



THE ROLE OF FOREIGN DIRECT INVESTMENT ON GHANA'S ECONOMIC GROWTH: A DURBIN WATSON ANALYSIS

Ernest Kay Bakpa^{1*} and Josephine Adwoa Yeboah²

¹School of Finance and Economics, Jiangsu University, Zhenjiang, China.

²Centre for Languages and Liberal Studies, Takoradi Technical University, Ghana.

*Corresponding Author's Email: ernestkay1481@gmail.com

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ABSTRACT: *Foreign Direct Investment (FDI) is an investment made by a firm or individual in one country into business interests located in another country. FDI is considered an important factor in developing an economy, as it raises the technological spillover and competition, and reinforces the production capabilities of the host country. FDI is normally taken or considered to be a major key to economic growth in most economies: developed and developing economies. The study examined how FDI impacted economic growth in Ghana from the period 1998 to 2017 with World Bank data time series data. The study revealed that there is a positive impact of FDI on economic growth in Ghana. The study further tested if the result is autocorrelated by applying the Durbin Watson test after the general method of moment regression had been done. The Durbin Watson test result confirms that, indeed, there is a positive correlation between FDI and economic growth.*

KEYWORDS: Durbin Watson, Economic Growth, Foreign Direct Investment, Ghana's Economy, Trade.



INTRODUCTION

Foreign Direct Investment (FDI) is an investment made by a firm or individual in one country into business interests located in another country. This mostly takes place when the firm or the individual opens or establishes a foreign business asset in a foreign company. FDI mostly aims at raising technological spillover and competition, and then reinforces the production capabilities of the host country (Ghana). Mostly, FDI is considered an important factor in developing an economy as it leads to job creation in an economy (Sakyi et al., 2015). In 2012, FDI inflow to Ghana represented about 8.09% of the real GDP. Ghana again in 2017 recorded about 93 new investments, estimating a total value of about US\$ 3.23 billion, representing about a 91.16% increase from US\$ 1.70 billion in 2016. Out of these investments, Ghana recorded US\$ 3.16 billion in FDI, representing a 101.26% increase from US\$ 1.70 billion in 2016. With this increase, a total number of jobs of about 5,970 was expected to be created in 2017 with 93 new investment records, which is a decrease from 6,599 estimated jobs in 2016. FDI is normally taken or considered to be a major key factor to economic growth in most economies: developed and developing economies (Adiputra & Patricia, 2020). Although there are different viewpoints on FDI, it is commonly accepted as one of the key drivers of job creation in an economy (Temiz & Gökmen, 2014). The question now is, with the level of FDI inflow to Ghana, does it correlate with growth in Ghana in terms of job creation?

The rate of FDI in developing economies has increased significantly following financial and political changes. To enhance their portion of FDI inflows, the majority of nations have relaxed limitations on FDI, reinforced macroeconomic stability, privatised government-owned firms, implemented domestic financial reforms, liberalised capital accounts, and provided tax incentives and subsidies. Ghana, for example, has implemented the Free Zones Act of 1995 and the Ghana Investment Promotion Act of 1994 to provide tax benefits and investor protection regulations. These measures are aimed at attracting foreign investors and creating a favourable climate for their business activities. The implementation of this programme and strategy in Ghana has resulted in a surge in FDI, contributing to economic growth. Ghana's opening-up policies and economic reforms prioritise the attraction of FDI. Ghanaian governments have enacted multiple laws to enhance investment conditions and the business environment, with the aim of attracting FDI. The World Bank's Doing Business team has ranked Ghana among the top 10 worldwide reformers for two consecutive years as a result.

FDI has been a prominent factor in the economic development of several African countries. Policymakers widely hold the notion that FDI has a positive impact on the productivity of host nations and contributes to their development. Multiple studies have been conducted on the relationship between FDI and economic growth. Their findings varied based on the diverse methodologies employed in their research. Several academics have discovered that FDI has a beneficial impact on economic growth.

FDI is a significant source of finance that also offers advanced technology. Generating this capital through domestic savings would be challenging, and even if it were possible, importing the required technology from outside would still pose difficulties. This is because transferring technology to enterprises with no prior experience in employing it is a complex, dangerous, and costly process. Over an extended duration, FDI generates several externalities that result in economy-wide advantages not fully captured in individual company income. These encompass the exchange of both broad information and specialised technology in the areas of production and distribution. Additionally, they involve improving industrial capabilities,



providing work experience for the workforce, and implementing contemporary management and accounting practices. Furthermore, there may be the construction of financial and trading networks, as well as improvements to telecommunications services.

There have been a lot of studies (Estrin & Uvalic, 2014; Nistor, 2015; Zahonogo, 2016) confirming the positive impact of FDI on economic growth leading to job creation and total growth in the real GDP. FDI's contribution to economic growth is in numerous ways such as the creation of jobs in the domestic market leading to capital accumulation through the incorporation of input into production processes and improvements in new technologies and human capital development (Ghosh et al., 2018; Popescu, 2014; Riley et al., 2017). According to Estrin and Uvalic (2014), FDIs are mostly important for transition economies because most of these economies have insufficient required reserves, technology and the needed capital to stimulate growth in the domestic economy.

For instance, Okwu et al. (2020) and Burlea-Schiopoiu et al. (2023) examined the impact of FDI on the economic growth of emerging economies. Through the analysis of cross-sectional data and employing OLS regressions, the researcher concludes that FDI has a favourable impact on the economic growth of host countries that choose an export-promoting strategy. However, this positive effect is not observed in countries that pursue an import substitution approach. Similarly, Gherghina et al. (2019), Iamsiraroj and Ulubaşoğlu (2015) and Sunde (2017) conducted a comparable analysis using cross-sectional data. The findings demonstrate that any alteration or rise in the stock of FDI is directly correlated with economic growth. Moreover, this effect is more pronounced in host countries that possess a greater level of institutional capability, as indicated by the extent of property rights protection and bureaucratic efficiency. However, Simionescu (2016) discovered relatively limited evidence of a favourable correlation between FDI and economic growth. This conclusion was reached after employing both time series and panel data fixed effect estimations on a sample of 32 established and developing nations. In contrast, Akadiri et al. (2020) and Yimer (2023) examined the relationship between cause and effect between FDI and economic growth. Zhang utilised data from 11 developing nations in East Asia and Latin America. Akadiri et al. (2020) employed cointegration and Granger causality tests to determine that FDI contributes to economic growth in five instances. However, the study also highlights the significance of host nation characteristics, such as trade regimes and macroeconomic stability.

According to Yimer's (2023) research, causality between economic growth and FDI goes in either direction, with a preference for growth causing FDI; there is minimal evidence that FDI promotes host-country growth. Expeditionary economic expansion may lead to a rise in FDI inflows. Gokmen (2021) conducted additional research that analysed the cause-and-effect link between FDI and economic growth. They employed a novel econometric methodology to determine the direction of causation between these two variables. Their study uses time series data from 1969 to 2000 for three developing nations: Chile, Malaysia, and Thailand. These countries have all received significant amounts of FDI but have diverse historical macroeconomic events, policy regimes, and growth patterns. According to their empirical research, GDP is the primary factor for FDI in Chile, rather than the other way around. However, for both Malaysia and Thailand, there is considerable evidence of a reciprocal relationship between the two variables. The implementation of a bootstrap test verifies the reliability of the aforementioned findings and assesses the accuracy of the outcome. Duodu et al. (2021) investigated the causal relationship between FDI and gross domestic product (GDP) growth in Ghana over the years, before and after the structural adjustment programme (SAP).



They also analysed the direction of causality between these two variables. The analysis utilised annual time series data spanning from 1970 to 2005. The analysis concluded that there is no causal relationship between FDI and economic growth for both the entire sample period and the period before the implementation of structural adjustment programmes (SAP). FDI contributed to the growth of gross domestic product (GDP) in the time following the implementation of structural adjustment programmes (SAP).

Analyzing many research works reveals conflicting positions on the relationship between FDI and economic growth. While many economists and policymakers agree that FDI capital inflows have the tendency to spur economic activity and stimulate economic growth, many other empirical studies reveal otherwise. Studies conducted by Yimer (2023), Ciobanu (2021), Raza et al. (2021) and Chanegriha et al. (2020) explicitly established a negative relationship between FDI and economic growth. Also, Fu et al. (2020) and Rakhmatullayeva et al. (2020) posited that there exist theories and literature that provide two-sided results concerning the impact of FDI and its relationship on the host country's economy. Studies have identified the positive impact of FDI on technology transfers and knowledge and skill transfers, which are crucial for accelerating economic growth. On the other hand, some studies have also reported the negative aspect of FDI, arguing that it may lead to the crowding out of local businesses, among other negative consequences for the local economy.

Trade is traditionally known to flow with Foreign direct investment and is considered an important factor in the economic growth process for all economies in the world. FDI and trade play the role of advancement in skilled labour through the importation and adoption of superior production technology and innovation. Always, exporters use innovation and developed production technology either by acting as subcontractors to foreign enterprises or through the international market's competition. This makes producers of import-substitutes face competition from producers abroad or foreign firms. This competition then pushes the producers to adopt more capital-intensive production facilities to face the hard competition in developing countries where products are usually scarce (Frankel, 2014; Tahir & Azid, 2015). The impact of trade on economic growth can be positive and significant due mainly to the accumulation of physical capital and technological transfer that comes with it in well-developed economies. Normally, trade can also lead to an inflow of FDI which plays an important role by increasing and augmenting the supply of funds for domestic investment in the host country (Arkolakis et al., 2018; Pegkas, 2015).

According to Belloumi (2014) on the relationship between export production and economic growth in some selected developing countries, their results proved and supported a long-run relationship between trade and economic growth in some of the selected countries, and that the promotion of export production will lead to a long-run growth effect on economies. This then attracts investors to the economy, leading to growth in the FDI position in the economy (Belloumi, 2014). Empirical study has revealed that export production and its promotion can greatly lead to growth through the introduction of new technologies which lead to human capital development and the creation of jobs (Ahsan et al., 2017; Pegkas, 2015).

Over the past five decades, economists have produced a large amount of statistical evidence on the relationship between international trade and economic growth. Some economists in most of the studies (Klobodu & Adams, 2016; Sakyi et al., 2015) have estimated correlation coefficients and regression coefficients, tested for cointegration, and performed a variety of other statistical tests to prove or disprove that there exists an impact or a relationship between



trade and economic growth and FDI and economic growth (Belloumi, 2014; Bernard et al., 2007). These studies were conducted to know if the positive impact of trade on economic growth can lead to growth in FDI (Naz et al., 2019). Most of them have proven that there is a relationship and there is an impact but to what extent the impact or the relation leads to growth or increase in FDI was not made known in most of the studies, particularly on Africa and its practical effect on growth. If there is an impact that leads to growth or an increase in FDI, is that increase in FDI autocorrelated to growth? Researchers (Van den Berg & Lewer, 2015) reject the hypothesis that trade slows economic growth and point out that there is no evidence of a negative autocorrelation between trade and economic growth, and hence, there is also no negative autocorrelation between FDI and economic growth (Seyoum et al., 2015).

Ghana ranks among the top 10 countries globally that receive significant FDI, which has been empirically linked to fostering economic growth. Multiple analyses have conclusively shown its influence on economic expansion. However, the primary issue is that FDI exhibits a positive correlation with economics. Furthermore, is the effect of FDI identical throughout the given time frame? In order to accurately assess the influence of foreign direct investment (FDI) on economic growth over a specific period, the study employed the Durbin-Watson (DW) statistic to examine the presence of autocorrelation. Autocorrelation is a mathematical measure of the similarity between a time series and a delayed version of itself across consecutive periods.

METHODOLOGY AND MODEL

Durbin-Watson and the General Method of Moment (GMM) model were used in analyzing the results. The Durbin Watson test is one of the statistical tests which is used to determine if there is an autocorrelation in a regression result. The GMM model is also one of the oldest regression estimators which is used to estimate the full impact of an independent variable on a dependent variable. Using the Durbin Watson test, we check whether there is a correlation between FDI and economic growth using GMM to estimate the coefficient of determination in Stata. We also discussed the R^2 which shows how the independent variable explains the total variation in the dependent variable. With the Durbin Watson test, we accept that there is an autocorrelation if the value falls between 0 and 1.99, which is positive, and we also reject that there is autocorrelation if the value falls between 2 to 4, which is negative.

The estimated model for the study follows:

$$GDP_{it} = \gamma_0 + \gamma_1 TD_{it} + \gamma_2 FDI_{it} + \gamma_3 GE_{it} + \gamma_4 GCF_{it} + \mu_{it}$$

In applying the Durbin Watson test of autocorrelation, we measure the GDP which is the gross domestic product at a period by the independent variables: "TD" which is trade is measured by the summation of total export minus total import, "FDI" which is foreign direct investment is measured as the total foreign investment flowing in the country, "GE" which is total government expenditure is measured by all forms of government expenditure in the country, and "GCF" (all forms of gross capital formation) is the value of all capital goods acquired to be used in the production process. All the variables are measured at a particular time period "t" and " γ_0 " are the constant and " $\gamma_1, \dots, \gamma_4$ " are the coefficients of the perimeters under study. " μ_{it} " is the error term of the equation.



DATA

In order to estimate the impact of FDI using econometric models, annual data covering Ghana's GDP from the World Bank database from 1998 to 2017 covering a 20-year period was used. The independent variables were trade (TD), foreign direct investment inflows (FDI), government expenditure (Arkolakis et al., 2018) and gross fixed capital formation (GFCF). The data for all these variables were also taken from the World Bank database and are expressed in percentage form of the real GDP. Table 1 presents the total sum of the data of each of the variables yearly.

Table 1: Level of the explanatory variables' inflow to Ghana annually

| YEAR | 1998 | 1999 | 2000 | 2001 | 2002 |
|--------------------------------------|-------------|-------------|-------------|-------------|-------------|
| foreign direct investment | 1.678 | 2.448 | 1.668 | 1.893 | 5.893 |
| Gross fixed capital formation | 11.063 | 5.372 | 6.553 | 5.628 | 4.572 |
| Trade | -12.856 | -17.584 | -18.439 | -19.579 | -12.257 |
| Government expenditure | 5.519 | 3.533 | 3.5167 | 3.517 | 3.467 |
| YEAR | 2003 | 2004 | 2005 | 2006 | 2007 |
| Foreign direct investment | 1.378 | 1.398 | 1.408 | 6.368 | 1.389 |
| Gross capital formation | 3.336 | 3.769 | 6.873 | 9.589 | 9.367 |
| Trade | -15.991 | -21.637 | -25.273 | -15.537 | -16.341 |
| Government expenditure | 3.977 | 3.687 | 4.912 | 11.815 | 17.955 |
| YEAR | 2008 | 2009 | 2010 | 2011 | 2012 |
| Foreign direct investment | 2.719 | 2.371 | 2.539 | 3.259 | 3.299 |
| Gross capital formation | 10.435 | 11.299 | 13.201 | 14.444 | 15.879 |
| Trade | -19.453 | -13.011 | -16.424 | -12.422 | -12.496 |
| Government expenditure | 14.669 | 16.952 | 7.469 | 6.5816 | 5.254 |
| YEAR | 2013 | 2014 | 2015 | 2016 | 2017 |
| Foreign direct investment | 3.239 | 3.309 | 3.199 | 3.499 | 3.259 |
| Gross capital formation | 12.818 | 22.217 | 23.973 | 20.02141 | 21.215 |
| Trade | -13.242 | -9.429 | -11.6985 | -7.184 | -10.818 |
| Government expenditure | 5.376 | 4.787 | 4.626 | 8.515 | 8.275 |

From Table 1, the level of the inflow of FDI, which is the main variable under consideration, shows that the nation Ghana over the years has had enough FDI inflow. From the table, trade inflow to the country over the years shows a negative return to the real GDP. All the amounts are in percentage of the real GDP.



RESULTS AND DISCUSSION

Table 2 presents the descriptive statistics of the variables taking into consideration the mean values of the yearly data.

Table 2: Descriptive statistic

| Variable | Mean | Std. Dev. | Min | Max |
|------------|---------|-----------|----------|--------|
| GDP | 2.231 | 1.531 | 4.981 | 4.780 |
| FDI | 1.699 | 1.409 | 5.897 | 3.499 |
| GCF | 11.571 | 6.365 | 3.376 | 23.953 |
| TD | -15.458 | 4.362 | -25.2731 | -7.184 |
| GE | 7.1244 | 4.502 | 3.037 | 17.635 |

Table 2 displays the descriptive statistics of the data. Foreign direct investment exhibits a positive mean value and standard deviation as well as all the other variables except trade, which is the only variable that shows a negative mean value. This is in line with the study of Bisiriyu and Osinusi (2020) which demonstrated positive mean values of FDI and economic growth.

Table 3 presents the correlation analysis of the data with the significant level. The correlation table shows how the explanatory variables relate to the dependent variable and vice versa.

| | GDP | FDI | GCF | TD | GE |
|-----|----------|---------|---------|---------|-------|
| GDP | 1.000 | | | | |
| FDI | 0.615*** | 1.000 | | | |
| GCF | 0.285* | 0.129* | 1.000 | | |
| TD | 0.079* | 0.493** | 0.604* | 1.000 | |
| GE | -0.158** | 0.697* | 0.681** | 0.538** | 1.000 |

Table 3: Correlation significant test of the explanatory variable on the dependent

Table 3 shows the correlation significance of the explanatory variables on economic growth. The table shows that all the variables are significantly correlated to the GDP and positive. From the table, only government expenditure is negative and at the same time significantly correlated to economic growth (GDP). The negative correlation between government expenditure and economic growth means that there may be a higher level of government expenditure which is not towards economic development, leading to an increase in productivity in the economy. The negative correlation is in line with Devarajan et al. (1996), Gurdal et al. (2021), Ahuja and Pandit (2020) and Chu et al. (2020). The table also shows that FDI is highly significant to the real GDP in Ghana. This means that there is a high level of FDI in the economy which is expected to lead to economic growth in both the long run and the short run (Ciobanu, 2021; Yimer, 2023).

Table 4 presents the general method of moment analysis by checking the impact of the independent variables on the dependent variable. Also, in Table 4, the main effect is the Durbin Watson test of autocorrelation of the FDI which is also presented.



Table 4: General method of moment regression result and the Durbin Watson test of autocorrelation

| Explanatory variables | Coefficient | z | P> z | Durbin Watson test |
|-----------------------|-------------|-------|-------|--------------------|
| FDI | 0.566 | 6.72 | 0.000 | |
| GCF | 0.001 | 1.66 | 0.096 | |
| TD | 0.031 | 0.14 | 0.005 | 1.012 |
| GE | -0.841 | -1.01 | 0.314 | |
| _cons | 4.221 | 1.08 | 0.280 | |
| R-squared | 0.957 | | | |

Table 4 presents the regression analysis of the FDI and other explanatory variables on the economic growth of Ghana. The results presented in Table 4 above indicate that the inflow of FDI impacts economic growth positively with the estimated coefficient of 0.566, which is about 57% of the GDP in the Ghanaian economy. The positive estimated coefficient, which is also significant, means the inflow of FDI in Ghana is a good part of growth and it also means that more jobs are created in the Ghanaian economy which is also expected to lower the unemployment rate. According to Chaudhury et al. (2020) and Chanegriha et al. (2020), a positive impact of FDI on economic growth means the nation is open to external markets which will lead to different levels of production in the economy. From Table 4, it is seen that trade impact on economic growth is negative with an estimated coefficient of 0.031, which is about 3.1% of GDP growth. This means that a 1% change in trade results in a 3.1% increase in economic growth, which is also statistically significant at a value of 0.05. This can only mean that there are more imports as compared to exports in Ghana's economy.

Again, from Table 4, foreign direct investment (FDI) has a substantial and beneficial effect on economic growth, as measured by the increase in gross domestic product (GDP). The observed favourable and significant impact aligns with the findings of previous research conducted in underdeveloped countries (Almfraji & Almsafir, 2014; Borensztein et al., 1998; Pegkas, 2015; Rao et al., 2023). The effect is consistently strong, meaning that it remains statistically significant and positive regardless of the various combinations of the other independent variables. The significance of domestic investment, namely gross capital formation, is critical in enhancing FDI's effects. The study finds that domestic investment gross capital formation at the current time has a favourable and consistent role. Furthermore, it was discovered that trade had a favourable and considerable impact on economic growth. The impact of government expenditure on economic growth is both negative and statistically significant, as evidenced by the correlation analysis. This suggests that a significant amount of government spending has a negative effect on economic growth and also hinders the potential benefits of FDI in both the long run and the short run in the Ghanaian economy.

The estimated coefficient of government expenditure impacts economic growth negatively with -0.841 and it is statistically significant. This also means that there is too much government expenditure which might not be directed to economic growth. The gross capital formation shows a positive impact on economic growth with an estimated coefficient of 0.001, which represents a 1% increase in GDP growth. The R-squared, which is 0.957, represents about 96%. This means the independent variables explained about 96% of variations in the dependent variable.



Computing the Durbin Watson test and checking for autocorrelation in the result shows that the result is autocorrelated. In other words, there is a positive correlation between FDI and economic growth in Ghana. The Durbin Watson test for autocorrelation states that from 0–1.99, there is a positive correlation and from 2–4, there is a negative correlation. The Durbin Watson test is based on the data and the result indicates 1.893118, which means that there is a positive correlation between FDI and economic growth. This positive autocorrelation means that FDI's impact on Ghanaian economic growth is the same or the benefit is the same across the year, according to the result, and it is also in line with the other studies (Burlea-Schiopoiu et al., 2023; Gupta, 2015; Malik, 2015).

CONCLUSION

With World Bank data, the study examines how FDI impacts economic growth in Ghana from the period 1998 to 2017 focusing on the Durbin Watson test. The study revealed that there is a positive impact of FDI on economic growth in Ghana. The study further tested if the result is autocorrelated by applying the Durbin Watson test, which confirms that, indeed, there is a positive correlation between FDI and economic growth. The study also measures some variables such as trade, gross capital formation and government expenditure, with government expenditure resulting in a negative impact on economic growth, and being statically insignificant. Other variables such as trade and gross capital formation impact economic growth positively but were not statistically significant because all the “p” values were more than the threshold of 0.05. Since the findings of the study conclude that FDI is one key factor the economy of Ghana needs to grow in creating jobs, it is suggested that more attention should be given to it to create more jobs in the country.

Furthermore, the current study demonstrates that FDI has a substantial role in fostering economic growth, particularly after a three-year timeframe. Therefore, it is imperative to promote FDI annually to bolster economic growth in Ghana's economy (Carkovic & Levine, 2005; Nunnenkamp, 2004; Zhang, 2001). To do this, the Ghanaian government should enhance the investment environment for foreign capital by ensuring both political and economic stability, as well as combating corruption. Furthermore, the Ghana Investment Promotion Centre attracting more FDI can be achieved by offering a sufficient market size, convenient access to export markets, well-developed infrastructure, cost-effectiveness, and other strategies. In addition, there is a justification for implementing progressive policies and effective governance procedures that are in line with global norms, in order to position Ghana as a very desirable location for foreign investment (Ayangbah & Sun, 2017).

It is important to note that FDI is not the only factor that determines gross domestic product (GDP); there are other variables that also have an impact on it. Subsequent researchers have the opportunity to investigate these factors. To conduct a comprehensive analysis of economic growth, it is necessary to examine the relationship between FDI and GDP in conjunction with other macroeconomic factors. Based on the current research findings and the available literature, it is clear that the duration for FDI to exert its impact on GDP differs across different economies. Therefore, it is intriguing to analyse the temporal delays in the impact of FDI on GDP in different economies.



The study's findings have several policy implications, as follows: Firstly, Ghana should expedite its transition from relying on natural resources and inexpensive labour to attracting high-tech FDI projects. This move would serve as a catalyst for economic growth in the upcoming era, facilitated by favourable tax policies, land availability, infrastructure development, access to high-quality personnel, and other related factors. Furthermore, Ghana should actively join international organisations and diligently fulfil its obligations under trade and investment agreements, which will help in broadening its export markets and consequently foster economic growth. This aspect deserves careful reconsideration and significant attention. Also, Ghana should actively lead in implementing reforms to enhance the index of investment freedom and financial freedom. Ghana aims to attract both domestic and foreign investment to foster economic growth by expanding output, which should be taken into consideration. As inflation detrimentally affects economic growth, it is imperative for Ghana to exert firm control over the yearly inflation index to serve as a catalyst for economic expansion.

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