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Tolerable Level of Corruption for Foreign Direct Investment in Europe and Asia

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ABSTRACT

In 2009, Foreign Direct Investment (FDI) flows to developed countries experienced the largest decline among all regions and sub-regions. However, South, East and Southeast Asia showed the smallest decline among developing economies and remained the largest recipient of FDI inflows. Meanwhile, approximately 68% of the countries in Asia scored less than the tolerable level of corruption for investment (TLCI) in Africa (-0.27) over recent years. Moreover, corruption has been observed to be significant in virtually all Asian countries, but, despite this, the region remains the number one global investment destination. This study, therefore, estimates the TLCI in Asia and Europe to enable comparison across these regions. Secondary data from the World Development Indicators were used in this study. The frequency of the data is annual, and it is available from 1996 to 2013. The dynamic panel data estimation technique was deployed while controlling for other variables. The estimated TLCIs for Europe and Asia are 0.534 and -0.735, respectively, on the control of corruption scale, which ranges from approximately -2.5 (weak) to 2.5 (strong). Despite the lower TLCI in Asia, the region is still able to attract relatively more FDI inflow than Africa. This scenario may be attributed to the presence of sound policy factors that drive FDI inflows. Another reason may be due to the nature, scope, social role and the perception of corruption across these regions.

KEY WORDS: corruption, tolerable level of corruption for investment, foreign direct investment, institutions

JEL Classification: F18, F23, F20, F30

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1. Introduction

In 2009, Foreign Direct Investment (FDI) flows to developed countries experienced the largest decline (44%) among all regions and sub-regions. South, East and Southeast Asia showed the smallest decline (17%) among developing economies and remained the largest recipient, while Africa recorded a decrease of 19%. According to the United Nations Conference on Trade and Development [UNCTAD] (2010), Asia was expected to experience faster investment recovery because Asia seemed to be the most attractive region for FDI inflow and therefore played a leading role in the global economic recovery, while a relatively weaker investment recovery was expected in Europe and Africa (UNCTAD, 2010). The steady improvement of macroeconomic conditions, recovering corporate profits and stock market valuations, and policies promoting openness to FDI were expected to be enhanced by the countries in all the regions over the next few years in order to boost speedy investment recovery. According to Abotsi and Iyavarakul (2015), a non-policy factor that enhances the attraction of FDI inflow into a country is its level of institutional quality.

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In fact, Abotsi (2016) postulates that at a high level of institutional quality, corruption is expected to have a positive impact on FDI inflow, and at a low level of institutional quality, corruption is expected to have a negative impact on FDI inflow. Empirical literature on the effect of institutional quality on FDI inflows reveals that countries that have weak institutions, especially high corruption and unreliable legal systems, tend to receive less FDI inflow (Gastanaga, Nugent & Pashamiova, 1998; Wei, 2000b). Recent theory on corruption and FDI inflow postulates that there is a corruption threshold with respect to the attraction of FDI inflow. Corruption is expected to have a positive impact on FDI inflows below the threshold and a negative impact above the threshold (Abotsi, 2016). An empirical study by Abotsi and Iyavarakul (2015) estimated the corruption threshold (referred to as the tolerable level of corruption for investment (TLCI) in their study) in Africa to be -0.27 on the control of corruption scale. In relation, approximately 68% of the countries in Asia scored less than the tolerable level of corruption for investment in Africa (-0.27) in 2009 and 2010 (in Europe, approximately 23% of the countries scored less) on the control of corruption index. In 2011, approximately 70% of Asian countries scored less than the TLCI in Africa (in Europe, approximately 19% of the countries scored less). In 2012, the number of Asian countries that scored less than the TLCI in Africa plummeted to 66% and remained at this figure until 2014 while that of Europe rose to 21%. Rent-seeking has been found to be endemic in both developing and developed countries, though the rent-seeking in developing countries can be more extensive and can include illegal forms (Khan & Sundaram, 2000). In fact, corruption has been observed to be significant in virtually all Asian countries (Khan & Sundaram, 2000), but, despite this, Asia remains the number one global investment destination. UNCTAD (2014) indicates that developing countries improved their global share of FDI inflows to a record level of 54% in 2013 with developing Asia attracting more inward FDI than either the EU or the United States. In 2014, the FDI inflows to developing Asia grew 9% to historically high levels, which further consolidated the region's position as the largest FDI recipient in the world (UNCTAD, 2015). This is contrary to empirical literature that states that high corruption actually deters foreign direct investment (Aizenman & Spiegel, 2003; Barassi & Zhou, 2012; Cuervo-Cazurra, 2008; Habib & Zurawicki, 2002; Hakkala, Norback & Svaleryd, 2008; Javorcik & Wei, 2009). The question that comes to mind is, "what is the tolerable level of corruption for investment in Asia and Europe?" It is thought-provoking to know the TLCI in Asia and Europe, as this enables comparison of the tolerable level of corruption for investment across these regions and fills the lacuna in the literature with respect to the threshold of corruption in attracting FDI inflow in other regions. This is the motivation for this study. The TLCI will motivate leaders of the countries on these continents to control corruption in their various countries to levels that will not deter FDI inflows. Additionally, the findings of this study will help potential investors in making an informed decision with respect to the destination of their investments.

Using a dynamic panel data estimation technique while controlling for other variables, the estimated TLCI is 0.534 and -0.735 for Europe and Asia, respectively, on the control of corruption scale, which ranges from approximately -2.5 (weak) to 2.5 (strong). This paper continues with a literature review on FDI inflow, corruption and other determinants of FDI used as control variables. These control variables include GDP growth rate, trade openness, inflation rate, exchange rate, rents on total natural resources (in the case of Europe) and rents on natural gas (in the case of Asia). This is followed by a presentation of the methodology used in the study, the results, a discussion, and finally, the conclusion.

2. Literature review

2.1. FDI inflow to Asia and Europe

South, East and Southeast Asia were the first to bottom out from the downturn in 2009. Intraregional FDI gained momentum and accounted for as much as half of the region's inward FDI stock after investment from developed countries plummeted. FDI inflows to China and India started recovering as early as mid-2009, and their continued FDI outflows were anticipated to bring the region's outward investment back to a place of growth in 2010. Apart from intraregional FDI, FDI flows from developing countries in Asia and Africa account for a major part of interregional FDI flows among developing countries. One of the most signifi-

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cant foreign investors in some sub-Saharan African countries is China. In Southeast Europe and the Commonwealth of Independent States (CIS), FDI inflows declined by 43% in 2009 after an eight-year upward trend. Also in the same year, FDI flows into the 27 European Union (EU) countries declined by 33% (to $362 billion) (UNCTAD, 2010).

FDI flows to South Asia continued to fall, but at the same time, major emerging regions, such as East and Southeast Asia, experienced strong growth in FDI inflows in 2010. FDI inflows to ASEAN more than doubled; those to East Asia saw a 17% rise while FDI to South Asia declined by one-fourth. Inflows to East, South, and Southeast Asia as a whole rose by 24% in 2010, reaching $300 billion. Similarly, in 2010, flows to the Commonwealth of Independent States (CIS) rose marginally by 0.4% while FDI flows to Southeast Europe plummeted sharply for the third consecutive year (UNCTAD, 2011). A 10% increase in Asia accounted for the rising FDI inflow to developing countries in 2011. In East Asia and Southeast Asia, FDI inflows reached new records, with total inflows amounting to $336 billion, accounting for 22% of global inflows. Southeast Asia continued to experience faster FDI growth than East Asia. FDI inflows to Europe, which had declined until 2010, showed a turnaround. In economies in transition in Southeast Europe and the Commonwealth of Independent States (CIS), FDI experienced some recovery after two years of stagnant flows, reaching $92 billion, which was driven in large part by cross-border M&A deals (UNCTAD, 2012).

Global FDI fell by 18% to $1.35 trillion in 2012. Developing economies in 2012 absorbed more FDI than developed countries for the first time ever, accounting for 52% of global FDI flows. FDI inflows to developing Asia fell by 7% to $407 billion but remained at a high level. The majority of developed countries saw significant drops in FDI inflows, especially the European Union, which alone accounted for two-thirds of the global FDI decline (UNCTAD, 2013). According to the UNCTAD (2014), after a decline in 2012, global foreign direct investment flows rose by 9% to $1.45 trillion in 2013, with growth expected to continue in the years to come. With a 3% increase, developing Asia remains the number one global investment destination. The report further states that Europe, which is traditionally the largest FDI recipient region, is at less than one-third of its 2007 inflows and one-fourth of its outflows. The European Union (EU) and the United States saw their combined share of global FDI inflows decline from well over 50% pre-crisis to 30% in 2013 (UNCTAD, 2014).

2.2. Influence of corruption on FDI inflow

The investment recovery in all regions has not been smooth since its downturn in 2009, with some regions experiencing an increase while others have experienced a decline over the period. Apart from the policy factors that drive FDI inflow, there are non-policy factors that also account for the inflow of FDI into these regions. These non-policy factors are corruption, factor endowments, market size of the host country, distance/transport costs, and political and economic stability (Mateev, 2009; Touchton, 2016). Whereas some studies (Egger & Winner, 2005) found a positive impact of corruption on FDI, studies elsewhere (Aizenman & Spiegel, 2003; Barassi & Zhou, 2012; Cuervo-Cazurra, 2008; Habib & Zurawicki, 2002; Hakkala et al., 2008; Javorcik & Wei, 2009) show that corruption actually deters foreign direct investment. These findings are consistent with the argument that the quality of the existing institutions in a foreign country has the potential to attract or repel FDI inflow (Abotsi, 2016). This is because firms exploit their ownership and location advantages in the foreign countries to minimize their transaction costs. Therefore, with the existing quality of institutions in a country, if firms are not able to exploit their ownership and location advantages, they will not be motivated to invest in the country. Empirical findings indicate that the corruption has a negative and highly significant impact on foreign ownership of firms in Africa (Abotsi, 2015). The control of the corruption variable is captured in this study as perceptions of the extent to which public power is exercised for private gain and is expected to have both negative and positive effects on the inflows of FDI into a country depending on the levels of institutional quality and corruption.

2.3. Other control variables

In addition to the control of the corruption variable and its squared values, some other variables identified in the literature to determine FDI inflow were included in the model as independent variables to serve as controls. These variables include GDP growth rate, trade

openness, inflation rate, exchange rate, rents on total natural resources (in the case of Europe) and rents on natural gas (in the case of Asia). A country with more stable macroeconomic conditions and a high and sustained growth rates is expected to attract more FDI inflows than a more volatile economy (Ranjan & Agrawal, 2011). Proxies for the macroeconomic stability of a country include GDP growth rates and inflation rates (Dasgupta & Ratha, 2000). High inflation rates are associated with economic disarray and lower purchasing power, so inflation risk becomes an important factor in long-run investment plans. Inflation has been found to have a negative relation with FDI inflows, though its magnitude is much smaller (Abotsi & Iyavarakul, 2015; Ranjan & Agrawal, 2011). The impact of exchange rates on FDI inflows has shown mixed results. The literature on exchange rates shows that the real exchange rate has both negative (Kyereboah-Coleman & Agyire-Tettey, 2008) and positive (Abotsi & Iyavarakul, 2015; Jeon & Rhee, 2008) influence on FDI inflows. Trade openness is an important vehicle for technological spillovers. Therefore, trade openness is generally a positive and significant determinant of FDI inflows (Sahoo, 2006). Jadhav (2012) opines that resource-seeking FDI is motivated by the availability of natural resources in host countries. However, according to Asiedu and Lien (2011), the presence of natural resources in host countries may affect the FDI-democracy relationship. Asiedu and Lien (2011) found that democracy has a negative effect on FDI inflows to countries where exports are dominated by natural resources. It is therefore expected in this study that GDP growth rate and trade openness will have a positive impact on FDI inflow. The inflation rate is expected to have a negative influence on FDI inflow. The influence of exchange rate, rents on total natural resources (in the case of Europe) and rents on natural gas (in the case of Asia) will be determined empirically.

3.0 Methodology

3.1 Data

Secondary data from the World Development Indicators (The World Bank, 2013) was used in this study. The frequency of the data is annual, and it is available from 1996 to 2013. In all, 43 countries were sampled from Europe and 39 from Asia. The control of the corruption index is drawn from the Worldwide Governance Indicators DATABANK (The World Bank, 2014), and it is one of the six dimensions of governance in the Worldwide Governance Indicators. The choice of this variable in determining the tolerable level of corruption is because of its authenticity and its free availability on the internet.

3.2 Data Analysis

A dynamic panel data estimation technique is used in this study as deployed in a similar study by Abotsi and Iyavarakul (2015) to allow for comparison of results. This dynamic panel model includes exogenous and endogenous variables in addition to the lagged dependent variable. The dynamic panel estimation technique is one of many panel data analysis techniques used in many studies in economics. This is because many economic relationships are dynamic in nature. Nerlove (2002) argues that economic behavior is inherently dynamic, and so most econometrically interesting relationships are either implicitly or explicitly dynamic. Bond (2002) also posits that dynamic models are of interest in a wide range of economic applications. In fact, the inclusion of lag of dependent variables as an explanatory variable is a parsimonious way of accounting for the effects of explanatory variables in the past, and this can also help to remove serial correlation in the disturbance term (Beck & Katz, 1996). Additionally, models including lagged dependent variables can also control for many omitted variables to a large extent (Abotsi & Iyavarakul, 2015). Empirical literature shows that firms tend to locate where other firms with similar characteristics are already established (Crozet, Mayer & Mucchielli, 2004; Head, Ries & Swenson, 1999; Pusterla & Resmini, 2007). This confirms the fact that current FDI depends on its own past realizations, and therefore the use of the dynamic panel model is appropriate. All of these informed the choice of the dynamic panel data estimation technique in this study.

The general model is of the form presented in equation (1).

$$y_{it} = \alpha y_{i,t-1} + x_{it}^{'}\beta + \varepsilon_{it} \quad (1)$$

where $\varepsilon_{it} = u_i + v_{it}$, for i = 1,…, N and t = 2,…, T, with $|\alpha| < 1$. The disturbance term ε_{it} has two orthogonal components. These components are the

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fixed effects u_i and the idiosyncratic shocks v_{it}. $E(u_i) = E(v_{it}) = E(u_i v_{it}) = 0$ for i = 1,…, N and t = 2,…, T.

The framework for evaluating the relations between FDI, corruption, and other determinants of FDI is presented in equation (2).

$$y_{it} = \beta_1 + \beta_2 x_{it} + \beta_3 x_{it}^2 + \omega z_{it} + \alpha_1 y_{i,t-1} + \varepsilon_{it} \quad (2)$$

where y_{it} is a measure of FDI in country i at time period t, $y_{i,t-1}$ is a measure of FDI in country i at time period $t-1$, x_{it} is an index of the control of corruption in country i at time t, x_{it}^2 is the squared index of control of corruption in country i at time period t, z_{it} are a set of control variables in country i at time period t, β_1, β_2, β_3, α_1 and ω (set of parameters) are parameters to be estimated, and finally, ε_{it} denotes the disturbance term. StataCorp 2013 is the statistical software used in the data analysis.

3.3 Model One: The System GMM Model of FDI (Europe)

The benchmark FDI equation for Europe in a linear form with a constant term is presented in equation (3).

$$\begin{aligned} &FDI\_netinflows\_perGDP_{it} = \\ &= \beta_1 + \beta_2 Control\_of\_Corruption_{it} + \\ &+ \beta_3 Control\_of\_Corruption\_Sqr_{it} + \\ &+ \beta_4 FDI\_netinflows\_perGDP\_1_{it} + \\ &+ \beta_5 GDP\_growth_{it} + \beta_6 Trade\_perGDP_{it} + \\ &+ \beta_7 Inflation_{it} + \beta_8 Official\_exchange\_rate_{it} + \\ &+ \beta_9 Total\_natural\_resources\_rents_{it} + \\ &+ Time(Dummies) + \varepsilon_{it} \end{aligned} \quad (3)$$

3.4 Model Two: The System GMM Model of FDI (Asia)

The benchmark FDI equation for Asia in a linear form with a constant term is presented in equation (4).

$$\begin{aligned} &FDI\_netinflows\_perGDP_{it} = \\ &= \beta_1 + \beta_2 Control\_of\_Corruption_{it} + \\ &+ \beta_3 Control\_of\_Corruption\_Sqr_{it} + \\ &+ \beta_4 FDI\_netinflows\_perGDP\_1_{it} + \\ &+ \beta_5 GDP\_growth_{it} + \beta_6 Trade\_perGDP_{it} + \\ &+ \beta_7 Inflation_{it} + \beta_8 Official\_exchange\_rate_{it} + \\ &+ \beta_9 Natural\_gas\_rents_{it} + \\ &+ Time(Dummies) + \varepsilon_{it} \end{aligned} \quad (4)$$

The net FDI inflow per GDP is used as the dependent variable in the system dynamic model. The control of corruption and its squared values are included as independent variables together with other control variables that were chosen based on previous research and data availability for the selected period. These control variables include GDP growth rate, trade openness, inflation rate, exchange rate, rents on total natural resources (in the case of Europe), rents on natural gas (in the case of Asia) and time-related shock variables (time dummies). It must be noted that infrastructure was captured in the model as fixed telephone subscriptions but was dropped by the Stata software due to collinearity.

The control of corruption variable is defined as the perception of the extent to which public power is exercised for private gain, including both petty and serious forms of corruption, as well as the "capture" of the state by elites and private interests (The World Bank, 2014). The control of corruption variable is transformed from its original scale, which ranges from approximately -2.5 (weak) to 2.5 (strong), to a new scale ranging from 0 to 100 for computational purposes and to allow for easy interpretation of the results. The formula; $x = (a + 2.5) * 20$, was used where x is the value of the transformed variable, and a refers to the value of the original scale (Abotsi & Iyavarakul, 2015).

This means that the higher a country is on the scale, the better the governance performance against corruption, which is an indication of a lower level of corruption. Trade openness refers to the sum of exports and imports of goods and services measured as a share of the gross domestic product. Total natural resource rents include the sum of oil, natural gas, coal (hard and soft), mineral, and forest rents. Natural gas rents are the difference between the value of natural gas production at world prices and total costs of production. Inflation, as measured by the consumer price index, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals. The official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. GDP growth rate refers to the annual percentage growth rate of GDP at market prices based on constant local cur-

rency, and the aggregates are based on constant 2005 U.S. dollars (The World Bank, 2014).

The two-step estimator is deployed in the estimation because the standard covariance matrix is robust to panel-specific autocorrelation and heteroskedasticity and is thus asymptotically efficient. Control of corruption and trade openness are treated as endogenous in this study, as in a previous study (Abotsi & Iyavarakul, 2015). All other independent variables are treated as strictly exogenous. No external instruments are used. In the case of the European panel, there are 46 countries (N), and in the case of the Asian countries, there are 39 countries (N) that are analyzed over a period of 19 years (T). This means there are more countries (N) than years (T) in both cases, which supports the argument made by many authors (Baltagi, 2008; Baum, 2006; Bond, 2002; Roodman, 2006; 2007; Sarafidis, Yamagata & Robertson, 2006) that dynamic panel models are specially designed for situations where T is smaller than N to control for dynamic panel bias.

3.5 System Generalized Method of Moments

The dynamic panel model is made up of System GMM (Generalized Method of Moments) and Difference GMM (Generalized Method of Moments). The System GMM estimate has an advantage over the Difference GMM with respect to variables that exhibit "random walk" or are close to random-walk variables (Baum, 2006; Bond, 2002; Roodman, 2006; 2007). Empirical research with dynamic models indicates that the System GMM is a good estimator, or at least better than the Difference GMM, which is severely downwardly biased (Hoeffler, 2002; Nkurunziza & Bates, 2003; Presbitero, 2005). Therefore, the System GMM estimator is chosen over the Difference GMM estimator in this study because it is consistent and asymptotically more efficient.

3.6 Specification Testing in Dynamic Panel Models

Specification testing in dynamic panel models is conducted to address problems of over-identification restrictions and serial correlation due to the inclusion of the lag of the dependent variable as an explanatory variable. The tests deployed are the standard Sargan and Hansen J test for over-identification restrictions and the Arellano-Bond test for autocorrelation. Roodman (2009) expounds that if the model is over-identified, a test statistic for the joint validity of the moment conditions falls out of the GMM framework. The null hypothesis in both of these tests is that all of the instruments are valid and the alternative is that some subsets are not valid. When the number of instruments i is large relative to the cross section sample size n, these tests lose power. The rule of thumb is to keep the number of instruments less than or equal to the number of groups (see Abotsi & Iyavarakul, 2015).

3.7 The Estimation of the Tolerable Level of Corruption for Investment

A common empirical test of the relationships between two economic variables that are predicted to be non-monotonic in various economic theories is to estimate an equation using a polynomial of the variable that is supposed to have the nonlinear relationship according to Plassmann & Khanna (2007). To empirically estimate the Tolerable Level of Corruption for Investment in both Europe and Asia, a power term of the control of corruption index is introduced into the dynamic model. The response variable in this study is foreign direct investment (FDI_netinflows_perGDP) and Control of Corruption and Control of Corruption Sqr variables are the control of corruption index and its square, respectively. The TLCI is obtained by estimating the equation and taking the derivative of the estimated equation with respect to the control of corruption variable.

$$\frac{\delta \hat{y}_{it}}{\delta x_1} = \hat{\beta}_2 + 2\hat{\beta}_3 x_1 = 0 \tag{5}$$

Solving this equation gives the turning point of the relationship indicating an inverse U-shape if $\hat{\beta}_2 < 0$ and vice versa. The turning point is given by $\varphi = -\frac{\hat{\beta}_2}{2\hat{\beta}_3}$, which is referred to as the threshold point or the Tolerable Level of Corruption for Investment (Abotsi & Iyavarakul, 2015).

3.8 Test of the U-Shaped Relationship

Lind and Mehlum (2007), explained that to properly test for the presence of a U-shaped relationship on some interval of values, there is the need to test whether the relationship is decreasing at low values within this interval and increasing at high values within the

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interval. Assuming that $\varepsilon_{it} \sim$ NID (0, σ2), a test based on likelihood ratio principle (Sasabuchi, 1980) takes the form:

For min(x)

$$H_0: \quad \beta_2 + \beta_3 f'(x_l) \geq 0$$

$$H_1: \quad \beta_2 + \beta_3 f'(x_l) < 0$$

For max(x)

$$H_0: \quad \beta_2 + \beta_3 f'(x_h) \leq 0$$

$$H_1: \quad \beta_2 + \beta_3 f'(x_h) > 0$$

The rejection of the null hypotheses in both cases is a confirmation of a U-shaped relationship on the interval of values. This test gives the exact necessary and sufficient conditions for the test of a U shape. An equivalent test is to check whether the confidence interval for the minimum point and is contained within the interval $[x_l, x_h]$ (Lind & Mehlum, 2007). The U-shaped relationship will be confirmed in this study using both tests. This procedure was also deployed by Abotsi and Iyavarakul (2015).

4.0 Results

4.1 Descriptive statistics

The descriptive statistics of the variables deployed for Europe and Asia in the study are presented in Table 1 and Table 2, respectively. The total number of observations is 462 for Europe and 519 for Asia. The period under study is from 1996 to 2013. The mean official exchange rates for Europe and Asia are 143.1281 and 1314.178, respectively, and the standard deviations are 693.4735 and 3480.971, respectively. This shows that the official exchange rate observations are widely dispersed in both Europe and Asia.

The results also show that over the period under consideration, some countries in both Europe and Asia experienced negative FDI inflow, GDP growth and inflation. Also worthy of mention are the mean trade openness (90.16152 and 95.33428 for Europe and Asia respectively) and standard deviation (30.05845 and 64.52994 for Europe and Asia respectively), which shows that these observations are widely dispersed within the period of observation.

4.2 Empirical Results of the Dynamic Panel Model Estimation

The estimated results of the dynamic panel model for Europe and Asia are presented in Table 3. The FDI net inflow per GDP is used as the dependent variable in the estimations, and the control of corruption variable and its squared values, as well as other control variables, are used as independent variables. The two-step estimator is deployed in the estimations with the control of corruption and trade openness variables treated as endogenous in both models. All the other independent variables are treated strictly as exogenous. No external instruments are used.

4.3 Model Specification Diagnostics Test

The validity of the estimated results in System GMM depends on the statistical diagnostics tests. If the model is well specified, the expectation is that the null hypothesis of no autocorrelation of the second order, AR(2), is not rejected. Therefore, the Arellano-Bond test for serial correlation supports the validity of the model specification (Basu 2008). The p-value of 0.494 and 0.818 for Europe and Asia, respectively, shows that the null hypothesis of no autocorrelation of the second order, AR(2), is not rejected. Since the number of instruments (42 and 37 for Europe and Asia, respectively) is less than the number of groups (43 and 39 for Europe and Asia, respectively), the assumptions underlying the two procedures are not violated. In the case of Europe, the 43 instruments came from the restriction of using two lags for levels and two for differences in the data (i.e., the restriction is set to (2 2) in *xtabond2*). However, in the case of Asia, the 37 instruments came from the restriction of using one lag for levels and one lag for differences in the data (i.e., the restriction is set to (1 1) in *xtabond2*).

The Hansen J-statistic tests the null hypothesis of the correct model specification and valid over-identifying restrictions, i.e., the validity of instruments. The rejection of the null hypothesis indicates that either or both assumptions are violated. The Hansen J-test of over-identifying restrictions does not reject the null hypothesis in either the Europe or Asia models at any conventional level of significance (p = 0.884 and 0.569

Table 1. Descriptive statistics (Europe)

Variable	Obs	Mean	Std. Dev.	Min	Max
FDI_netinflows_perGDP	462	5.336405	6.364192	-16.1545	50.96784
Control_of_corruption	462	58.05281	22.73689	25	101
GDP_growth	462	3.777827	4.662255	-14.814	34.5
Trade_perGDP	462	90.16152	30.05845	24.17033	169.9286
Inflation	462	7.766153	14.5344	-2.41026	168.6202
Official_exchange_rate	462	143.1281	693.4735	0.081405	8880.052
Total_natural_resources_rents	462	4.694349	10.06215	0	68.35304

Table 2. Descriptive statistics (Asia)

Variable	Obs	Mean	Std. Dev.	Min	Max
FDI_netinflows_perGDP	519	3.768904	5.032905	-3.46865	45.28994
Control_of_corruption	519	44.27746	18.14811	13.4	98.4
GDP_growth	519	5.609956	4.559997	-13.1267	54.15777
Trade_perGDP	519	95.33428	64.52994	18.93944	439.6567
Inflation	519	7.045173	9.6846	-18.1086	90.98073
Official_exchange_rate	519	1314.178	3480.971	0.081405	20933.42
Total_natural_resources_rents	519	2.725519	4.835469	0	29.56645

for Europe and Asia, respectively), giving an indication that the models in both cases have valid instrumentation. Efendic, Pugh and Adnett (2009) postulates that the check for the "steady state" assumption suggested by (Roodman, 2006) can also be used to investigate the validity of instruments in System GMM. The results show that the estimated coefficients on the lagged dependent variable (FDI_netinflows_perGDP_1) are 0.671 and 0.626 for Europe and Asia, respectively. This means that the steady-state assumption holds. The evidence from the various tests above satisfies the key assumptions of System GMM estimation.

The Wild Chi-square test of joint significance indicates that the null hypothesis, which states that independent variables are jointly equal to zero at any conventional level of significance, may also be rejected (p=0.000) in both models (Europe and Asia).

4.4 Interpretation and discussion of results

The results show that control of corruption is negative and significant (at the 5% significance level for both Europe and Asia) while the square of control of corruption is positive and highly significant (at the 1% significance level for both Europe and Asia) in both models. The control of corruption scale ranges from approximately -2.5 (weak) to 2.5 (strong), which means the higher the score of the country, the less corrupt it is. This result is consistent with the findings by Abotsi and Iyavarakul (2015), which indicate that at low scores, corruption has a negative impact on FDI

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inflows, and at high scores, corruption has a positive impact on FDI inflows. This finding is also consistent with earlier studies that show corruption deters foreign direct investments (Aizenman & Spiegel 2003; Barassi & Zhou 2012; Cuervo-Cazurra 2006; 2008; Habib & Zurawicki, 2002; Hakkala, et al. 2008; Javorcik & Wei 2009; Voyer & Beamish 2004; Wei 2000a) and a few other studies by Egger and Winner (2005), who found a positive impact of corruption on FDI.

Table 3 shows that the lag of FDI inflow, GDP growth rate, trade openness, inflation rate and official exchange rate are statistically significant in both the Europe and Asia models. Total natural resources is also significant in the Europe model. The probability value associated with the t statistics of the coefficients of these variables is less than 0.05, which shows that the estimated value of the coefficient is statistically significant. Coefficients of lag of FDI inflow, GDP growth rate, trade openness, and inflation rate are positive, which implies that these variables have a positive effect on total inward FDI. The official exchange rate and total natural resources rents (in the case of Europe) are negative, which implies that these variables have a negative effect on total inward FDI. Even though the coefficient of natural gas rents (in the case of Asia) is negative, it is not statistically significant.

The results on the lag of FDI seem to confirm the empirical literature that finds that firms tend to locate where other firms with similar characteristics are already established (Crozet et al., 2004; Head et al., 1999; Pusterla & Resmini, 2007). The finding on trade openness supports the assertion that trade liberalization leads to increased FDI inflow (Anyanwu 2012; Anyanwu & Erhijakpor 2004; Asiedu 2002; Ranjan & Agrawal 2011; Sahoo 2006). This result on inflation is consistent with Jadhav (2012) but inconsistent with other findings by Abotsi and Iyavarakul (2015) and Ranjan and Agrawal (2011), who found inflation to have a negative relation with FDI inflow. The findings on GDP growth rate are also consistent with the earlier assertion that market size is a positive and significant determinant of FDI flows (Abotsi & Iyavarakul, 2015; Garibaldi et al. 2002; Nunes, Oscategui, & Peschiera, 2006; Sahoo 2006). This is because GDP growth rate represents a country's economic track record and serves as an indicator of profitable investment opportunities to the outside world.

The global economy experienced a severe recession inflicted by a massive financial crisis and an acute loss of confidence in 2009 (Abotsi & Iyavarakul, 2015). Therefore, time dummy variables were included in both models to capture universal time-related shocks before and after the global economic recession. The results show that the dummy for 2009 is positive and highly statistically significant, which seems to suggest that FDI inflow to Europe and Asia did not suffer a time-related shock in 2009 due to the severe global economic recession as in the case of Africa. The finding in a similar study by Abotsi and Iyavarakul (2015) suggests that FDI inflow to Africa suffered a time-related shock in 2009 due to the severe global economic recession.

4.5 The Estimated Tolerable Level of Corruption for Investment

The results in Table 3 show that at low scores, corruption has a negative impact on FDI inflows, and at high scores, corruption has a positive impact on FDI inflows. The TLCI of a country will determine whether or not FDI is likely to flow to a country. The coefficient $\hat{\beta}_2$ of the control of corruption variable tells both the direction and steepness of the curvature. As $\hat{\beta}_2$ is a positive value, it indicates that the curvature is upwards but less steep. Using equation 5, the turning point is 60.68 for Europe and 35.30 for Asia. These turning points are highly statistically significant with a 95% confidence interval between 53.08 at the minimum and 68.29 at the maximum for the Europe model and between 19.75 at the minimum and 50.85 at the maximum for the Asia model. This is shown in Table 4.

The usual criteria used by most researchers to test the precision of a turning point are that if both $\hat{\beta}_1$ and $\hat{\beta}_2$ are significant and if the implied extreme point is within the data range, then they have found a U-shaped relationship (Abotsi & Iyavarakul, 2015). This test is satisfied in this study because the results in Table 3 show that both the control of corruption and the square of control of corruption are significant. However, Lind and Mehlum (2007) argue that though these criteria are sensible, they are neither sufficient nor necessary and are too weak. Using the joint test in finding out whether the relationship is decreasing at low values within this interval and increasing at high values within the interval, the results of the combined test (Table 5) re-

Table 3. Results of the Dynamic System GMM Estimation

Dependent variable	**FDI_netinflows_perGDP**	
Variables	**Europe**	**Asia**
Control_of_corruption	-0.534**	-0.0951**
	(0.238)	(0.0424)
Control_of_corruption_Sqr	0.00440**	0.00135***
	(0.00177)	(0.000431)
FDI_netinflows_perGDP_1	0.671***	0.626***
	(0.0353)	(0.0215)
GDP_growth	0.724***	0.410***
	(0.0406)	(0.0322)
Trade_perGDP	0.0655***	0.0249***
	(0.00840)	(0.00175)
Inflation	0.0636**	0.0687***
	(0.0279)	(0.0238)
Official_exchange_rate	-0.00106**	-0.000197***
	(0.000469)	(6.67e-05)
Total_natural_resources_rents	-0.268***	
	(0.0622)	
Natural_gas_rents		-0.00185
		(0.0260)
2008 (year dummy)	-1.116***	-0.958***
	(0.332)	(0.142)
2009 (year dummy)	3.875***	1.504***
	(0.412)	(0.195)
2010 (year dummy)	-0.937**	0.530***
	(0.377)	(0.0949)
Constant	8.029	-2.551***
	(6.788)	(0.944)
OIR test (p-value)	0.884	0.569
Arellano-Bond test for AR(1)	0.012	0.001
Arellano-Bond test for AR(2)	0.494	0.818
Number of instruments	42	37
Observations	461	495
Number of groups	43	39

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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Table 4. The Turning Point Estimate

	Turning point	Std. Err.	z	P>z	[95% Conf. Interval]	
Europe	60.68375	3.8792	15.64	0.000	53.08075	68.28676
Asia	35.2993	7.93559	4.45	0.000	19.74583	50.85277

Table 5. Joint hypothesis test results

Control of corruption	Turning point	
	Europe	Asia
$H_0: \beta_1 + \beta_2 f'(x_l) \geq 0$	-0.3141378** (0.1507288)	-0.0589969** (0.0283805)
$H_0: \beta_1 + \beta_2 f'(x_h) \leq 0$	0.346116*** (0.1202149)	0.1699939*** (0.0518314)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ject the null hypothesis ($H_0: \beta_1 + \beta_2 f'(x_l) \geq 0$ and/or $\beta_1 + \beta_2 f'(x_h) \leq 0$) and confirms a U-shaped relationship for the observed data range. This test gives the exact necessary and sufficient conditions for the test of a U shape. The confidence intervals for the turning point of Europe $(53.08075 \leq \varphi \leq 68.28676)$ and that for Asia $(19.74583 \leq \varphi \leq 50.85277)$ are contained within the observed respective data range, which further confirms this U-shaped relationship.

The estimated TLCI is 60.68 for Europe and 35 for Asia. These figures translate to 0.53 and -0.74 for Europe and Asia, respectively, on the original control of corruption scale, which ranges from approximately -2.5 (weak) to 2.5 (strong). This means that all the countries in Europe and Asia falling below the corresponding TLCI are less likely to attract FDI inflow and those falling above are more likely to attract FDI inflow. This follows the theory proposed by Abotsi (2016), which postulates that there is a corruption threshold with respect to the attraction of FDI inflow. Below the threshold, corruption is expected to have a positive impact on FDI inflows and above the threshold, corruption is expected to have a negative impact on FDI inflows. All the countries falling below the TLCI are above the threshold of corruption, and those falling above the TLCI are conversely below the threshold of corruption. Specifically, the findings in this study are consistent with research by Cole, Elliott and Zhang (2009) on the determinants of province-level FDI in China, which found that foreign capital prefers to locate in regions in which the government has made more effort to fight corruption and the local government is considered to be more efficient. Abotsi (2016) postulates that, at a high level of institutional quality, corruption is expected to have a positive impact on FDI inflow and at a low level of institutional quality, corruption is expected to have a negative impact on FDI inflow. The confidence interval for the TLCI translates to ($0.15 \leq \varphi \leq 0.91$) for Europe and ($-1.51 \leq \varphi \leq 0.04$) for Asia on the original control of corruption scale. Therefore, countries that fall within this range can be referred to as transition countries.

A similar study by Abotsi and Iyavarakul (2015) found the TLCI for Africa to be -0.27. The TLCI in Europe (0.53) is higher than the TLCI in Africa and is consistent with the report that Europe is traditionally the largest FDI recipient region (UNCTAD, 2014). This is also consistent with the postulation by Abotsi

(2016) that, at a high level of institutional quality, corruption is expected to have a positive impact on FDI inflow. However, in the case of Asia, the TLCI (-0.74) is lower than the TLCI in Africa, but FDI inflow to Asia is greater than that to Africa. This implies that even at high level of corruption, FDI inflow to Asia is higher than Africa. This suggests that despite the corruption levels in Asia, the region is still able to attract relatively more FDI inflow. A similar result by Touchton (2015) shows that while economic growth rates have remained relatively high in Southeast Asia, which indicates continued investment in markets, empirical literature provides evidence of a strong negative relationship between barriers to entry and the rule of law. This scenario may be attributed to the presence of sound policy factors that drive FDI inflows such as trade openness, product market regulations, labor market arrangements, corporate tax rates, trade barriers, and infrastructure in Asia. With the existing quality of institutions in a country, as long as firms are able to exploit their ownership and location advantages, they will be motivated to invest in the country. According to Khan and Sundaram, (2000), businesspeople may subjectively evaluate corruption to be less serious if the system works and they make large profits. For example, the improved economic growth in Thailand in the face of high corruption was attributed to the dynamics of Thai clientelism, which led to competitive market structures in addition to collective action problems resolved by their institutions (Khan & Sundaram, 2000). Another reason may be due to the nature, scope, social role and the perception of corruption across these regions. Comparing corruption across regions is a difficult task, both due to the secretive nature of corruption and the variety of forms it takes. A common explanation of differential corruption among sociologists is that social norms are very different in different countries. Therefore, what is deemed in one culture as corrupt may be considered a part of routine transactions in another (Bardhan, 1997). According to Bardhan (1997), gift-exchange is a major social norm in business transactions in developing countries.

5.0 Conclusion

Corruption has been observed to be significant in virtually all Asian countries (Khan & Sundaram, 2000), but, irrespective of this observation, Asia remains the number one global investment destination, which is contrary to the empirical literature that states that high corruption actually deters foreign direct investment. This study, therefore, sought to determine the TLCI in Asia and Europe to enable comparison of the tolerable level of corruption for investment across these regions since the TLCI for Africa is already known. This study also sought to fill the lacuna in the literature with respect to the threshold of corruption in attracting FDI inflow in the various regions. The findings of this study show that the estimated TLCI for Europe is 0.534 and that for Asia is -0.735 on the control of corruption index, which ranges from approximately -2.5 (weak) to 2.5 (strong). Despite the corruption levels in Asia, the region is still able to attract relatively more FDI inflow than Africa. It is recommended that leaders of the countries on these continents enact policies to control corruption in their various countries to levels that will not deter FDI inflows. Additionally, the findings of this study will assist potential investors in making an informed decision with respect to the destination of their investments.

The findings suggest that leaders in African countries should not only concentrate on the control of corruption but also consider policy factors that drive FDI inflows such as trade openness, product market regulations, labor market arrangements, corporate tax rates, trade barriers, and infrastructure. The limitation of this study is the assumption that foreign investors choose a country based solely on the level of corruption of the host country because there are other country-based business risks and individual-specific shocks that investors take into consideration before an investment decision is made. It is recommended that further studies should explore the nature, scope, social role and the perception of corruption across the regions. This will give a better understanding of the dynamics of corruption across these regions.

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