QUANTIFYING THE LINK BETWEEN CORRUPTION AND FOREIGN DIRECT INVESTMENT INFLOWS: THE CASE OF SUDAN

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Abstract: The international community perceives Sudan as extraordinarily corrupt, and all available data and country reports indicate persistent, widespread and endemic forms of corruption. Although corruption is common in many economies in the world, its impact is more significant on fragile economies like Sudan. This paper investigates the quantitative link between corruption level and foreign direct investment inflows (FDI) to Sudan. The Transparency International Corruption Perceptions Index (CPI) is employed as the measure of corruption. CPI measures perceived corruption rated on a scale from zero (most corrupt) to 100 (no corruption). Empirically, in order to determine the quantitative magnitude of the impact of corruption on FDI, time series econometrics analysis is applied to a date set from 2002 to 2016. In addition to the CPI, a list of commonly used regressors in empirical studies of corruption and growth are employed. This list includes Consumer price index, trade openness, political stability. The result shows a statistically significant dependence between CPI and FDI to Sudan, and indicates that the clearer the country from corruption, the higher the FDI inflows could be. From a policy perspective, efforts should be made to curb corruption.

1. INTRODUCTION

Corruption is generally regarded as one of the most severe obstacles to development (Lederman, Loayza, & Soares, 2005). However, there is an active debate concerning the relation between corruption level and economic growth (Shao, Ivanov, Podobnik, & Stanley, 2007). Although there is no consensus on the corruption impact on economic indicators, however, the general view is that its adverse effects would outweigh the positive ones, in any, specifically in the long run (Özşahin and Üçler, 2017). Rehman & Naveed (2007) mention that corruption has been blamed for the failures of certain developing countries to grow and develop. The African Union estimates that due to corruption,

the African continent loses 25% of GDP (Podobnik, Shao, Njavro, Ivanov, & Stanley, 2008). In addition, Shao *et al.* (2007) state that the level of corruption in a given country is widely believed to be an essential factor to consider when projecting economic growth, estimating the effectiveness of the government administration, making decisions for strategic investments, and forming international policies.

This research focuses on the corruption impact onforeign direct investment (hereafter FDI) to Sudan. FDI is considered one of the significant determinants of a country's economic performance and growth (see Asghar, 2016; Omisakin, Adeniyi & Omojolaibi, 2009).

Corruption remains very hard to measure. One reason could be the illegality in its nature (Tafa, 2014). In the current research, we employ the Transparency International Corruption Perception Index (hereafter CPI) as a measure of the level of corruptionin Sudan. The CPI is a composite index based on independent surveys of businesses and people on the assessments of corruption in different countries provided by more than ten independent institutions around the world. Including the World Economic Forum, United Nations Economic Commission for Africa, the Economist intelligence Unit, the International Institute for Management Development. The CPI ranges from 0 (highly corrupt) to 100 (highly transparent).

This research assesses the link between corruption and FDI inflows in Sudan. Iy investigates whether lower corruption level in Sudan is associated with higher FDI inflows to the country.

FDI inflows playa vital role in the growth dynamics of host countries. It can provide foreign capital and foreign currency for investment, generate domestic investment in matching funds, facilitate the transfer of managerial skills and technological knowledge, increase local market competition, create modern job opportunities, and increase global market access for export commodities, among others (Quazi, 2014). Corruption is perceived as detrimental to investment as it acts like a tax on investment by increasing the cost of doing business (Wei, 2000; Tanzi & Davoodi (1997). Thus it is logical to state that foreign investors will shun a country where corruption is spread.

Anoruo & Braha (2005) argue that African countries have not received adequate attention on the subject of corruption even though most of the corrupt nations in the world are located in Africa. In the case of Sudan, it is surprising that very few studies – to our knowledge- have addressed the issue of corruption in the country. Early in the eighties, Kameir and Kursany (1985) studied and analyzed the wide spread of corruption in the country. They referred to corruption asa 'fifth' factor of production.This is because, according to them, it became a major source of income generation at that time. Bearing in mind that since then, there has been no aserious attempt to curb

corruption in the country, it is not exaggerative to say that it has become an infinite dilemma. Elamin (2019) investigated the issue of corruption in Sudan from a theoretical perspective; she analyzed the possible causes and stated the primary diagnostics of the high level of corruption in the country. She also highlighted the negative consequences and proposed a comprehensive four-steps strategy the fight corruption.

On the empirical side, Onour (2018) studied the cost of corruption on Sudan's economy. Measuring corruption by using the World Banks' control of corruption index, he found that a 1 percent increase in corruption level results in a decrease in the economic performance of the country by 6% (measured by the share of agriculture in Sudan's GDP)

Other researchers investigated the issue of corruption in Sudan from a non-economic perspectives. For instance, Hamid *et al.* (2018a) generated a conceptual paper addressing the issue of corruption in Sudan within the context of Sudanese press. They focused on how media ownership and access to information influence the Sudanese press, frames the coverage of issues of corruption. Besides, Hamid *et al.* (2017) identified how press freedom affects the Sudanese newspapers in framing the issues of corruption in Sudan. Also, Hamid *et al.* (2018b) identified how the restrictive laws affect the Sudanese newspapers' framing of the issues of corruption in Sudan.

To our knowledge, this is one of the first researches addressing the impact of corruption on FDI inflows to Sudan. The findings of this research will provide interested stakeholders (including political leaders, anti-corruption agencies, businesses, … etc) with empirical evidence of how corruption affectsinvestment in the country.The author hopes this research will encourage further studies on the impact of corruption on Sudan's economy, a very critical topic that has been, to some extent, overlooked by the literature.

The paper is organized as follows. The next section reviews the literature on the link between corruption and economic factors. The data and methodology are explained in Section 3.Estimation results and reseatchimplications are then discussed and analyzed in Section 4. The final section concludes the study.

2. LITERATURE REVIEW

2.1. Definition of Corruption

Cultural differences make it challenging to find a consistent global definition of corruption. For instance while some cultures refer to bribery as a sort of corruption, other cultures consider it as gifts (Anoruo & Braha, 2005). Nevertheless, corruption is generally defined as 'the use of power for profit, preferment, or prestige, or for the benefit of a group or a class, in a way that constitutes a breach of law or of standards

of high moral conduct' (Gould and Kolb, 1946, p. 142). It is also defined as 'the use of public resources to further private interests' (Sumner, 1982). Alesina & Weder (2002) described corruption as 'the misuse of state property by a public official for personal gain'.The Transparency International'' has defined corruption as the abuse of public or private power to satisfy particular interests.

Many studies have analyzed the economic consequences of corruption on economic factors, The mainstream view is that corruptionbreeds inefficiencies and distortions, which harm the economy (Quazi, 2014). To mention few, Fraj and Lachhab (2015) results showed that corruption has a negative impact on capital accumulation human, which undermines the economic growth of developing countries. In addition, Anoruo & Braha (2005) Found that corruption retards economic growth directly by lowering productivity, and indirectly byrestricting investment. On the other hand, in investigating the relationship between corruption and FDI inflows Shakib (2016), Al-Sadig (2009) found that a decrease in the level of corruption may leads increase in FDI inflows.

2.2. Foreign Direct Investment

FDI is a type of investment that Multinational corporations (publicly or privately owned) can do in foreign countries (Dunning & Lundan, 2008). FDI inflow is the level of FDI that comes into a country from year to year (Kolnes, V.L.).

Corruption can have a negative impact on FDI by raising the overall cost of doing business and lowering the profitability of an investment. These extra costs are arising from paying commissions to politicians/bureaucrats forbig contracts or bribing local officials for licenses/permits, utilities connection, police protection, and taxassessment and others (Quazi, 2014).

The literature confirms the negative association between FDI inflows and corruption; Amarandei's(2013)results show a negativesignificant relationship between corruption and FDI in central and east European states. The same result is concluded by Shakib (2016)who used a panel data of 48 different countries. Wei (2000) analyzed bilateral FDI flows from 12home countries to 45 host countries and found that corruption acted like a tax and reduced FDI. Quazi(2014)found that an improvement in Corruption Perceptions Index score can lead an increase in theaverage annual FDI inflow in East Asia and South Asia.

The current study focuses on analyzing the relationshipbetween corruption and FDI inflows into Sudan. The available literature on the topic of corruption and FDI lacks studies that focus on Sudan. From the few studies that focused on Sudan Fahad, A. Y. and Ahmed, M (2016) research. They performed a panel causality test using panel data from post-conflict countries. In addition to Sudan, they include Algeria, Congo DR, Iraq, Kenya, Peru, Sierra Leone, and South Africa.Their result showed that that

corruption impacts negatively upon inward FDI post-conflict countries in the long run. In addition, Emmanuel Pitia Zacharia Lado (2015) carried outa study to establish the possible factors that determine the inflow of Foreign Direct Investmentinto Sudan. He found that inflationand openness of the economy to the outside world have been effective indetermining the inflow of the FDI to in the short-run. However,his work didn't examine the link between corruption and FDI.

In this study we examine -in addition to macro-economic instability and openness that are studied by Emmanuel Pitia Zacharia Lado (2015)- corruption and political stability as determinants of FDI. We use consumer price index as a measure for the macro-economic instability. Also, trade openness is employed to measure the openness of the economy.

3. DATA

Some studies have concluded that other economic factorsare more significant determinants of FDI than corruption (Quazi, 2014). Thus, in the current study in addition to CPI we include three other control variables that are: political stability index, trade openness, and consumer price index. Table 1 exhibits all the variables used.[1]

Table 1: The variables used in the study

Variable	*Source*	*Explanation*
Foreign direct investment (FDI) as a percentage of GDP	World Bank's open data	Net inflows (new investment inflows less disinvestment) in the country from foreign investors, divided by GDP.
Corruption perception index (CPI)	Transparency International	A measures of perceived corruption rated on a scale from zero (most corrupt) to 100 (no corruption).
Consumer price index	Federal Reserve Economic Date	a proxy for macro-economic instability which is a measure that examines the weighted average of prices of a basket of consumer goods and services.
Political stability	Worldwide Governance Indicators - World Bank Data	Measures perceptions of the likelihood of political instability and/orpolitically-motivated violence, including terrorism. It gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.
Trade openness	World Bank's open data	The openness of the economy to the outside world measured as (imports+exports)/GDP

The data cover the period 2002 through 2016. The reason for choosing this time interval is that the Transparency International CPI starts to cover Sudan in 2002. In other words there is no data on Sudan's CPI before 2002.

Corruption index ranges from 0 to 100. An index of 0indicates a highly corrupt country. While an index of 100 indicates a highly clean country. Inother words, the lower the index, the more corrupt the country. Similarly, the higher the index, the leastcorrupt a country is. In 2016 Transparency International's CPI ranked Sudan 165 out of 168 countries surveyed. According to the latest CPI in 2017 Sudan is the 6th most corrupt country out of 180 countries survived around the world. On a scale of 0 (highly corrupt) to 100 (very clean), the Corruption Perception Index for 2017 marked Sudan 16.

Figure 1 plots the association between corruption as measured by CPI, consumer price index, political stability and FDI as a percentage of the GDP. In addition, Table 2 exhibits the correlation matrix of the variables. Form Figure 1 and Table 2It is observed
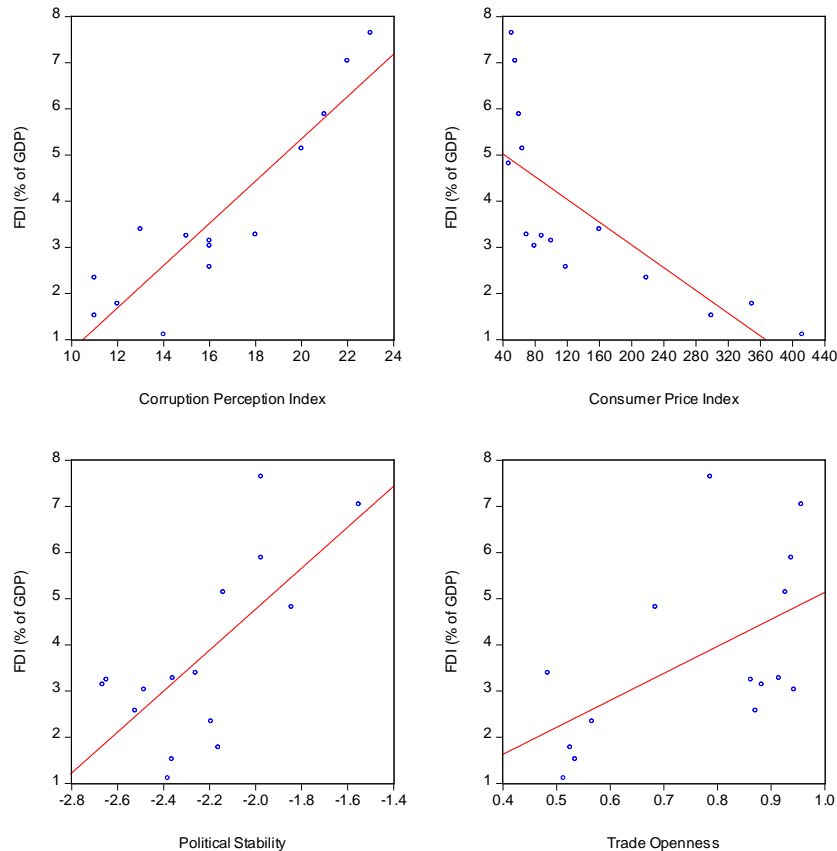
Figure 1: The association between CPI, political stability, consumer price index, Trade openness and FDI

that the relationshipbetween foreign direct investment and the CPI is positive (note that a higher CPI indicates the clearer the countr). Respectivelyin the years analyzed a rise in the CPI (the clearer the country) increases the inflows of FDI. While there is a negativecorrelation between consumer price index and FDI, respectively, a rise in the consumer price index deters the inflows of FDI. Also,it can be seen that a direct relationship between political stability and foreign direct Investment. The same is observed on the link between trade openness and foreign direct Investment.

Table 2: Correlation matrix

	FDI (% of GDP)	*CPI*	*Political stability*	*Consumer price index*	*Trade openness*
FDI (% of GDP)	1	-	-	-	-
CPI	0.91	1	-	-	-
Political stability	0.69	0.54	1	-	-
Consumer price index	-0.74	-0.73	-0.16	1	-
Trade openness	0.57	0.75	0.08	-0.85	1

4.   ESTIMATION METHOD AND RESULTS

The Ordinary Least Squares (OLS) estimation methodology is applied to estimate the regression models. Four models are estimated; the first one regresses the FDI on a constant and CPI only, each time only one additional regressor is included and the model is re-estimated. The four models are checked for auto correlation and heteroskedasticity using Breusch-Godfrey Serial Correlation LM Test and Breusch-Pagan-Godfrey heteroskedasticity test. For all the four models the test for auto correlation and heteroskedasticity revealed no sign of autocorrelation and heteroscedasticity. Table 3 shows the regression estimation results for the four models. It could be seen from Table 3 that the CPI coefficient is highly significant in all the models estimated.

Table 3: FDI for model's regression estimation results

Variable	*Model 1*	*Model 2*	*Model 3*	*Model 4*
Constant	-3.08***	-2.4627	7.1057**	7.32***
Corruption perception index	0.46***	0.40***	0.22**	0.33***
Consumer price index	-	-0.0026	-0.0059**	-0.009***
Political stability index	-	-	2.69***	1.86**
Trade openness	-	-	-	-4.5**
Adjusted R-squared	0.81	0.80	0.91	0.95

***, ** ,* Significant at the 1%,5% and 10% level respectively

Model 1 which includes only one regressor that is CPIis expressed as follows:

$$Model\ 1:\ FDI_t = \beta_0 + \beta_1\ CPI_t + e_t \tag{1}$$

Where FDI_t refers to FDI (% of GDP) at time t, and CPI refers to corruption perception index at time t. The CPI coefficient is significant at the 1% level. The R-squared indicates that 81% of the variation in the FDI inflows could be explained by the change in the CPI. This model indicates that an increase in the corruption perception index (i.e. the clearer the country) by one unit results in an increase in the FDI inflow by 0.46 percentage points[1].

Model 2 included in addition to the CPI, the consumer price index and model 3 adds the political stability index, that is:

$$Model\ 2:\ FDI_t = \beta_0 + \beta_1 CPI_t + \beta_1 C.\ Price.I_t + e_t \tag{2}$$

$$Model\ 3:\ FDI_t = \beta_0 + \beta_1 CPI_t + \beta_2 C.\ Price.I_t + \beta_3 + P.\ S_t + e_t \tag{3}$$

Where

$C.Price.I_t$ is the consumer price index at time t, and $P.S_t$ is the political stability index at time t.

The consumer price index coefficient turned to be significant in the third model at the 5% level. In both models there is a negative relation between FDI and consumer price index, that is an increase in the consumer price index leads to a decrease in the FDI inflows. CPI is significant in model 2 and 3 at the 1% level and 5% level respectively. The political stability coefficient which turned to be significant at the 1% level indicates that an increase in the political stability of the country leads to higher FDI inflows.

According to model 3 an increase in the corruption perception index by one unit results in an increase in the FDI inflow by 0.22 percentage points. In addition an increase in the consumer price index by one unit causes a decrease in the FDI inflows by 0.0059 percentage points. While an increase in the political stability index by 1 unit causes an increase in the FDI inflows by 2.69 percentage points.

Model 4 adds the trade openness effect to model 3 as follows:

$$Model\ 4:\ FDI_t = \beta_0 + \beta_1 CPI_t + \beta_2 C.Price.I_t + \beta_3 P.S_t + \beta_4 + T.\ O_t + e_t \tag{4}$$

where

$T.O_t$ is the trade openness at time t.

Again, CPI is significant at the 1% level, indicating a positive relationship between CPI and FDI, asserting the fact that the clearer the country from corruption, the higher the FDI inflows to it. The consumer price index coefficient that is significant at the 1% level highlights the negative relation between the average prices with in the country and

the FDI. Also, the positive political stability coefficient which turned to be significant at the 5% level indicates that an increase in the political stability of the country leads to higher FDI inflows. Trade openness is negative and significant at the 5% level, indicating a negative relation between the trade openness and the FDI inflows. This is a quite surprising result and is not supported by the literature.

Model 4 indicates that an increase in the corruption perception index by one unit results in an increase in the FDI inflow by 0.33 percentage points. In addition, an increase in the consumer price index by one unit causes a decrease in the FDI inflows by 0.009percentage points. Also, an increase in the political stability index by 1 unit causes an increase in the FDI inflows by 1.86 percentage points.

To summarize, CPI coefficient is highly significant in the models estimated, indicating a positive relationship between CPI and FDI inflows. This shows that the higher the CPI (the clearer the country from corruption), the higher the FDI inflows it.The estimated results are noteworthy for several reasons. First, this study finds that corruption is also a significant androbust determinant of FDI in Sudan. It is found that a 100 percentage pointsincrease in corruption perceptions index (a 1-point improvement in CPI score) can lead to 0.3 to 0.46 percentage points increase in theaverage annual FDI inflow in the sample.Therefore, in order to attract more FDI, Sudan should focus on reducing corruption by enforcing the currently existing anti-corruption policies and/or adoptingnew strategies. We refer the reader to Elamin (2019) study thatprovided a comprehensive analysis of the issue of corruption in Sudan, and suggested a two-stages approach to fight the problem of corruption within the country.

5. CONCLUSION

Sudan's share of foreign direct investment (FDI) has been declining since 2001, despite a sharp increase in FDI inflows to the region in 2003. This paper analyzed the relation between corruption and FDI and concludes that corruption is one of the factors contributing to this decline in FDI inflows to Sudan. This is proved by the significant oistivielink between corruption perception index (CPI) and FDI inflows. The higher the CPI, i.e the cleaner the country, the higher the FDI inflows into it. To check the robustness of this result four different models that include different control variables - namely consumer price index, political stability and trade openness- are estimated. In all models there is a highly significant positive association between FDI and CPI. The country of Sudan has to prioritize its fight against corruption as one of the mostcrucial tasks to be carried out.Foreign investors will shun a country where corruption is spread; therefore, the international community's perception of the level of corruption in Sudan is one of the determinant of the country's economic performance. To encourage FDI

inflows to the country, there is a need to change how the international community perceives the corruption level in Sudan.

Note

1. Note that FDI inflows is measured as net inflows of foreign direct investments (% of GDP), while CPI is not in a percent.

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