

Econometric analysis of the effect of Ghana's increasing external debt on foreign direct investment (FDI)

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Abstract

The study explored the relationship between foreign direct investment (FDI) and several covariates including external debt, GDP per capita income, and gross fixed capital formation, for Ghana from 1980 to 2013. It was conducted following Ghana's bail out by the International Monetary Fund (IMF) to stabilise the Ghanaian currency (the Cedi) as debt levels soared and the Cedi depreciated precipitously against the Dollar. The primary research question that precipitated the study was: by how much will foreign direct investment inflows in Ghana change percentage-point wise per a unit increase in her external debt stock?

In the econometric analysis, two OLS regressions were run: the 'log-level' model and the 'log-log' model. The coefficients on external debt, GDP per capita and gross fixed capital formation (a proxy for infrastructure) were all statistically significant, excluding the GDP deflator, which though had its expected sign, was insignificant at 10% significance level using 'log-level' regression.

In the 'log-log' model, only external debts and gross fixed capital formation were statistically significant at 5% significance level. The R-squared explained 89.98% and 89.64% of the total variation in FDI using the log-level and log-log models respectively. The semi-elasticities of $\log(\text{FDI})$ with respect to external debts, GDP per capita and gross fixed capital formation were 0.3%, 0.2% and 7.5% respectively, while the elasticities of $\log(\text{FDI})$ with respect to external debts and gross fixed capital formation were -1.56 and 1.38 respectively. The magnitude of the proportionate changes in $\log(\text{FDI})$ was very large when the percentage

increase in the explanatory became very large. To avoid violating the Gauss Markov assumptions of multiple linear regression, the Breusch-Pagan test for heteroscedasticity using 'log-level' was employed by regressing residuals-squared on all the independent variable. A correlation test was also run to ensure that there was no perfect correlation between the independent variables.

Overall significance of the regression was tested using the F statistics and there was a strong rejection of the null hypothesis that none of the variation in $\log(\text{FDI})$ was explained by the independent variables. The study finds that in order for government to attract more FDI, emphasis has to be placed on fiscal discipline, sound economic policies, and infrastructural development. The study will enable government and policy makers to estimate the percentage point fall in FDI per a unit increase in external debts so as to strategise borrowing.

Key words: Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI), External Debt Stock, Breusch-Pagan test, International Monetary Fund (IMF)
JEL classifications: H54, H63, H81, O14, O15

Introduction

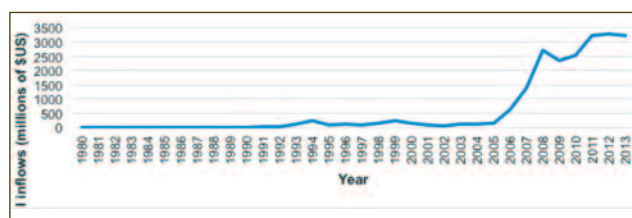
Foreign direct investment (FDI) has played a critical role, as far as the developmental agenda of many economies is concerned. FDI and foreign portfolio investment (FPI) are routes for overseas investors to invest in an economy. FDI is defined as an investment made by a foreign company or

entity in the productive assets of another nation while FPI is investment by investors in financial assets such as stocks and bonds of entities located in another country (Picardo, 2015). The study centred on FDI only because it is more stable and presents a lasting commitment to an economy than FPI due to its illiquid nature (Picardo, 2015). Despite some misgivings regarding the effect of FDI on the local industry of the host country, economic policy makers and analysts seem to agree that FDI brings with it economic development, financial resources, marketing expertise, increased employment, etc. (Karuiki, 2015). FDI thus provides a source of capital and up-to-date technology without the risk of indebtedness.

According to Adegbite and Ayadi (2010), FDI spurs economic growth and development because it is a means of bridging the technological and capital resource gap in less developed countries. In countries where domestic investment is inadequate, FDI can make up for that gap (Adegbite & Ayadi, 2010).

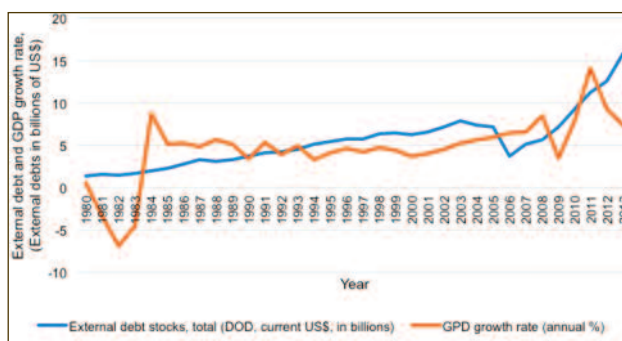
The inflow of FDI into key sectors (financial, tourism, manufacturing, agriculture, etc.) of the Ghanaian economy can potentially increase its GDP, reduce unemployment and hence stimulate economic growth. The many benefits of FDI has resulted in intense competition amongst developing countries in attracting investment through the creation of favourable and suitable investment environment.

Figure 1.16: FDI increases in some years and drops in other years due to various economic factors



In spite of the crucial role that FDI plays in developing economies like Ghana, there are several factors like political instability, inflation, high tax rate, high labour cost, etc. that can limit the inflow of foreign investment. Some other important determinants of foreign direct investment into a country include GDP, GDP per capita, external debts stock, real interest rate, and many more (Karuiki, 2015). For the purpose of this empirical study, however, the variable of interest was Ghana's external debts stock and its effect on foreign direct investment. The emphasis was on external debt because Ghana has been caught up in a huge debt repayment which, according to the IMF, was over 70% of Ghana's GDP (Ghanaweb, 2014). A graph of external debt and economic growth (figure 1.1) from 1980 – 2013 is shown above right.

Figure 1.1: A graph of external debts stock and GDP growth rate



From the graph, it can be observed that Ghana's economy after achieving an unprecedented growth of about 15% in 2011, commenced falling when external debt stock started skyrocketing due to debt unsustainability. External debts is the total public and private debts owed to non-residents and repayable in foreign currency, goods and services (Index Mundi, 2015). Ghana's external debt stock has surged upwards over the years. Dr Wampah, governor of the Bank of Ghana, speaking to journalists at the Monetary Policy Committee (MPC) in May 2015, stated that Ghana's total debts stock as at the end of March 2015 stood at GHC88.2 (\$25.2) billion, representing 65.3% of GDP (Ghana Business News, 2015).

In early 2015, the International Monetary Fund (IMF) approved a \$918 million extended credit facility to help Ghana restore both debt sustainability and macro-economic stability to foster economic growth and development (IMF, 2015). Even though initial performance of the IMF policies seem to be encouraging, the long run effectiveness of the IMF solution is open to speculation because stabilising debt levels requires difficult, but sustained fiscal consolidation and the implementation of sound economic policies by government (Bawumia, 2015).

Ghana's recent appetite for debt set against a record of poor economic management and fiscal indiscipline means even the IMF solution could plausibly fail if the necessary infrastructural investments are neglected because of corruption and ineptitude. On the other hand conscious and determined infrastructural development in the form of roads and the provision of public utilities will certainly attract investment from abroad mainly in the form of FDI.

Given the background provided and following the debt crisis and weak economic fundamentals that Ghana currently faces, this study is undertaken to investigate the impact of billowing debt levels on FDI and, by implication, future Ghana GDP per capita growth. Specifically, the study sought to answer the question: *by how much will foreign direct investment inflows in Ghana change percentage-point wise per a unit increase in her external debt stock?* This is a valid question because over-reliance

on external borrowing can create tremendous economic risks. It can also stoke fear of economic hardship which could likely make investment in the host country very unattractive.

The study is worth undertaking because knowing the economic relationship between Ghana's external debts and foreign direct investment would help economic policy makers, policy analysts, and government in estimating the direction of the causal relationship between foreign direct investment and external debts, while explicitly holding other factors constant. Knowing the direction of effect of external debts on foreign investment would enable government to plan and manage its appetite for borrowing. Moreover, this research would be of great importance to investors in their investment and financing decisions in Ghana.

Literature review

Several studies have been conducted both on the relationship between FDI and growth and on the factors that typically determine FDI for numerous economies in both the developed and the developing world. Most of the studies on the determinants of FDI have been empirical in nature, employing different explanatory variables, depending on the variables of interest of researchers. The available literature has identified several determinants depending on the country of interest and time periods under consideration.

There has been a remarkable recent growth in FDI in developing economies (especially in Africa) following political transformation, macro-economic stability, and economic growth (Antwi, Xicang & Emire, 2013).

To increase their share of foreign investment inflows, most countries have eased certain restrictions on FDI through the institution of domestic financial reforms, granting of tax incentives, and trade liberalisation (Antwi, Xicang & Emire, 2013) amongst others. Ghana, through the Free Zones Act and the Ghana Investment Promotion Act 1994, has granted certain tax incentives and instituted other investment protection policies to create an enabling environment for investors to invest. This enterprise has increased FDI inflows in Ghana. The increased FDI flow is likely an important determinant of economic growth. For instance, Ghana's share of FDI quadrupled from 2005 to \$636 million in 2006 which represented 19.4% of gross fixed capital formation (Antwi, Xicang & Emire, 2013). An engrossment of Ghana's opening up policies and macro-economic reforms has been the center of attraction of this high level of foreign direct investment.

FDI has created many positive externalities in the form of economic benefits to the Ghanaian economy through

the transfer of knowledge and key technology in the production and distribution of goods and services. For example, over the past decade, FDI has brought in large-scale surface mining activities through mine expansion and rehabilitation, mineral exploration, and mines development (Awudi, 2002).

As economies expand and approach industrialised status, an influx of foreign direct investment contributes to the further integration of the country into the global economy by stimulating and boosting international trade and networks (Antwi, Xicang & Emire, 2013).

Hossein Ostadi and Samin Ashja (2014) investigate the relationship between external debts and FDI in D-8 member countries using panel data. They found a significant negative relationship between external debts and FDI. The study also revealed that GDP has a positive effect on FDI (Ostadi & Ashja, 2014). This attests to the fact that economic growth and debt sustainability can together serve as a possible path to boost foreign direct investment inflows to the host country. This result also presents evidence that a rising foreign debt emasculates foreign investors' decision as investors will have negative expectations about the future economy, thereby reducing FDI.

In testing for causality between external debt and foreign private investment in Nigeria, Ajisafe, Nassar, Fatokun, Soile, and Gidado (2006) established that assuming zero corruption, external debts does help government to undertake investment activities which, in turn, leads to increased productivity and standard of living in the long run. They, however, noted that mismanagement and over-reliance on debt financing can deter foreign investors as more resources would be needed to service the debts (Ajisafe et al, 2006).

A study undertaken by Demirhan and Masca (2008) sought to explore the determining factors of foreign direct investment inflow in developing countries over the periods of 2000 to 2004. The study used cross-sectional data from 38 developing countries by means of cross-sectional data. In the study, GDP per capita growth rate (variable of interest) was found to have a positive and statistically significant relationship with FDI. This affirms the intuition that increasing GDP per capita is a sign of economic growth and presents a better picture in terms of opportunities to potential investors, thereby increasing FDI (Demirhan & Masca, 2008).

Shamsuddin (1994) examining the economic determinants of FDI in less developed countries, employed cross-sectional data on 36 countries. Abdul Shamsuddin emphasised that GDP per capita is the most important factor that influences private foreign direct investment (Shamsuddin, 1994). Thus, market size is a very important determinant of FDI.

In assessing the impact of economic growth on FDI, Antwi, Emire and Xicang (2013) established that there is a positive and statistically significant relationship between FDI and GDP, and GDP per capita. This again underscores the fact that the size of the market of the host country is vital in attracting FDI. In this study, the multiple ordinary least square regression was used on annual data covering the periods 1980 to 2010 (Antwi, Xicang & Emire, 2013). Nine explanatory variables were used in the model and 96.3% of the total variation in FDI was explained by these variables. No interaction term(s) was used in the regression model.

Many studies have shown that inflation is an determinant of foreign direct investment. For example, Bouoiyour (2007) conducted a study on the determining factors of FDI in Morocco and found inflation to be inversely related to FDI because investors want to preserve the value of their investment in the recipient countries.

A high rate of inflation reflects the presence of economic pressures and instability thereby sending signals to potential investors of future macro-economic risk (Bouoiyour, 2007). A higher inflation that is not accompanied by a corresponding rise in the return to investors could lead to loss of foreign direct investment into the host country. In a research paper on the determinants of foreign direct investment in India, Singhania and Gupta underscored that some inflation is good for FDI but should always be maintained at a threshold level because a high inflation could switch off investors from investing in the host country (Singhania & Gupta, 2011).

Gross fixed capital formation – a typical proxy for domestic investment – has been shown to have a statistically significant relationship with FDI (Karuiki, 2015). In the study, gross fixed capital formation was used as a proxy for infrastructure. According to Karuiki, gross fixed capital formation include plant, machinery and equipment purchases, roads and railway construction, schools, hospitals etc. Effective infrastructure that guarantees uninterrupted power and water supply as well as stable communication links make the host country attractive to foreign investors (Karuiki, 2015).

In summary, the review suggests a positive relationship between FDI and growth in the absence of corruption and identifies external debt, inflation, gross fixed capital formation and real GDP per capital growth as the main determinants of FDI depending on the country, time period and context. This study focuses on identifying the key determinants of FDI for Ghana given the opportunity cost of government's policy of awarding tax breaks to foreign companies to attract FDI. The research also tackles the magnitude question: by how much do the different factors

impact FDI *ceteris paribus*. The results should help inform Ghana's policy on FDI.

Data and methodology

The econometric analysis employed in estimating the relationship between external debt and foreign direct investment used annual time series data on FDI and selected explanatory variables from 1980 to 2013. Data for the econometric model is secondary data sourced from the World Bank database on international countries (formerly the World Development Indicators). The econometric model constructed used the multiple ordinary least squares regression. The dependent variable is FDI [foreign direct investment, net inflows (BOP, current \$US)] while external debt stock (% of exports of goods, services and primary income), GDP deflator (annual %), gross fixed capital formation (% on GDP), and GDP per capita (current, \$US) are the explanatory variables. The data on these variables are obtained from the World Bank.

Econometric model specification: first econometric model

$$\text{Log}(FDI)_t = \beta_0 + \beta_1 EDEBT_t + \beta_2 GDPDEFL_t + \beta_3 GDPc_t + \beta_4 CAPFORM_t + \mu_t$$

Where:

$\text{Log}(FDI)$ = the logarithm of foreign direct investment. We took logarithm of the FDI to avoid outliers in the data and to minimise the variation in FDI inflows.

$EDEBT$ = external debt stock (% of exports of goods, services, and primary income).

$GDPDEFL$ = GDP Deflator (annual %).

$GDPc$ = Gross Domestic Product per capita (current, \$US).

$CAPFORM$ = gross fixed capital formation (% of GDP)

t = time period covering 1980 to 2013, μ_t = the error term, and β_j = coefficients of independent variables, where $j = (1, 2, 3, \text{ and } 4)$ as above. In the model, we assume that the error term is normally distributed, $N(0, \Sigma^2)$. The basis for this assumption is to obtain exact sampling distributions of the t statistics and F statistics to carry out hypothesis tests.

This study expects that:

- β_1 (the change in $\log(FDI)$ with respect to a percentage increase in $EDEBT$, *ceteris paribus*) is less than zero or is negative. It is assumed that there exists a negative relationship between FDI and external debt in Ghana since a rising debt indicates debt unsustainability and

fiscal indiscipline, and investors do not respond favourably to debts

- β_2 (the change in $\log FDI$ with respect to a percentage increase in $INFL$, holding all other factors constant) is less than zero. Higher inflation is an indication of macro-economic risk and instability. This destroys the value for money which most likely can negatively affect foreign direct investment
- β_3 (the change in $\log FDI$ with respect to a unit increase in $GDPc$, *ceteris paribus*) is greater than zero. An increasing GDP per capita shows a growing economy and an increase in the market size of Ghana. This will attract foreign investors as the growing economy can be very beneficial
- β_4 (the change in $\log FDI$ with respect to a unit increase in $CAPFORM$, *ceteris paribus*) is greater than zero. A rapid increase in gross fixed capital formation will make business in the host country very attractive. This will attract more foreign investors.

The null hypothesis is that individual coefficients of the independent variable are zero while the alternative hypothesis is that they are different from zero. The regression run in this study used a significance level of 5%. The decision rule is that we fail to reject the null hypothesis that 'individual coefficients are zero' if the p-value associated with each parameter is greater than 0.05, otherwise the null hypothesis is rejected in favour of the alternative hypothesis.

To avoid possible bias in the estimates, and to underpin the validity of the results obtained, particular attention was paid to the Gauss-Markov Assumptions. The econometric model specified above shows that the assumption of linearity in parameters was well taken care of. The independent variables (external debts, inflation, and GDP per capita) were randomly sampled. To check for the problem of multicollinearity amongst the independent variables, a correlation test was run and the results is shown in figure 1.6 and figure 1.7 in the appendix on page 48. In the log-level regression however, there was high but not perfect correlation between GDP per capita and GDP deflator.

Figure 1.15: Descriptive statistics and discussion of empirical results

Summary Statistics

Variable	Mean	Standard deviation	Min	Max
<i>FDI</i>	627,000,000	189,000,000	2,000,000	3,290,000,000
<i>EDEBT</i>	248.513	19.441	70.953	393.588
<i>GDPDEFL</i>	52.292	14.017	0.059	294.46
<i>GDPc</i>	608.87	76.545	264.693	1875.526
<i>CAPFORM</i>	18.023	1.333	3.531	30.982

Observations number = 34

The main objective of this study is to develop an empirical framework to estimate how external debts, inflation rate, and GDP per capita explain foreign direct investment (FDI). By regressing FDI on the explanatory variables (we used log-level here), the output generated is shown below.

Figure 1.13: OLS results – dependent variable: $\log(FDI)$

Independent variables	Coefficient	Standard error	t statistic	p-value
<i>EDEBT</i>	-0.0028**	0.0008	3.409	0.002
<i>GDPDEFL</i>	-0.005	0.004	1.115	0.274
<i>GDPc</i>	0.0015**	0.0007	2.089	0.00003
<i>CAPFORM</i>	0.075**	0.01	7.508	0.00000002
<i>Intercept</i>	6.645**	0.406	16.353	0

Observations = 34 R-squared = 0.8998

Note: the coefficients with (**) are statistically significant at 5%.

Inferential statistics

Null and alternative hypotheses →

- 1) $H_0 : \beta_0 = 0; H_1 \neq 0$
- 2) $H_0 : \beta_1 = 0; H_1 \neq 0$
- 3) $H_0 : \beta_2 = 0; H_1 \neq 0$
- 4) $H_0 : \beta_3 = 0; H_1 \neq 0$
- 5) $H_0 : \beta_4 = 0; H_1 \neq 0$

From the regression output above, it can be seen that all the explanatory variables have their expected signs and they explain 89.98% of the total variation in foreign direct investment inflows in Ghana. This is depicted by the value of the R-squared.

The negative sign associated with the co-efficient of external debts means that a rising debt could seriously affect foreign investment as this signals a high financial risk. The p-value connected with external debts is 0.002 which is less than 0.05 and 0.10 respectively 5% and 10% significance levels. This means that the coefficient on external debts is statistically significant in the regression.

A high GDP deflator is a sign of macro-economic risk which can scare foreign investors due to the loss of value for money. This is depicted by the expected sign on the coefficient of GDP deflator. However, the p-value associated with this coefficient is 0.274 which is statistically insignificant at both 5%, and 10% significance levels. This could be due to some time-series data problems.

The coefficient associated with GDP per capita is positive, meaning that an increase in Ghana's market size is a critical factor in determining foreign direct investment. The p-value is almost zero and is therefore statistically significant.

Gross fixed capital formation also showed its expected positive sign. The p-value associated with the coefficient is also almost zero, making it statistically significant at even 1% significance level.

Below is the final estimated equation along with the standard errors, number of observations and the R-squared.

$$\log(FDI) = 6.645 - 0.003EDEBT + 0.002GDPc + 0.075CAPFORM$$

(0.406) (0.0008) (0.0007) (0.010)

n = 34 R² = 0.8998

From the estimated equation above, a unit increase in external debts holding other factors fixed will cause a 0.003 percentage point change in $\log(FDI)$ and an 0.3% change in log FDI which is not economically large. However, Ghana's rising external debts can lead to a great deal of loss of foreign investment inflows. For instance, if debts increase by 50% the percentage point fall in $\log(FDI)$ will be 15%. This change is large economically and should be of interest to government given that debt levels are already high and tend to increase by rather large amounts. Holding other factors fixed, a 1% increase in GDP per capita will increase $\log(FDI)$ by 0.2%. Even though this is not economically large, a high percentage increase in GDP per capita (say 50%) is economically large as FDI will increase by 10%.

Gross fixed capital formation in the form of infrastructure is an important determinant of FDI inflow. From the estimated equation, if $CAPFORM$ increases by 1%, $\log(FDI)$ will increase by 7.5% which is very large economically.

The Breusch-Pagan test for heteroscedasticity was done by regressing residuals-squared (\hat{u}^2) on $EDEBT$, $GDPDEFL$, $GDPc$, and $CAPFORM$ and the regression output shown in figure 1.11 in the appendix. The R-squared from regressing \hat{u}^2 on all the independent variables is 0.0897.

$$H_0: \text{Var}(u | EDEBT, GDPDEFL, GDPc, CAPFORM) = \Sigma^2$$

$$H_1: \text{Var}(u | EDEBT, GDPDEFL, GDPc, CAPFORM) \neq \Sigma^2$$

$$F \text{ statistic} = \frac{R_{\hat{u}^2}^2 / k}{(1 - R_{\hat{u}^2}^2) / (n - k - 1)}$$

Where $R_{\hat{u}^2}^2$ is the R-squared from regressing the residuals on the explanatory variables and k is the number of independent variables.

$$F \text{ statistic} = \frac{0.0897/4}{(1 - 0.0897) / 29}$$

The above gives an F statistic of 0.714 which is less than the F critical with 4 numerator degrees of freedom and 29 denominator degrees of freedom. Hence, we fail to reject the null hypothesis that variance of the error term is homoscedastic. A plot of the residual against the predicted $\log(FDI)$ shows that the errors are not varied (graph in figure 1.12) in the appendix.

To check for the elasticity of FDI with respect to the explanatory variables, a log-log regression was run and the OLS results shown below.

Figure 1.14: OLS results – dependent variable: $\log(FDI)$

Independent variables	Coefficient	Standard error	t statistic	p-value
$\log(EDEBT)$	-1.56**	0.473	3.576	0.003
$\log(GDPDEFL)$	0.23	0.18	3.289	0.211
$\log(GDPc)$	0.47	0.534	0.882	0.385
$\log(CAPFORM)$	1.38**	0.593	2.326	0.03
Intercept	8.45**	2.362	3.576	0.001
Observations = 34 R-squared = 0.8964				

Note: the coefficients with (**) are statistically significant at 5%.

From this table, only $\log(EDEBT)$, $\log(CAPFORM)$ and the intercept were statistically significant at 5% significance level with their expected signs. The coefficient on $\log(GDPc)$ came with the expected sign but is statistically insignificant at 5% significance level. The coefficient on $\log(GDPDEFL)$ does not have the expected sign (negative). This could mean that some price increases are good for FDI. It could also be due to some problems with the time-series data. The estimated equation using the log-log model can therefore be shown below.

$$\log(FDI) = 8.45 - 1.56\log(EDEBT) + 1.38\log(CAPFORM)$$

(2.362) (0.473) (0.593)

n = 34 R² = 0.8964.

From the log-log equation above, a proportionate change in FDI with respect to a unit increase in $\log(EDEBT)$ holding $\log(CAPFORM)$ is -1.56%. This is the estimated elasticity of FDI with respect to $(EDEBT)$ holding $\log(CAPFORM)$ constant. Thus, a 1% increase in external debts will decrease FDI by approximately 2% points; this is economically very large. On the other hand, the estimated elasticity of FDI with respect to $CAPFORM$ and holding $EDEBT$ constant is 1.38%, meaning that a 1% increase in gross fixed capital formation will increase FDI by approximately 1% point. This change is also economically large.

Conclusion and recommendation

The central purpose of this study was to identify the determinants of foreign direct investment in Ghana. FDI is an important source of funding for capital intensive projects and exposes the host country to up-to-date technology. This study finds that external debts, GDP deflator, gross fixed capital formation and GDP per capita are key determining factors of FDI inflow in Ghana. All independent variables, except for the GDP deflator, were found to be statistically significant at 5% significance level. The total variation in foreign direct investment as explained by the independent was about 89.98%. The log-log regression run produced an R-squared of 89.64 which is not too far from the R-squared using the log-level model.

The results and findings of this paper would help the government of Ghana, policy makers, and businesses to estimate the *ceteris paribus* effect of rising external debts on FDI. The negative coefficient associated with external debts means that a rising debt would scare foreign investors from investing in Ghana due to high financial risk. From the log-level estimated equation, a unit increase in external debts will result in a 0.3 percentage point fall in $\log FDI$. This means that very high external debts as in the case of Ghana can seriously affect foreign investment inflow. An increase in GDP per capita signals a high market size and a growing economy, thereby attracting foreign investors. Using the log-log regression, a 1% increase in external debts was associated with approximately 2% point fall in FDI. This also shows that a very high debt is detrimental to FDI.

We recommend that the government of Ghana maintains a degree of debt sustainability and economic stability with a focus on infrastructural development as these are crucial for attracting more foreign investment. A country that wallows in debt can lose a great deal of foreign investment which provides a source of capital and up-to-date technology to accelerate the economic development of the country. The government of Ghana

should put in place sound economic policies, eschew corruption, strategise its borrowing and, as a matter of fact, use borrowed funds for appropriate and intended projects to foster economic growth.

Institutional strengthening is also recommended to ensure that economic activities take place in the right economic environment. Strong institutions would be a boost for both domestic and foreign direct investments which would in turn expand Ghana's development opportunities.

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Acronyms

EDEBT	external debts stock
GDPDEFL	gross domestic product deflator
GDPc	gross domestic product per capita
CAPFORM	gross fixed capital formation
FDI	foreign direct investment, net inflows (current \$US)
FPI	foreign portfolio investment
log	natural logarithm
IMF	International Monetary Fund.

Definition of terms

FDI: investments made by residents, companies and entities from a foreign country into another country

FPI: this is an investment in financial assets such as stocks and bonds made by investors from one country into a different country

GDP deflator: is a measure of price changes in domestically produced goods and services, calculated as nominal GDP divided by real GDP multiplied by 100

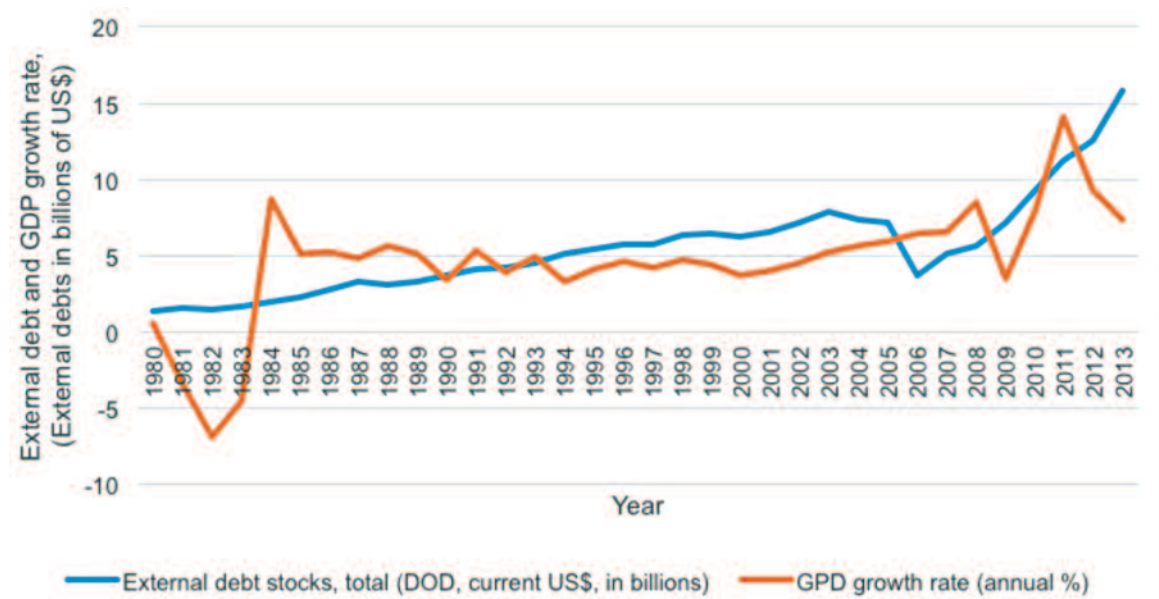
External debt stock: the total public and private debts owed to nonresidents and repayable in foreign currency, goods and services

Gross fixed capital formation: a measurement of the net increase in fixed capital such as plant, machinery and equipment

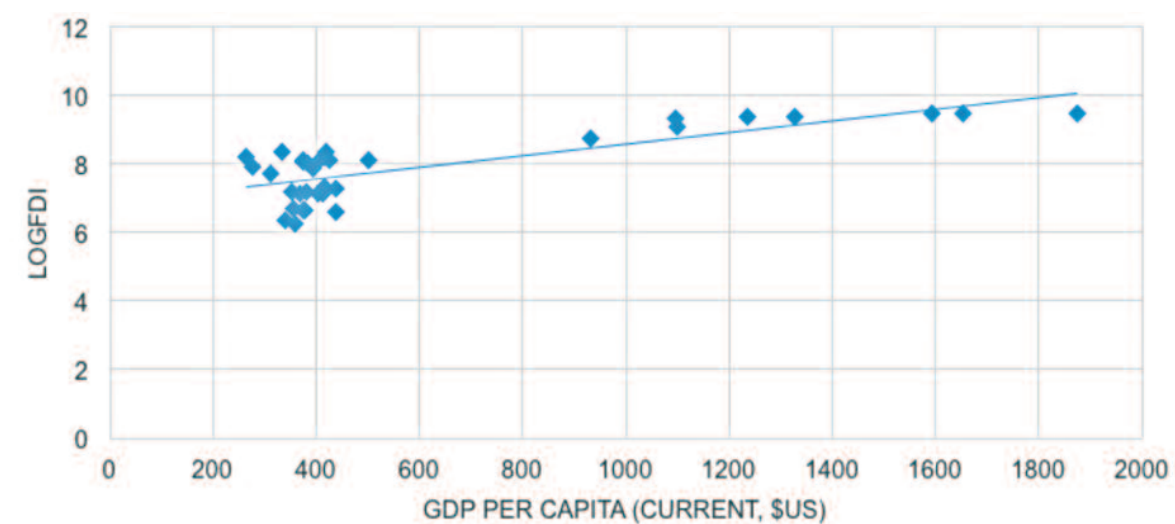
GDP per capita: the total output produced by a country divided by the country's population.

Appendices

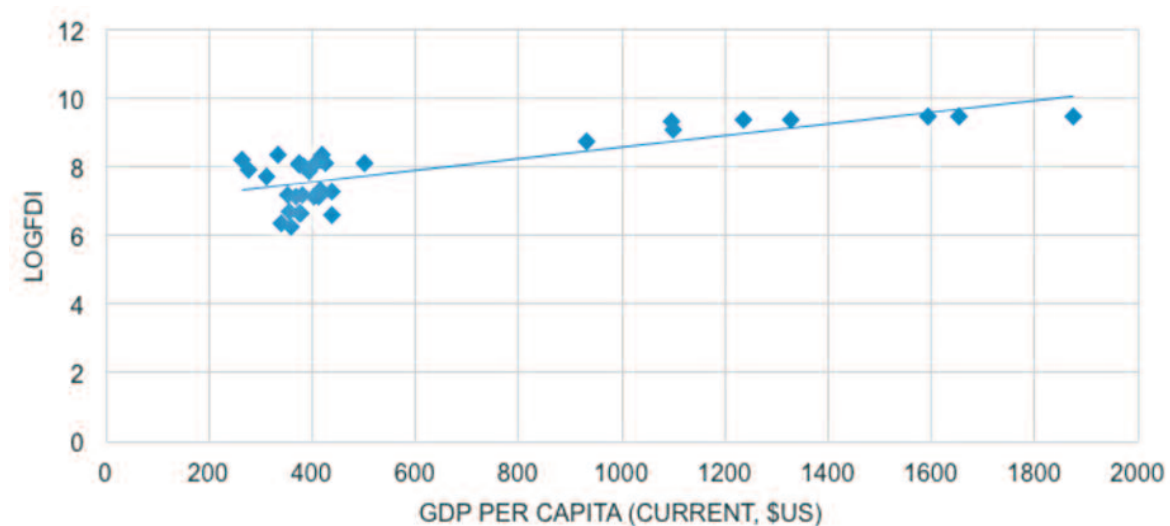
A graph of external debts stock and GDP growth rate



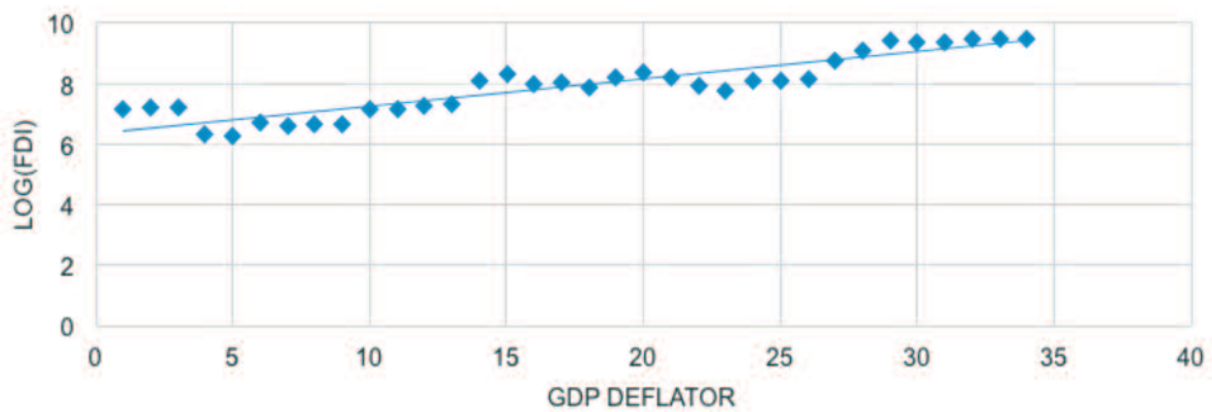
A scatter plot of logFDI and GDP per capita



A scatter plot of logFDI and GDP and external debts from 1980–2013



A scatter plot of log(FDI) and GDP deflator



A scatter plot of log(FDI) and gross fixed capital formation

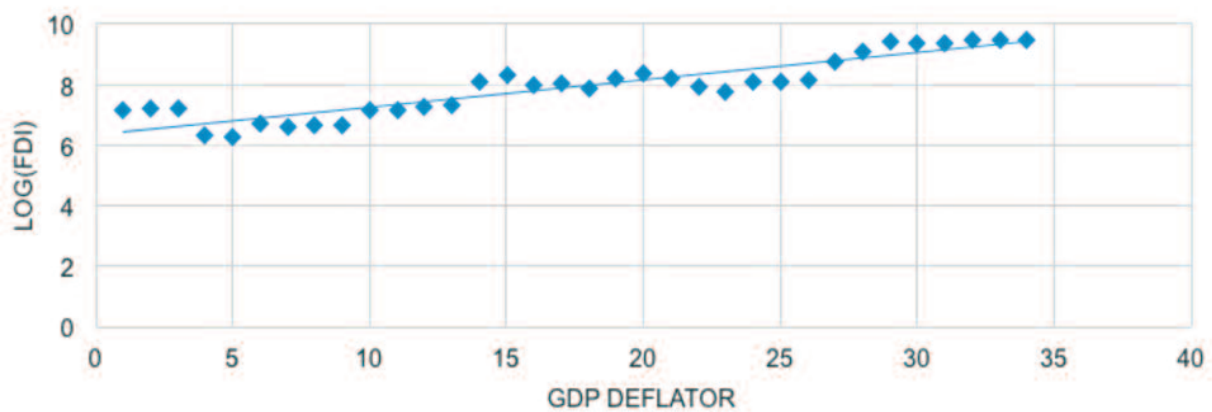


Figure 1.6: (log-level)

	<i>log(FDI)</i>	<i>EDEBT</i>	<i>GDPDEFL</i>	<i>GDPc</i>	<i>CAPFORM</i>
<i>log(FDI)</i>	1				
<i>EDEBT</i>	-0.730781659	1			
<i>GDPDEFL</i>	0.82012137	-0.782167141	1		
<i>GDPc</i>	0.778725834	-0.767377469	0.97703407	1	
<i>CAPFORM</i>	0.780928218	-0.339511553	0.516824393	0.415053885	1

Figure 1.7: (log-log)

	<i>log(FDI)</i>	<i>log(EDEBT)</i>	<i>log(GDPDEFL)</i>	<i>log(GDPc)</i>	<i>log(CAPFORM)</i>
<i>log(FDI)</i>	1				
<i>log(EDEBT)</i>	-0.742127743	1			
<i>log(GDPDEFL)</i>	0.884128513	-0.56844198	1		
<i>log(GDPc)</i>	0.759612861	-0.863799921	0.653555671	1	
<i>log(CAPFORM)</i>	0.740099314	-0.248809086	0.873465678	0.365143986	1

Figure 1.9

ANOVA								
	df	SS	MS	F	Significance F			
Regression	4	28.54247507	7.135619	65.12136	4.55806E-14			
Residual	29	3.17765073	0.109574					
Total	33	31.7201258						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	6.644673502	0.406332676	16.35279	3.55E-16	5.81362987	7.475717135	5.81362987	7.475717135
EDEBT	-0.002803902	0.00082261	-3.40854	0.001937	-0.004486328	-0.001121476	-0.004486328	-0.001121476
GDPDEFLL	-0.004674333	0.004190615	-1.11543	0.273825	-0.013245104	0.003896438	-0.013245104	0.003896438
GDPc	0.001455944	0.000696927	2.089091	0.045585	3.05682E-05	0.002881319	3.05682E-05	0.002881319
CAPFORM	0.075327469	0.010033009	7.507964	2.83E-08	0.054807662	0.095847275	0.054807662	0.095847275

Figure 1.10

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.946798223							
RSquare	0.896426876							
Adjusted RSquare	0.882140928							
Standard Error	0.336582855							
Observations	34							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	4	28.43477327	7.108693	62.74885	7.36469E-14			
Residual	29	3.285352532	0.113288					
Total	33	31.7201258						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	8.447068789	2.362053152	3.576155	0.001247	3.616127665	13.27800991	3.616127665	13.27800991
log(EDEBT)	-1.556775173	0.473370162	-3.28871	0.002643	-2.52492586	-0.588624486	-2.52492586	-0.588624486
log(GDPDEFLL)	0.230683317	0.18044011	1.278448	0.211229	-0.138358145	0.599724778	-0.138358145	0.599724778
log(GDPc)	0.470712019	0.533987135	0.881504	0.385293	-0.621414299	1.562838337	-0.621414299	1.562838337
log(CAPFORM)	1.380100732	0.59328482	2.326203	0.027202	0.166697032	2.593504432	0.166697032	2.593504432

Figure 1.11

ANOVA								
	df	SS	MS	F	Significance F			
Regression	4	28.54247507	7.135619	65.12136	4.55806E-14			
Residual	29	3.17765073	0.109574					
Total	33	31.7201258						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	6.644673502	0.406332676	16.35279	3.55E-16	5.81362987	7.475717135	5.81362987	7.475717135
EDEBT	-0.002803902	0.00082261	-3.40854	0.001937	-0.004486328	-0.001121476	-0.004486328	-0.001121476
GDPDEFLL	-0.004674333	0.004190615	-1.11543	0.273825	-0.013245104	0.003896438	-0.013245104	0.003896438
GDPc	0.001455944	0.000696927	2.089091	0.045585	3.05682E-05	0.002881319	3.05682E-05	0.002881319
CAPFORM	0.075327469	0.010033009	7.507964	2.83E-08	0.054807662	0.095847275	0.054807662	0.095847275

Figure 1.12: A scatter plot of predicted log(FDI) and residual

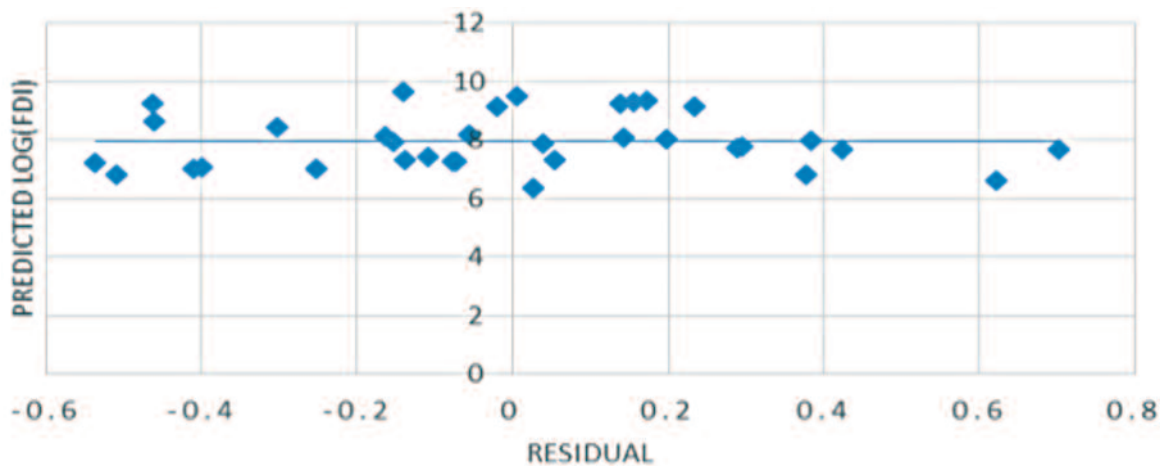


Figure 1.13a

OLS results. Dependent variable: log(FDI)

Independent variables	Coefficient	Standard error	t statistic	p-value
<i>EDEBT</i>	-0.0028	0.0008	3.409	0.002
<i>GDPDEFL</i>	-0.005	0.004	1.115	0.274
<i>GDPc</i>	0.0015	0.0007	2.089	0.00003
<i>CAPFORM</i>	0.075	0.01	7.508	0.00000002
<i>Intercept</i>	6.645	0.406	16.353	0

Observations = 34 R-squared = 0.8998

Figure 1.13b

OLS results. Dependent variable: log(FDI)

Independent Variables	Coefficient	Standard error	t statistic	p-value
<i>log(EDEBT)</i>	-1.56	0.473	3.576	0.003
<i>log(GDPDEFL)</i>	0.23	0.18	3.289	0.211
<i>log(GDPc)</i>	0.47	0.534	0.882	0.385
<i>log(CAPFORM)</i>	1.38	0.593	2.326	0.03
<i>Intercept</i>	8.45	2.362	3.576	0.001

Observations = 34 R-squared = 0.8964