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Onyinye Udenze '14
Illinois Wesleyan University, oudenze@iwu.edu

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Abstract

Using panel data, this paper will empirically test the relationship between the levels of perceived corruption and the net foreign direct investments (FDI) inflows as a fraction of the GDP across several developing countries over a period of seven years. It is hypothesized that increased corruption translates into a decrease in net FDI inflows. If this relationship manifests as predicted, there are more incentives for low and middle income economies to intensify their efforts in the anti-corruption programs in order to attract more FDI, reduce poverty and foster economic growth and development. This study looks at the relationship between perceived corruption as an institutional factor and the net foreign direct investment inflows.

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Oyinye Udenze

I.   Introduction

With the rise in globalization and economic integration, developing countries have had an increasing interest in attracting foreign direct investments (FDI). This is important because according to the International Monetary Fund, FDI promotes growth and economic development by transferring technology, skills and innovation. Consequently, most developing countries are interested in increasing the flow of investments into the country in pursuit of such a promotion of economic growth. According to the World Bank, FDI refers to "the 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." For the purpose of convenience, the World Bank classifies low and middle income countries as developing countries. Therefore, these are countries whose Gross National Income per capita is less than $12,476. Mauro (1995) argues that investments from abroad would lead to an inflow of resources that could be harnessed and result in growth. This is especially important for a lot of developing countries with low savings and investments which normally have little promise of economic growth.

As reported by the Global Investments Trends Monitor, the share of FDI inflows to developing countries has been increasing since the 1980's. In 2012, FDI inflows to developing nations exceeded those to the developed world by $130 billion. With the increase of investments in the developing world, it is important to study the factors which determine how the funds are distributed across countries. Anyanwu (2011) finds that FDI inflows are influenced by GDP per capita, trade openness, current account balance and several other factors that predict the business environment. He concludes that most international investors have to consider the macroeconomic determinants in the country to be invested in. It is important to determine the conditions in the countries, calculate the level of risk of the business and predict the chances of survival and success. With the rise in globalization, the relationship between countries depends on a variety of factors. Bray (2007) reported that in a survey of international business managers, over 60% of respondents reported that corruption can increase the cost of international projects by more than 15%. According to the Transparency International Global Corruption Report of 2009, businesses in Russia pay up to $33.5 billion in bribes and kickbacks on a yearly basis. These studies suggest that the perceived level of corruption in a country is an indicator of business conditions and national stability, and is predicted to have an effect on FDI inflows. More corrupt countries tend to be less stable and riskier for business ventures. Bray (2007) concluded that corruption tends to increase the cost of doing business, alter the resource allocation process and potentially results in higher prices of goods and services. Corruption is generally defined as the use of public position for personal gains. The World

Bank recognizes corruption as a serious economic, political and social problem which is already being addressed in many countries. The international financial institution provides support to countries to aid anti-corruption programs and encourage good and transparent governance.

Using panel data, this paper will empirically test the relationship between the levels of perceived corruption and the net FDI inflows as a fraction of the GDP across several developing countries over a period of seven years. It is hypothesized that increased corruption translates into a decrease in net FDI inflows. If this relationship manifests as predicted, there are more incentives for low and middle income economies to intensify their efforts in the anti-corruption programs in order to attract more FDI, reduce poverty and foster economic growth and development.

This study looks at the relationship between perceived corruption as an institutional factor and the net foreign direct investment inflows. The scholarly debate on institutions and their relationship with the economy has been going on for some time. North (1990) shows that "the polity and the economy are inextricably linked in any understanding of the performance of an economy and therefore we must develop a true political economy discipline." In his study, he makes reference to the enforcement of property rights and patents and how they can act as an incentive to encourage innovation, investment and foreign technology. He argues that a competent judicial system is vital in fostering economic performance. Drawing from this conclusion, Mauro (1995) points out that corruption has a significant negative effect on investment and therefore stalls economic growth. While North (1990) and Mauro (1995) focus on overall investments and the economy, this study specifically tests the theory proposed by Wei (1997). Wei (1997) shows that foreign investors are not attracted

to countries with high levels of corruption because of the uncertainty of business conditions. He claims that "corruption embeds arbitrariness and creates uncertainty" and that the effect of corruption is considerably more impactful on returns on investment than that of taxes because the corporate tax rate is known, but the cost of corruption is uncertain. This idea is the underlying concept in the hypothesis that corruption has a negative effect on FDI inflows.

The empirical studies testing the relationship between FDI inflows and corruption have mixed results. Bardhan (1997) explains that corruption reduces bureaucracy, increases the speed of investments and therefore leads to quicker wealth accumulation. Bellos and Subasat (2011) find that a high level of corruption is associated with a high level of FDI stock. This is in line with the efficient grease hypothesis which is the view that corruption can improve efficiency and therefore has a positive effect on investment. On the other hand, many economists like Alemu (2012), Woo (2010) and Aparna and Kartikeya (2011) find that corruption deters FDI inflows. Alemu (2012) concludes that corruption weakens economic reform and consequently leads to economic instability in Asian economies. He claims that corruption is one of the damaging risks that multinational companies must take into account. Using an extensive sample of 90 countries from 1984 to 2004, Woo (2010) finds that corruption deters foreign investments and suggests that countries should fight corruption not just for political reasons, but also to facilitate economic growth. Aparna and Kartikeya (2011)'s paper motivates my analysis. Their results show that a 1% decrease in the level of corruption may lead to a 9% increase in FDI flows in emerging economies. Therefore, they conclude that corruption plays an important role in investors' decision of where to invest. Based on their model, this paper uses net FDI inflows in emerging

economies as the dependent variable and corruption perception from Transparency International as the independent variable. However, while they used data from 1980-2000, this paper uses more recent data from 2005-2011. Like most papers which have tested the relationship between corruption and FDI inflows, this study uses ordinary least squares regression and controls for trade openness and GDP growth.

Related studies commonly used similar methods and variables, but studied different economies. Aparna and Kartikeya (2011) focused on emerging economies, Alemu (2012) focused on Asian economies, while Woo (2010) looked at a more diverse selection of countries. This study focuses on low and middle income economies in recent times. In addition, two different subsamples are used; one representing developing countries in Sub-Saharan Africa and the other representing the low and middle income countries in the rest of the world.

The rest of the paper is organized as follows: Section 2 describes the data across the sample period from 2005 to 2007 and statistical methods; Section 3 presents the estimation results; finally, Section 4 presents the conclusions. Tables and Figures can be found in the Appendix at the end of the paper.

II.   Data and Methods

In order to estimate the relationship between corruption and net FDI inflows, data for the dependent variable were obtained from the World Bank Development Indicators database. Net inflow of FDI as a percentage of the GDP (FDI/GDP) is used as the dependent variable. This indicator accounts for the size of the economy as opposed to the net inflows of FDI which are expressed in current US dollars. The maximum value for the FDI/GDP is about 85% as shown in Table 1. This is an outlier which was observed in Liberia in 2011 because, according to Gorman and Fay (2012), after the second

Liberian civil war, the country actively sought foreign investments to improve its economy. It is important to note that the FDI/GDP variable measures net inflows of foreign investments. Hence, it is calculated by adding new investment inflows and subtracting divestitures. The minimum value of the FDI/GDP data points is negative. In 2005, Angola's net FDI inflows as a fraction of its GDP in 2005 was -4% indicating that there were more divestments than new investments in the given country for that year. A few other countries including Venezuela, South Africa and Nepal also experienced negative net FDI inflows for a few years in the sample.

Annual corruption perceptions index (CPI) data were obtained from Transparency International. This index is derived by using surveys to determine the perceived levels of corruption in different countries. The results of the surveys are transformed into numerical values ranging from 0 to 10 with a higher CPI score indicating a lower level of perceived corruption. To facilitate comprehension, the data for the independent variable were transformed by subtracting the CPI score from the maximum score of 10. Hence, a higher number indicates more corruption. Data was collected for seventy-three countries from 2005 to 2011. As shown in Table 1, the average perceived corruption level for all seven years is 6.97.

Microsoft Excel was used to compile the above data and EViews was used for the regression analysis. As shown in Figure 1, without accounting for other variables, there is a negative relationship between the seven year average of net FDI inflows and the level of perceived corruption for the seventy three countries. Ordinary least squares regression is used to estimate the relationship between corruption and FDI/GDP as shown by the general regression equation.

$$\text{Net FDI Inflows to GDP} = \alpha + \beta \text{Corruption} + \varepsilon$$

Based on the studies done by Alemu (2012), Woo (2010) and Aparna and Kartikeya (2011), it is hypothesized that corruption deters foreign investors and thus, an increase in the perceived level of corruption leads to a decrease in the net inflows of foreign investments. Therefore, the expected sign for the regression equation is negative. Bushra et. al, (2003) studied the factors that determine the FDI inflows into a country. These factors include trade openness, GDP growth, inflation rate, GDP per capita (GDP/CAP), gross capital formation (GCF/GDP), days to start a business (DSB) and number of procedures to start a business (NOP). They are included as independent variables in the study because it is important to control for these factors to improve the accuracy of the estimation of the relationship between perceived corruption and FDI inflows. Trade openness was calculated by adding the export and import values and dividing the sum by the GDP of the country for that year. This variable predicts how open the borders of the country are. Data for all other control variables were obtained from the World Bank Development Indicators database. The World Bank calculates GDP growth by finding the annual percentage growth rate of GDP at market prices. The inflation rate measures the annual growth rate of the GDP deflator and shows the rate of price change in the country while the GDP per capita is calculated by dividing the GDP by the midyear population. The gross capital formation is the measure of the additions of fixed assets and net inventories in the country. The days to start a business and the number of procedures are variables measured by the World Bank that indicate the number of days and procedures to required start up a business in the country. In addition to estimating the general relationship between the perceived level of corruption and FDI/GDP, this study uses 2 subsamples to test the relationship

between the two variables in the developing countries in Sub-Saharan Africa and in the rest of the world.

As opposed to using cross sectional data, using panel data across seventy-three countries and over seven years provides more data points and accounts of variation across countries and over time. However, the range of the data is limited by the availability of data for developing countries. The period of observation, 2005 – 2011, only accounts for one economic cycle. Therefore, there is no framework to compare the effects of perceived corruption on FDI inflows over recessionary periods. Another potential flaw in this research is the use of a corruption perceptions index. Corruption is difficult to measure numerically. However, this research attempts to study how investors' views on the level of corruption in a country affect their decision to invest in that country. Therefore, using an index that measures the perceptions of corruption is adequate.

III.   Estimation Results

In order to effectively run the regression testing the effect of corruption perception on the net inflows of FDI, the first order differences were computed for net FDI inflows, corruption, GDP per capita and gross capital formation as a percentage of GDP. These transformations were done to ensure stationarity of the data series and prevent issues with autocorrelation. This research uses panel data across seventy-three countries and over seven years. The variables, days to start a business and number of procedures to start a business were initially considered but were dropped because they were not significant or relevant. Subsequently, the regression equation was run as follows:

$$\Delta \text{NET FDI INFLOWS} = \alpha + \beta_1 \Delta \text{Corruption} + \beta_2 \Delta \text{Openness} + \beta_3 \text{GDPGrowth} +$$
$$\beta_4 \text{Inflation} + \beta_5 \Delta \text{GDP/CAP} + \beta_6 \Delta \text{GCF/GDP} + \varepsilon_t$$

Three separate regressions were run, one for all the low and middle income countries in the sample, the second for a

subsample of the countries in Sub-Saharan Africa and the third for the subsample representing the rest of the world. As shown in Table 2, in Model 1, for all developing countries in the sample, the sign of the corruption perception variable was negative as expected. It indicates that a one point increase in the corruption perception figure would lead to a 0.58% decrease in the portion of Net FDI inflows to the GDP of the country. However, this coefficient was not statistically significant. As expected, the level of openness has a positive relationship with the Net FDI inflows. Similarly, an increase in GDP growth, as well as an increase in the gross capital formation as a percentage of GDP, leads to an increase in Net FDI inflows. The three variables are significant at the 1%, 10%, and 1% levels respectively. The signs of the coefficients of inflation and GDP per capita contradicted expectations. According to the three models, inflation has a positive effect on net FDI inflows while GDP per capita has a negative effect. This is an area for further research as these signs are not consistent with the expectations. The adjusted R-squared in the first model is 0.3489 indicating that the variables explain about 35% of the variation in the net inflows of FDI. The F-statistic is also very high because the combined explanatory power of the variables is significant.

Model 2 estimates the relationship between perceived corruption and net FDI inflows in the 22 Sub-Saharan countries in the sample. In this subsample, the sign of the coefficient of perceived corruption is positive. This suggests that in low and middle income Sub-Saharan countries, a one point increase in the level of perceived corruption could lead to a 0.01% increase in the net inflows of FDI. This is consistent with the Efficient Grease Hypothesis, mentioned by Kardesler et al (2009), which shows that corruption may attract foreign investors. However, the coefficient of corruption perception is not statistically significant and the magnitude

is small. The signs of the other variables are similar to those in the first model with the openness and GDP growth variables being very significant at the 1% and 5% levels respectively. Of the three samples, the coefficient of GDP growth has the highest magnitude in the second model. Also, the coefficient of gross capital formation as a percentage of GDP is the lowest in this model. This indicates that the growth of GDP is more relevant in attracting FDI in Sub-Saharan Africa than in the rest of the world and gross capital formation is not as important in attracting FDI as it is in other regions. The variables in this model explain 42% of the variation in the dependent variable and the combined effect of all variables is statistically significant at the 1% level.

The last model estimates the relationship between net FDI inflows and perceived corruption in the subsample that represents the rest of the world. In this model, the sign of the coefficient of perceived corruption is negative and significant. In addition, the magnitude is larger than in the first two models and also larger than those of the other variables in the same model. This implies that in low and middle income countries outside Sub-Saharan Africa, a one point increase in corruption perception would lead to a 0.88% decrease in the net FDI inflows as a percentage of GDP. The results of this model provide evidence for the theory proposed by Wei (1997) showing that foreign investors would not be attracted to countries with high levels of corruption. The variables in this model explain 26% of the variation in the net inflows of FDI and the combined effect of all variables is significant at the 1% level. A one percent increase in the level of openness would lead to a 0.09% increase in net inflows of FDI while a 1% increase in the gross capital formation as a fraction of GDP would lead to a 0.27% increase in the net FDI inflows as a percentage of GDP. In this model, corruption has three times the effect on net inflows of

FDI as the gross capital formation which has three times the effect of trade openness index on the dependent flow variable.

IV. Conclusion

The effect of corruption on economic activities has been discussed extensively in current literature. Wei (1995), Mauro (1997), Woo (2010) and Alemu (2012) are proponents of the view that corruption deters investment while Bardhan (1997) and Bellos and Subasat (2011) argue the reverse. This study is intended to provide evidence and add to the literature on this topic. Using the Corruptions Perceptions Index from Transparency International and economic indicators from the World Bank Development Database, this study tests the relationship between corruption perception and the net inflows of FDI as a percentage of GDP in low and middle income countries in Sub-Saharan Africa and in the rest of the world.

Using Ordinary Least Squares regression in the Eviews statistical package, the findings are that in low and middle income countries, there was a negative correlation between net FDI inflows and corruption perception between 2005 and 2011. During the same period, the relationship was positive in the Sub-Saharan African countries in the sample. However, these coefficients were not statistically significant. The findings suggest that GDP growth is more relevant in attracting FDI in Sub-Saharan Africa than in the rest of the world, and gross capital formation is not as important in attracting FDI as it is in other regions. In low and middle income countries outside Africa, the findings reveal a statistically significant negative relationship between net FDI inflows and perceived corruption. A one point increase in corruption perception in these countries would lead to a 0.88% decrease in the net FDI inflows as a percentage of GDP. The effect of corruption on net FDI inflows is three times that of gross capital formation and almost ten times that of trade openness in the sampled countries.

Though not statistically significant, the findings provide evidence for the Efficient Grease Hypothesis in Sub-Saharan Africa. However, the significant results provide evidence for the contradicting theory proposed by Wei (1997) that corruption deters foreign investors. This was found in low and middle income countries outside Sub-Saharan Africa. Given these results, if the level of corruption in Paraguay decreased by two points, and was similar to that of Turkey in 2011, all else equal, Paraguay could experience an increase in net FDI inflows of over $7 million. Based on this study, efforts to reduce corruption in low and middle income countries outside the Sub-Saharan African region would likely attract more foreign investments and, according to Mauro (1995), stimulate economic growth.

One could argue that FDI inflows affect the level of perceived corruption and not the other way around. A future avenue for research would be to look at the endogeneity problem, and test which variable is the cause and which is the effect. Also, the unexpected signs for GDP per capita and inflation could pose questions for further study. Furthermore, this study was limited by the availability of data for low and middle income countries. Future studies should use a longer time period and control for more variables including political factors, currency and exchange rate risks.

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Table 1: Descriptive Statistics

	MEAN	MEDIAN	MAX	MIN	STD. DEV	NO. OF OBS.
Net FDI Inflows to GDP (%)	5.3630	3.9575	84.9449	-4.6180	6.4489	511
Corruption Perception	6.9618	7.2000	8.6000	3.9000	0.9388	511
Openness (%)	84.2790	72.6260	365.3582	21.9373	42.5122	511
GDP Growth (%)	5.5206	5.6758	34.5000	-14.8000	4.3525	511
Inflation (%)	9.2849	7.5319	80.7501	-18.8477	8.3656	511
GDP per Capita ($)	3017.362	2258.981	13559.33	143.7835	2684.573	511
Gross Capital Formation to GDP (%)	24.4163	23.7303	62.5087	3.0316	7.3549	511

Figure 1: Average Net FDI Inflows and Corruption per Country
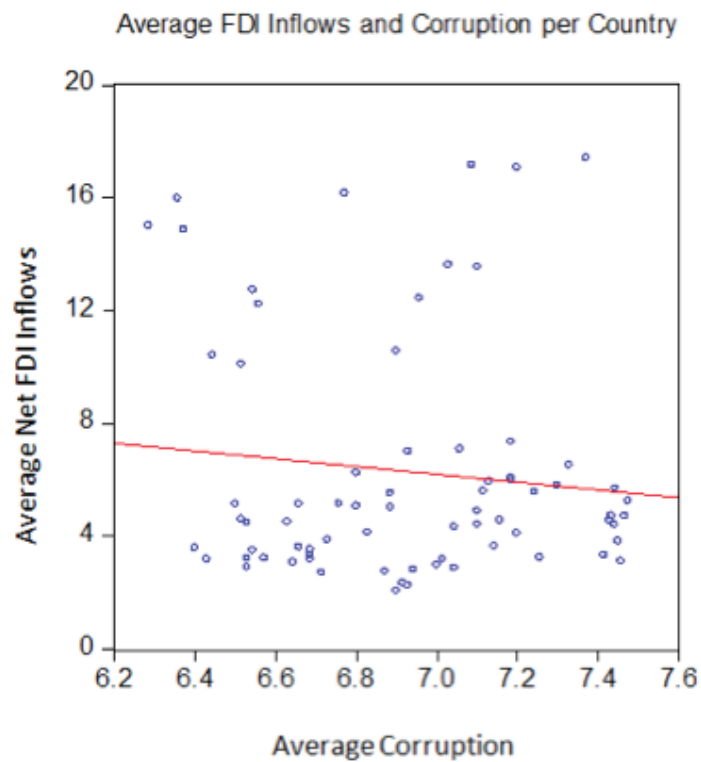
Table 2: Estimation Results
Dependent Variable: Net FDI Inflows as a percentage of GDP

	Model 1: Low and Middle Income Countries N=438	Model 2: Low and Middle Income Countries in Sub-Saharan Africa N=132	Model 3: Low and Middle Income Countries in the Rest of the World N=306
Constant	-0.5312* (-1.6882)	-1.4723* (-1.6648)	-0.3205 (-1.0914)
Change in Corrup-tion Perception	-0.5844 (-1.1553)	0.0118 (0.0078)	-0.8855* (-1.9228)
Change in Open-ness Level	-0.5844 (-1.1553)	0.1769*** (8.2224)	0.0907*** (5.6657)
GDP Growth	-0.5844 (-1.1553)	0.2591** (2.3542)	0.0125 (0.3006)
Inflation	-0.5844 (-1.1553)	0.0576 (1.2746)	0.0398* (1.9166)
Change in GDP per capita	-0.0006* (-1.8299)	-0.001 (-0.8314)	-0.0003 (-1.0378)
Change in Gross Captial Formation	0.2197*** (4.9560)	0.129 (1.0389)	0.2664*** (6.4331)
Adjusted R=Squared	0.3489	0.4242	0.2641
F-statistics	40.0309***	17.0858***	19.2401***

Significance at the 1% (***),
5% (**), and 10% (*) levels
(t-values in parenthesis)