Release 10

Appendix 3: Developing countries

Code	Country	Code	Country
AGO	Angola	MDA	Moldova
ARG	Argentina	MNG	Mongolia
ARM	Armenia	IRQ	Iraq
AZE	Azerbaijan	MAR	Morocco
BGD	Bangladesh	MOZ	Mozambique
BLR	Belarus	MMR	Burma (Myanmar)
BLZ	Belize	NAM	Namibia
KGZ	Kyrgyzstan	NIC	Nicaragua
LAO	Laos	NER	Niger
BOL	Bolivia	NGA	Nigeria
BWA	Botswana	PAK	Pakistan
BRA	Brazil	PAN	Panama
BGR	Bulgaria	PRY	Paraguay
MWI	Malawi	PER	Peru
MUS	Mauritius	PHL	Philippines
CMR	Cameroon	POL	Poland
ZMB	Zambia	ROM	Romania
CHL	Chile	RUS	Russia
CHN	China	SVK	Slovakia
COL	Colombia	SVN	Slovenia
ZAR	Congo [DRC]	SWZ	Swaziland
CRI	Costa Rica	ZAF	South Africa
HRV	Croatia	TJK	Tajikistan
CUB	Cuba	TZA	Tanzania
CZE	Czech Republic	THA	Thailand
DOM	Dom. Republic	LSO	Lesotho
ECU	Ecuador	SUR	Suriname
EGY	Egypt	TUN	Tunisia
SLV	El Salvador	TUR	Turkey
EST	Estonia	TKM	Turkmenistan
ETH	Ethiopia	UGA	Uganda
ZWE	Zimbabwe	UKR	Ukraine
GHA	Ghana	URY	Uruguay
WBG	Palestine	UZB	Uzbekistan
GTM	Guatemala	VEN	Venezuela
HTI	Haiti	VNM	Vietnam
HND	Honduras		
HUN	Hungary		
IND	India		
IDN	Indonesia		
JAM	Jamaica		
JOR	Jordan		
KAZ	Kazakhstan		
KEN	Kenya		
LVA	Latvia		
LTU	Lithuania		
MKD	Macedonia		
MDG	Madagascar		
MYS	Malaysia		
MLI	Mali		
MEX	Mexico		

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