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Exploring Intellectual Capital

Macroeconomic Determinants of Foreign Direct Investment Inflows and Impulse Response Function

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Abstract

The purpose of the contemporary research was the examination of macroeconomic determinants of foreign direct investment inflows into post-conflict Sierra Leone for the period, 2002-2015, and whether the determinants have a long-run and short-run association with FDI. A complementary exploration was the likely impulse response effect on FDI and GDP of a shock to FDI. The research method was quantitative, applying time series data with 56 observations and 6 variables. Applying the Phillips-Ouliaris cointegration model, the results indicated a statistically significant long-run relationship between FDI inflows and its determinants (*Rho* = --17.064, *Tau* = -2.996, *p* < .05). Moreover, the error correction model (lerrorECM) utilized to examine the short-run deviation from the long-run had the predictable sign, but was statistically insignificant ($\beta_{lerrorECM}$ = -.1542, *SE* = .0825, *t* = -1.87, *p* = .0680), signifying the adjustment towards equilibrium happened in the same reviewed period. Additionally, the effect on FDI of a shock to FDI had a short-term positive impact of up to the sixth period, and a negative long-term impact beginning in the seventh period. Nevertheless, the research was limited to 14 post-conflict years (2002-2015), which may be inadequate to achieve a comprehensive determinant of FDI inflows.

Keywords: Foreign Direct Investment, Applied Econometrics, Macroeconomic Determinants, impulse Response Function, and Real Interest Rate

1. Introduction

Inherently, Sub-Saharan Africa has experienced an increased flow of foreign direct investment (FDI) from multinational enterprises in the last thirty years, even whether FDI spurs economic growth in a nation appears undecided (Bartels, Nanapolitano, & Tissi, 2014; Chia & Ogbaji, 2013; Kemeny, 2010; Okafor, 2015; Okurut, Narrayana, & Chidizie, 2012; Rachdi & Saidi, 2011). Tripath, Seth, and Bhandari (2015) intuitively noted FDI was a speculation in productive resources by a corporation located in a nation in a distinct nation. The authors argued FDI largely appeared in two categories, either through the purchase of a business in the host nation or by the creation of a subset company in the host nation of a prevailing business in the home nation. Adejumo (2013), citing the World Bank, also noted FDI was the net inflows of speculation to procure a durable controlling interest (10 percent or better of elective stock) in a business performing in an economy excluding that of the stakeholder.

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Given this, it is worthy to acknowledge the continued significance of FDI as a major source of capital investment in Sub-Saharan Africa, even as questions persist concerning its true association with the economic growth of a country. Owusu-Antwi, Antwi, and Poku (2013), for example, augmented this conception by noting FDI inflows delivered desperately desired investment to fund domestic events, generating the stage for transferring technology and technical knowledge for the host nation. Using relevant econometric models on a few selected macroeconomic factors, Owusu-Antwi et al. (2013) realized inflation and gross domestic product (GDP) *per capita*, among others, were the significant determinants of FDI inflows into Ghana. The author surmised liberalizing Ghana's economic activities might evolve into noteworthy inflows of FDI in the nation. Owusu-Antwi et al's. (2013) arguments were consistent with those of Rachi and Saidi (2011), for example, who argued there was an unbalanced unison that financial liberalization had valued influences on economic growth. Kunle, Olowe, and Oluwafolakemi (2014) also argued FDI was an apparatus of economic growth, and that Nigerian policy makers must liberalize trade hurdles to encourage global financiers.

Meanwhile, some academics, including Acheampong and Osei (2014), and Okurut et al. (2012), had noted that FDI had a negative or insignificant impact on the economic growth of Sub-Saharan Africa. Acheampong and Osei (2014), for example, found in their research on FDI inflows into Ghana that, FDI showed a long-run positive relationship with the GDP macroeconomic factor, though this association was insignificant. In addition, the authors similarly realized a positive short-run connection between FDI inflows and GDP, though this association was also insignificant. The innate implication is that, there is no significant short-run and long-run impact of FDI on the economic growth of Ghana. Acheampong and Osei (2014) findings are at variance with those of Kunle et al. (2014) who realized a strong connection between FDI inflows and economic growth for the same Sub-Saharan country. Okurut et al. (2012), in contrast, noted economic growth, including inflation, had negative and significant impacts on FDI inflows into the Economic Community of West African States (ECOWAS), in their research on the determinants of FDI inflows into ECOWAS.

Given these varied outcomes on FDI and economic growth, particularly in Sub-Saharan Africa, the objective of the current research is two-fold:

1. The exploration of possible long-run and short-run macroeconomic determinants of FDI inflows into post-conflict Sierra Leone (2002-2015); and,
2. The exploration of a possible shock to FDI inflows and its impact on itself, including its effect on the real GDP in post-conflict Sierra Leone, for the period under review.

The objective is especially significant because Sierra Leone has recently experienced a surge in FDI inflows during its post-conflict years, which ensued in the first quarter of 2002. The World Bank (2017), for example, noted the net FDI inflows into post-conflict Sierra Leone in 2004 was about $61.2 million (in current US$). This figure was about $429.7 million (in current US$) in 2013 (World Bank, 2017). However, there is scarcely any concrete information in the literature regarding the determinants, specifically, macroeconomic determinants of FDI inflows into post-conflict Sierra Leone. This provides the underpinning for a theoretical examination on the macroeconomic determinants of FDI inflow into post-conflict Sierra Leone, for government

policy stratagem. In the interim, about economic growth, the World Bank (2017) noted the annual GDP growth rate (proxy for market growth) for post-conflict Sierra Leone was about 6.4% in 2004, but the growth rate dropped to about -20.6% in 2015. The World Bank (2017) also reported the GDP *per capita* growth rate (proxy for market size) for post-conflict Sierra Leone in 2014 stood around 2.29%, but this figure was about -22% in 2015. The World Bank (2017) similarly reported the net inflows of FDI as a percentage of GDP was about 32.3% in 2011, but the figure dropped to about 12.3% in 2015. The implication here is the recognition that, Sierra Leone appears to have experienced a reduction in economic growth in 2015. It is possible the economy experienced a shock, which showed in its dismal growth results of 2015. Nevertheless, there is barely any information in the existing literature concerning the possibility of a shock to the economy of post-conflict Sierra Leone. Thus, the dismal economic growth figures for 2015 offered a supplementary objective, to explore the possibility of a shock to FDI inflows and its impact on the economic growth of post-conflict Sierra Leone, for the period under review.

In sum, Sierra Leone is evidently at an evolving stage of multinational investments following the conclusions of its internal conflict, and is lacking in desirable information on the post-conflict influence of macroeconomic elements on the inflows of FDI. This insufficiency aided in underpinning the importance of an empirical study on the determinants of FDI inflows into post-conflict Sierra Leone, along with determining any possible shock effect on FDI inflows and economic growth.

The research is significant in part because of it expectation of filling the current gaps in the determinants of FDI inflows into post-conflict Sierra Leone, as well as providing the primary outlook to the examination of the possibility of a shock to FDI inflows and its impact on economic growth in post-conflict Sierra Leone, for the sampled period. The outcomes hold concrete implications for governments, policy makers, and stakeholders, along with the addition of a new knowledge to the endless journals on FDI inflows and economic growth.

2. Literature Review

2.1. Conceptual Framework. The objective of the contemporary research is the examination of macroeconomic determinants of FDI inflows into post-conflict Sierra Leone (2002-2015), and the possibility of an exogenous shock on FDI inflows and economic growth of the country, for the sampled period. Thus, the conceptual framework applied in the current research include aspects of the international trade theory, the internalization theory, and the eclectic paradigm theory of FDI, because of their inherent references to FDI, trade openness, and market growth, inter alia, which are significant in exploring the macroeconomic determinants of FDI inflows into post-conflict Sierra Leone. Intuitively, there are several existing journals on FDI, and some acknowledged the realization that, FDI in Sub-Saharan Africa, for instance, was conceivable through international trade and international investment (Bartels et al., 2014; Fehér & Poór, 2013; Okafor, 2015; Saibu & Akinbobola, 2014; Seyoum, Wu, & Lin, 2015). Mundell (1957) was a leading proponent of the neoclassical international trade theory in the determination of FDI inflows into a nation. Obviously, Mundell (1957) integrated FDI into the neoclassical structure as the consequence of obstacles to trade in goods. Mundell (1957) argued that, even if there

were the slackening of trade obstacles, this would not simultaneously result in the restructuring of capital movements, since FDI was at the instant a share of the factor characteristics of the host-nation, which included sunk and fixed costs. Mundell furthered that, trade obstacles heartened FDI, and trade openness neither lessened FDI nor upsurge trade. In sum, Mundell argued FDI and trade were alternatives to one another. It is obviously apparent in the neoclassical international trade framework that nations cannot be outflow and inflow financiers simultaneously because across-movements of FDI are nonexistent. The neoclassical international trade theory was among the conceptual models applied by Aliber (1970) in his research on a theory of direct foreign investment. Even so, Denisia (2010) noted the neoclassical international trade theory was problematic due to its failure to describe the presence of multinational corporations, because descriptions regarding dissimilarities in rates of return between nations could describe portfolio investments, but not FDI.

Adding to the neoclassical trade theory is the internalization conception of FDI. Buckley and Casson (2009, 2011) were the earlier pioneers of the internalization of FDI into foreign nations, centered on their argument that, market limitations engendered the occurrence of internalizing businesses in an organization. In effect, FDI cut business expenses, and enriched the production effectiveness of the transnational company (Buckley & Casson, 2009, 2011). Buckley and Casson obviously appear as the front-runners in postulating the macroeconomic concepts of trade openness and market efficiency determinants of FDI inflows into a nation. Buckley and Casson's (2009, 2011) concept of the internalization of FDI was empirically applied by Ogasavara and Maseru (2013), to explore the dynamics and impetuses regarded by Asian multinational businesses for penetrating the Brazilian market. Applying a quantitative methodology, Ogasavara and Maseru realized that, market structures, specifically concerning the scale and development of the host's market, were the motivational forces behind the entrance resolutions of Asian corporations into the Brazilian market. Ogasavara and Maseru further revealed a sign of market-seeking reasons as conclusive administrators of Asian assets in Brazil. Buckley and Caisson's (2009, 2011) conception of internalization of FDI encountered criticism, however, because it centered in its selection of industry-delineated features as the primary importation regarding the internalization choosing (Kurtishi-Kastrati, 2013). Even with this reproach, the theory is substantial because it helped outline the cost efficiency as an FDI determinant.

Similarly, Dunning (1988, 2001) was influential in examining the determinants of FDI by proposing the eclectic paradigm (OLI) theory of FDI. Dunning (1988, 2001) said financiers elected FDI because of its three groups of advantages comprising ownership, locational, and internalization specific advantages. Dunning (1988, 2001) said, for instance, that the location specific advantage was the achievements the business accrued because it placed its business actions in a precise district. The locational advantage similarly embraced the ease of access of small manufacturing costs, skilled workforce, standard infrastructure, and regional strategies, among others, in the host country that may lure FDI inflows (Dunning, 1988, 2001). Thus, it seems locational prosperities would advance on condition the host economy can support outsized markets or the inclination of generating them by trade openness, low manufacturing expenditures, or exceptional infrastructure. This feature of Dunning's conception accordingly

seems to embrace macroeconomic determining factors (e.g. market size, and trade openness) of the inflows of FDI into a country. Okafor (2015) congruently applied the OLI model in panel data procedures, to examine the locational determining factors of the United States (US) FDI inflow measures into 23 Sub-Saharan Africa countries, from 1996 to 2010. Employing quantitative procedures on panel data, Okafor realized that US outward FDI into Sub-Saharan Africa grew into credibility because of the deposit of crude oil and natural gas, infrastructural development, market prospect, and primary education attainment rates. Okafor moreover found labor force (of age 15 and greater) and inflation influenced the US inflow of FDI, whereas political uncertainty, corruption, including exchange rate had insignificant negative associations with US FDI inflow. Despite the all-embracing use of the OLI model, it was faulted for its compressed predictive ability for the mixture of variables (Fofana, 2014). However, Dunning (2001) rejoined the OLI paradigm was not postulated to include all types of manufacturing selections the multinational organizations expected.

2.2. Macroeconomic Determinants of FDI. There are several research studies in the present journals on the macroeconomic determinants of FDI inflows into nations, including Sub-Saharan Africa. Some of the related determinants include market growth and market size (GDP growth and GDP *per capita*), exchange rate, inflation, trade openness, interest rate, and money supply (Babatunde, 2011; Bekana, 2016; Ezeoha & Cattaneo, 2012; Faroh & Shen, 2015; Fiodendji & Evlo, 2015; Oladipo, 2013; Okurut et al., 2012; Owusu-Antwi, 2012; Wafure & Nurudeen, 2010). The application of market growth and market size as important determinants of FDI inflows, for example, is noteworthy in several empirical research studies on FDI (Bekana, 2016; Fiodendji & Evlo, 2015; Gwenhamo, 2011; Okafor, 2015; Suliman, Elmawazini, & Shariff, 2015; Owusu-Antwi et al., 2013; Wafure & Nurudeen, 2010). Several empirical investigations in the existing journals, for example, have often embraced the real GDP growth (a proxy for market growth), and the real GDP *per capita* (a proxy for market size) in examining the importance of market growth and market size as determinants of the inflow of FDI into a host country. Javed, Nawaz, and Gondal (2014), and Musonera, Nyamulinda, and Karuranga (2010), for example, had separately noted the importance of the employment of the GDP growth and GDP *per capita* in theoretical and empirical studies, to pull in real economic growth. Gwenhamo (2011) also used the real GDP as a measurement of the market extent of the host country, and deduced the macroeconomic element was a substantial determining factor of horizontal FDI, and was consistently striking in empirical studies. Utilizing the Johansen cointegration model, to examine the long-run determining factors of the inflows of FDI into Zimbabwe, Gwenhamo (2011) realized real GDP had a positive and significant effect on FDI inflow with inherent elasticity of 1.01. Concluding, Gwenhamo said the result confirmed the market size hypothesis, which postulated that bigger markets were the underpinning of the economies of scale that improved returns from business speculations, and therefore encouraged the inflows of FDI.

Bekana (2016) accomplished a parallel exploration on the determinants of the inflows of FDI into Ethiopia. Bekana (2016) had maintained that the fundamental reason of FDI inflows into emerging countries was to access the domestic market and, consequently, market size was important for host country indigenous market inclined FDI. Applying the Engle-Granger

cointegration procedures on some time series data, including GDP growth rate and GDP *per capita* for the period, 1991 to 2013, Bekana realized the GDP growth rate and the GDP *per capita* had positive long-run and short-run effects on the inflows of FDI. Bekana (2016) established that market-growing proficiencies were noteworthy determinants of the inflows of FDI into Ethiopia. Fiodendji and Evlo (2015) correspondingly researched the supremacy of institutional variables, including GDP growth rate and GDP *per capita* in alluring the inflows of FDI into Sub-Saharan African countries. Using the panel data procedure on 30 Sub-Saharan African states, including macroeconomic and institutional elements, Fiodendji and Evlo realized the GDP growth had a positive and significant influence on the inflows of FDI, thus signifying market-related variables were indispensable for FDI. Nevertheless, Fiodendji and Evlo found the GDP *per capita* (a proxy for market size) was insignificant, indicating the market size was not a dominant element in revealing the variances of FDI in the sampled data. In his exploratory research on the US and Chinese FDI in Africa, Hasnet (2013), for example, similarly found that market size had a significant and positive impact on both the US and Chinese outflows of FDI worldwide, including African countries. Other academics have likewise noted that market growth (real GDP) and market size (GDP *per capita*) are significant determinants of FDI inflows into a nation, specifically into Sub-Saharan Africa (Suliman et al., 2015; Wafure & Nurudeen, 2010). These distinct reviews offer the presence of the GDP element as an important determinant of the inflows of FDI into some Sub-Saharan Africa countries.

However, despite the recognition that, GDP (market growth and market size) seemed important in the determining of FDI inflows, other researchers have similarly found this macroeconomic element as a negative or irrelevant feature in FDI determining dynamics (Acheampong & Osei, 2014; Eregha, 2015; Ezeoha & Cattaneo, 2012; Fiodendji & Evlo, 2015; Musonera et al., 2010; Okurut et al., 2012). Acheampong and Osei (2014), for example, examined the determining factors of the inflows of FDI into Ghana, applying econometric models. Utilizing the Vector Error Correction procedure on a few selected time series data, including GDP (proxy for market size), for the sampled period, 1980 to 2010, Acheampong and Osei found a positive but insignificant long-run relationship between the inflows of FDI and GDP. Furthermore, Acheampong and Osei found a positive but insignificant short-run relationship between the inflows of FDI and GDP. The authors insinuated the insignificance of the market size might be due to the resource seeking motives of the inflows of FDI into Ghana. Acheampong and Osei's (2014) results agreed with the assessments of Ezeoha and Cattaneo (2011) who had said foreign investors operating in the mining industry generally shipped their outputs overseas and, therefore, were not primarily concerned about the extent of the host country's domestic market.

Meanwhile, Musonera et al. (2010) also explored the relevance of FDI in Sub-Saharan Africa, applying the Eastern African Community (EAC) as a case study. With the application of regression models, and some EAC nations institutional and macroeconomic time series data for the period, 1995 to 2007, Musonera et al. realized the GDP *per capita* (proxy for market size), for instance, had a negative but significant impact on the inflows of FDI into Tanzania. The authors also realized the GDP *per capita* had a positive but insignificant impact on the inflows of FDI into Kenya and Uganda. Musonera et al's. (2010) positive and insignificant results on

market scope for Kenya and Uganda individually appears equivalent with the results achieved by Acheampong and Osei's (2014) regarding the market size of Ghana. Equally, Ezeoha and Cattaneo (2012) examined the impact of finance, institutions, and natural resource heritage on the inflows of FDI into Sub-Saharan Africa, and recognized that the real GDP growth rate and the GDP *per capita* had negative and significant impacts on the inflows of FDI into the countries under review. The negative estimate of the GDP *per capita* was inconsistent with the market size assumption, which projected market size to embrace a positive impact on the inflows of FDI into developing countries because western foreign shareholders normally aimed economies with, oversized markets (Billington, 1999). Following the recent views, it appears the role of GDP (market growth and market size) as a significant determinant of the inflows of FDI into a nation is mixed.

Incidentally, too, the official exchange rate of a country is a significant variable in the determination of the inflows of FDI, and has been a noteworthy macroeconomic element in a few research journals on FDI (Bekana, 2016; Dua & Garg, 2015; Ezeoha & Cattaneo, 2012; Naanwaab & Diarrassouba, 2015; Oladipo, 2013; Omodero & Ekwe, 2017; Wafure & Nurudeen, 2010). Dua and Garg (2015), for example, had earlier reasoned concerning the host country's currency depreciation regarding its exchange rates. Dua and Garg furthered that a depreciation of the host country currency enhances the relative price of the wealth commanded by the businesses in the host countries, which encouraged the multinationals to invest a greater amount by means of FDI in the host native country. Vijayakumar, Sridharan, and Rao (2010), in the interim, regarded the exchange rate as the asset of a nation's currency, and conceivably realistic as a substitute for the level of inflation and the purchasing power of the investment industry. In addition, Vijayakumar et al. (2010) hypothesized that the devaluing of a nation's currency caused a decrease in the exchange rate vulnerability, and currency devaluation improved the purchasing authority of financiers in overseas currency counterparts (FDI). Obviously, Dua and Garg's (2015), and Vijayakumar et al. (2010) taken together seemed analogous regarding currency devaluation and its augmentation of the inflows of FDI into a host country. Oladipo (2013) similarly researched the relationship between exchange rate and the inflows of FDI into Nigeria for the period, 1985 to 2010, and found exchange rate expressively determined the inflows of FDI into the nation. Correspondingly, Bekana (2016) else realized the official exchange rate, inter alia, significantly induced the inflows of FDI into Ethiopia for the sampled period, 1991 to 2013. In total, the review on the host nation's exchange rate appears to be a deciding influence on the inflows of FDI into a country.

At the present, inflation is a macroeconomic risk element, which seemed an important determining factor of the inflows of FDI in some journals (Babatunde, 2011; Bekena, 2016; Dinda, 2014; Hua, 2014; Kahai, 2004; Leshoro, 2014; Omankhanlen, 2011; Reenu & Kumar, 2015). Kahai (2004), for example, had earlier said monetary and fiscal policies impacted economic stability by affecting inflation rate, including external and monetary balances. This dynamic, Kahai continued, in sequence, affected all kinds of speculation, including FDI. Thus, employing the linear regression procedure on a panel data of 55 emerging nations, Kahai realized inflation, among other things, was a substantial determinant of the inflows of FDI. Likewise, Asiedu (2002), and Koojaroenprasit (2013) in the same way, established the notion

that the inflation rate was applicable as a measurement of the complete macroeconomic stability of a nation. Given this, Dinda (2014) argued high inflation might perform as impediment to the inflows of FDI into a nation because it upsurges the cost of capital to the user cost of capital. In his exploratory research on the determining influence of China's external direct speculation in Africa, Hua (2014) realized that the inflation of African nations wielded a negative impact on China's investments. Other academics have also realized that high inflation hinders the inflow of FDI into a country (Bibi, Ahmed, & Rashid, 2014; Fauzel, Seetanah, Sannassee, 2015; Kaur & Sharma, 2013; Okurut et al., 2012). Grounded on this review, it is practical to assume high inflation connotes economic instability, and this would have a negative effect on the inflows of FDI.

Even when it is arguable that high inflation is a deterrent to the inflow of FDI into a country, there are some empirical findings which realized inflation had insignificant effect on FDI inflows, despite the expected sign (Koojaroenprasit, 2013; Niazi, Riaz, Naseem, & Rehman, 2011; Shahmoradi & Baghbanyan, 2011; Omankhanlen, 2011). Koojaroenprasit (2013), for instance, researched the determinants of FDI into Autralia, employing three FDI source countries, including USA, UK, and Japan, and realized inflation had a negative but insignificant impact on the inflow of FDI into Australia from the UK. Koojaroenprasit surmised that inflation was not a determining factor of Australian FDI from the three country sources, because the research model also encompassed the real interest rate, which likewise considered the inflation rate. Niazi et al. (2011) similarly realized a negative but insignificant relationship between FDI and inflation, in their research on the effect of inflation and growth on the inflows of FDI into a country. Shahmoradi and Baghbanyan (2011) also found inflation had a negative but insignificant effect on the FDI inflows into developing countries, in their panel data research on the determinants of FDI in developing nations. Thus, the significance of inflation as a macroeconomic determinant of FDI has a mixed review.

The application of trade openness as a determinant of FDI inflows is significant in some research studies (Babatunde, 2011; Bekana, 2016; Gwenhamo, 2011; Kaur & Sharma, 2013; Owusu-Antwi, 2013; Quazi, Vemuri, & Soliman, 2014; Wafure & Nurudeen, 2010). Naanwaab and Diarrassouba (2016), for instance, had noted the openness of the host nation to trade was also a noteworthy feature in international choices in locating to a specific nation. Babatunde (2011) had equally argued that the inflow of FDI was sensitive to the level of trade openness together with the speculation atmosphere in host countries. Furthermore, Babatunde said the conclusive effect of trade on FDI was relatively dynamic to the type of econometric procedure employed and the countries explored. Likewise, Owusu-Antwi (2013) argued that a host nation's trade openness appeared as a key determining factor in the flow of FDI, and had varied impacts on FDI. Therefore, employing the regression procedure on time series data for the sampled period, 1988 to 2011, Owusu-Antwi recognized the coefficient estimate of trade openness, inter alia, was significant and had a positive impact on FDI. Owusu-Antwi inferred that an efficient setting that had supplementary openness to trade was conceivable to induce international corporations and, those countries that embraced trade liberalization earned further FDI. Owusu-Antwi's (2013) findings were compatible with the results of Babatunde (2011) who similarly recognized that the coefficient estimate of trade openness was significant

at the 1% significance level, and had a positive relationship with FDI, in his research on trade openness, infrastructure, FDI and growth in Sub-Saharan African countries.

In a similar vein, Naanwaab and Diarrassouba (2016) said that openness of the host country to trade was a compatibly substantial characteristic in transnational determinations to locate in a definite country, which was principally essential to export-engrossed transnationals. Utilizing the Generalized Method of Moments (GMM) technique on a panel data of 137 nations (consisting of low, middle, and high earnings), Naanwaab and Diarrassouba recognized that trade openness, among other things, had a positive and substantial effect on the inflows of FDI, all embracing. Quazi et al. (2014) also researched the effect of corruption on FDI in Africa and recognized that economic openness had a positive effect on FDI, but this effect was weak. In total, it appears there is an association between trade openness and the inflows of FDI into a host nation. Despite all this, some academics, particularly Vijayakumar et al. (2010), had recognized that trade openness was not an important FDI determining factor, in their research on FDI inflows into BRICS countries. Therefore, trade openness as a determinant of FDI inflows into a host country seems to have a mixed result, even when it is arguably a significant macroeconomic element in determining the economic growth of a country.

Added to this is the realization that, macroeconomic scholars have further explored the significance of interest rate and gross capital formation in the determination of FDI inflows into a nation (Anna et al., 2012; Awan, Khan, & Zaman, 2011; Dua & Garg, 2015; Oladipo, 2013; Jepkurui & Olweny, 2015; Koojaroenprasit, 2013; Kok & Ersoy, 2009; Siddiqui & Aumeboonsuke 2014; Singhania & Gupta, 2011, Victor, 2013). Anna et al. (2012), for example, argued that interest rate was the rate which was levied or paid for the usage of money or the price of financing. Koojaroenprasit (2013) also noted the significance of interest rate in the determination of FDI inflows, and had argued advanced interest rate might echo advanced market peril, and consequently decreased FDI inflows. However, Gross and Trevino (1996) had earlier argued a comparatively large interest rate in a host nation had a positive effect on FDI inflows, but the route of the effect might be in an inverse if the overseas financiers hinge on the host nations' capital market in floating FDI account. Consequently, the significance of interest rate as an FDI determinant appears mixed, following these arguments. Dua and Garg (2015) also discussed the significance of interest rate as a determinant of FDI inflows relative to the income and substitution effect. Dua and Garg said regarding the income effect, for example, that an upsurge in production/interest rates of the FDI home nations (developed nations) echoed superior incomes of businesses in these nations and, therefore, superior accessibility of resources for investment at home along with overseas. Jepkurui and Olweny (2015) also found that interest rate was a significant determinant of the inflow of FDI into Kenya, in their research on the macroeconomic factors of FDI inflows in Kenya.

Aside interest rates, economic scholars have likewise explored the possible significance of gross domestic factors in the determination of FDI inflows into a nation (Bayar & Ozel, 2014; Chakraborty & Mukherjee, 2012; Danish & Akram, 2014; Gupta & Singh, 2016; Kok & Ersoy, 2009; Ojong, Arikpo, & Anthony, 2015; Oladipo, 2010; Vijayakumar et al., 2010). Kok and Ersoy (2009), for instance, noted that the domestic gross fixed capital formation as a percentage of GDP was the investment stock in the host nation and the obtainability of infrastructure.

Vijayakumar et al. (2010), at the same time had argued that in a transformation economy, enhancements in the investment environment facilitated the attraction of advanced FDI inflows. The advanced FDI inflows transformed into advanced gross capital formation which, in sequence, led to superior economic growth (Vijayakumar et al., 2010). Ojong et al. (2015) correspondingly researched the determinants of FDI inflows into Nigeria for the period from 1983 to 2013. Employing the ordinary least square model, Ojong et al. realized gross fixed capital formation, among other things, had an oblique but significant effect on FDI inflows into Nigeria. Awan et al. (2011) equally recognized a positive and significant connection between gross fixed capital formation and FDI inflows, in their research on the economic determinants of FDI inflows into Pakistan. Danish and Akram (2014) realized a similar result when they recognized that domestic gross fixed capita formation, inter alia, had a positive and significant effect on FDI inflows into Pakistan, in their research investigation on FDI inflows. In all, it appears the domestic factor of gross (fixed) capital formation is a significant macroeconomic determinant of FDI inflows.

3. Methodology

The methodology of the contemporary study is quantitative research with the application of secondary time series data. The methodology encompasses a few model specifications, and model estimation.

3.1. Model Specification.

The assumption of the contemporary research is that, FDI is a function of trade openness, gross fixed capital formation, inflation, GDP growth, interest rate, exchange rate, and that these macroeconomic elements together have long-run and short-run effects on FDI inflows into post-conflict Sierra Leone. Therefore, considering the given macroeconomic determinants of FDI inflows, conjecturing an external direct speculation methodology engenders the following FDI formulation:

$$FDI = f(Trade, GFCF, INF, GDPgrowth, IntRate, EXRate)$$

The preliminary econometric model is the log-log (Koojaroenprasit, 2013; Awan et al., 2011) autoregression design, to determine the long-run and short-run association between FDI inflows and the selected macroeconomic elements. The preliminary conversion of all the elements applied in the contemporary research into natural logarithm is striking, because it moderated the series values, and therefore sanctions the regression calculations to be less susceptible to outliers (Wooldridge, 2016). Therefore, the primary model specification for determining the long-run association among the selected macroeconomic elements is the Phillips-Ouliaris cointegration model, after Shin (1994). The cointegration analysis specifies assessing the econometric equivalence:

$$\Delta LFDI_t = \alpha_0 + \alpha_1 \Delta LTrade_{t-1} + \alpha_2 \Delta LGFCF_{t-2} + \cdots + \alpha_w \Delta zt\text{-}w + et \qquad (1)$$

where

$\Delta LFDI_t$ = changes in log *FDI* at time t; α_0 = a constant; $\Delta LTrade_{t-1}$ = changes in log *Trade* at time t; $\alpha_w \Delta zt\text{-}w$ = changes in the remaining log predictors at t times; et = error term. The *a priori* anticipation of the cointegration check unveils a long-term association between FDI and the

selected macroeconomic determinants. Furthermore, the *a priori* anticipation of the coefficient estimation for the individual elements in the long-run model includes the following:

$$\alpha_{Trade} > 0, \alpha_{GFCF} > 0, \alpha_{INF} < 0, \alpha_{GDPgrowth} > 0, \alpha_{IntRate} < 0, \alpha_{ExRate} > 0$$

Moreover, congruence with the Phillips-Ouliaris, including the Engle-Granger cointegration models, when elements are cointegrated, there must be an error correction model (ECM), which specifies the short-run obscured impulses or variations of the cointegrated elements in the direction of their equilibrium figures (Akhtar, Khan, & Hussain, 2013). Thus, adapting Wooldridge's (2016) methodology, the model description is a modest error correction model, and is appropriate in determining the short-run relationship between FDI inflows and its macroeconomic determinants:

$$\Delta m_t = \beta_0 + \beta_1 \Delta m_{t-1} + \delta_0 \Delta y_t + \delta_1 \Delta y_{t-1} + \lambda x_{t-1} + \varepsilon$$
(2)
$$= \beta_0 + \beta_1 \Delta m_{t-1} + \delta_0 \Delta y_t + \delta_1 \Delta y_{t-1} + \lambda(m_{t-1} - \beta y_{t-1}) + \varepsilon_t$$

where $E(\varepsilon_t|S_{t-1}) = 0$, and S_{t-1} have values within Δy_t, including all earlier statistics of y and m. Besides, the error correction term is $\lambda(m_{t-1} - \beta y_{t-1})$, and is purely an illustration of an error correction model (ECM). Like the cointegration model, the *a priori* anticipation of the error correction model unveils a short-run relationship between FDI inflows and its selected macroeconomic determinants. In addition, the coefficient estimation for the individual element within the ECM model has an equivalent *a priori* expectation as the cointegration model in Equation (1).

3.2. Model Estimation. The pertinent model practical in the contemporary research is the autoregression model. The use of the autoregression model is noteworthy due to the features of time series data, which regularly channel the existence of serial correlation in the series. The autoregression model appears to resolve the serial correlation problem through supplementing the regression model with an autoregressive configuration for the random error, thereby elucidating for the autocorrelation of the errors (Peiris, 2014; SAS, 2016). Moreover, due to the features of time series, it is crucial to assess the stationarity of the data by employing the Augmented Dickey Fuller (ADF), the Phillips-Perron (PP), and the Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) tests for unit root (Eita, 2012; Phillips & Perron, 1988; Kwiatkowski, Phillips, Schmidt, & Shin, 1992; Silvia, Iqbal, Bullard, Watt, & Swankoski, 2014; Woolridge, 2016) on each element prior to exploiting Equation (1). It is possible the regression outcome will conceivably be specious in the feasible incident the time series are not stationary (Akhtar et al., 2013). In this regard, differencing the data will rectify this problem.

Therefore, referencing Wooldridge (2016), the all-purpose ADF procedure appears to exemplify the following equation:

$$\Delta n_t = \beta_0 + \delta n_{t-1} + \vartheta_1 \Delta n_{t-1} + \varepsilon_t$$
(3)

where n = time series; t = time trend; Δ = first difference function; β_0 = constant; ε_t = error term; and, $|\vartheta_1| < 1$. After the argument by Wooldridge (2016), following this design, the null hypothesis, H_0: $\delta = 0$, $\{\Delta n_t\}$ seems to trace a stable $AR(1)$ model, whereas in the alternate hypothesis, H_1: $\delta < 0$, appears to specify that $\{n_t\}$ trace a stable $AR(2)$ model. Furthermore, the adding of p lags of Δn_t in Equation (3) is a preference, to clarify the nuances in the unit root

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process, and this complete arrangement of the Dickey-Fuller assessment is the ADF, because the lagged adjustments were amplified with the regression (Wooldridge, 2016), Δn_{t-p}. Supplementary to the ADF test are the PP, after Phillips and Perron (1988), and the KPSS, after Kwiatkowski et al. (1992) tests for stationarity. The ADF and PP tests share similar null-and-alternative hypotheses for unit root. The addition of the KPSS test was to augment the ADF and PP unit root tests, because both tests exhibited varied stationarity results at times. The KPSS test contrasted with the ADF and PP tests because of a dissimilar null hypothesis underscoring none unit root (stationary), while its alternate hypothesis accentuated a unit root (nonstationary).

Addition to the exploration of the long-run and short-run determinants of FDI inflows is the examination of a possible exogenous/endogenous shock, termed impulse response function, on FDI inflows and economic growth in post-conflict Sierra Leone, for the period under review. Dritsaki and Dritsaki (2012), for example, argued regarding the vector autoregression model (VAR) that, the impulse response function (IRF) described the impact that an unsystematic impulse shock had on the endogenous element of a VAR model. Typically, the expression of these shocks utilized the standard deviations of the disturbance terminologies (one or two standard deviations) (Dritsaki & Dritsaki, 2012). Thus, following Koop, Pesaran, and Potter (1996), a traditional IRF model appears to have the following equation:

$$IRF_k(m,\delta,\omega_{t-1}) = E[K_{t+m}|N_t = \delta, N_{t+1} = 0...., N_{t+k} = 0, \omega_{t-1}]$$
$$-E[K_{t+m}|N_t = 0, N_{t+1} = 0...., N_{t+k} = 0, \omega_{t-1}]$$

(4)

for $k = 1,2,3,....$

Koop et al. (1996) noted that the traditional IRF was the divergence between two distinct recognitions of K_{t+m} that were indistinguishable up to t-1. One recognition presumed that between t and $t+k$ the structure was knockout simply by a shock of magnitude δ at epoch t (i.e., $N_t = \delta$), whereas the second recognition, considered as the benchmark, presumed that the structure was not knockout by any shock between t and $t+k$.

4. Data

The data for the contemporary research are annual time series on the ideal macroeconomic elements, to determine FDI inflows into post-conflict Sierra Leone. The data comprise the gross domestic product growth rate, the inward flow of FDI stock, gross fixed capital formation, exchange rate, inflation, trade openness, and interest rate. The data exploration is for the period, 2002 to 2015. The period seems important in determining FDI inflows alongside the possible effect of a shock on FDI inflow and economic growth in the post-conflict Sierra Leone for the period under review.

The data sources for the contemporary research exploration include the United Nations Conference on Trade and Development (UNCTAD), and the World Development Indicators (WDI) of the World Bank. The UNCTAD is the primary source for the FDI and inflation elements. The essential operationalized element in the FDI variable is the net inward FDI stock measured in millions of current US dollars, converted into real FDI inflow by dividing FDI over the host country's consumer price index (CPI, 2005 = 100), following the methodology of Li, Liu, and

Jiang (2015). The inward FDI stock data increasingly shields the realization of flows in the host country-state, and are slightly unsteady than flows (Gwenhamo, 2011; Júlio, Pinheiro–Alves, & Tavares, 2013; Kerner & Lawrence, 2014). FDI is the dependent variable in the contemporary research. The relevant inflation (INF) determinant in the current research is the nation's average annual consumer price index (2005 index based), following a similar concept by Adeleke (2014). The WDI of the World Bank remains the data source for the macroeconomic elements of trade openness, gross fixed capital formation, gross domestic product growth rate, interest rate, and exchange rate.

The relevant trade openness (Trade) element is a measurement of the addition of export of goods and services and the import of goods and services as a percentage of GDP at market values, following parallel concepts by Gwenhamo (2011), and Kaur and Sharma (2013). The gross fixed capital formation (GFCF) applied in the contemporary research is the gross fixed capital formation as a percentage of GDP, ensuing an analogous application by Danish and Akram (2014), and Kok and Ersoy (2009). The gross domestic product growth rate (GDPgrowth) is obviously the real annual GDP growth rate, and appears as a proxy for economic growth in the current research. The application of the GDPgrowth is critical, to acquire real growth (Javed et al., 2014; Musonera et al., 2010). The real interest rate (IntRate) is the macroeconomic element applied in the contemporary research, following a similar application by Dua and Gard (2015). The real interest rate describes the nominal interest rate adjusted for inflation. The exchange rate (ExRate) determinant is the nation's real effective exchange rate, with the application of the 2010 CPI based index. Ezeoha and Cattaneo (2012), and Omodero and Ekwe (2017) similarly used the real exchange rate index in their research explorations on FDI.

Because the primary macroeconomic elements in the dataset are low frequency annual time series, transforming them into high frequency quarterly time series is significant, to embark on compressed and additional far-reaching short-range explorations (Pavia-Miralles, 2010), and policy evaluation in the contemporary research. Furthermore, transforming the complete macroeconomic elements applied in the contemporary research into natural logarithm is important, because it contracted the series of its values, and thus endorsed the regression estimates to become less susceptible to outliers (Wooldridge, 2016). In the contemporary research, some of the elements of interest have positive values, and the log transformation methodology is instantaneously applicable. However, some elements, including GDP growth and interest rate might encompass a few negative values, and log transformation is impossible for a negative value or 0 (Cowpertwait & Metcalfe, 2009; Osborne, 2002, 2008; Wooldridge, 2016). Given this, a mutual practice for negative numbers is the addition of a constant to the data, to guarantee all values are positive preceding the application of the log transform. Cowpertwait and Metcalfe (2009) had similarly suggested that taking the log of a negative value simply required the addition of a constant to the entire terms in the series, so that if $\{x_t\}$ was a series encompassing negative values, then adding c_o in such a way that $c_o > \max\{-x_t\}$, after which, taking logs generated a transformed series $\{\log(c_o + x_t)\}$ that was well-defined for all t.

5. Results

The primary objective of the contemporary research was the exploration of the long-run and short-run macroeconomic determinants of FDI inflows into post-conflict Sierra Leone. However, preceding the determination of a long-run association between FDI and its determinants, was the examination of whether the selected macroeconomic elements of interest exhibited stationarity, that is, whether the elements had unit roots. Silvia et al. (2014) had argued if elements had unit roots, or appeared in the *I*(1) level form, it advocated the practice of the cointegration models in lieu of the ordinary least square procedure. Therefore, the application of the ADF, PP, and KPSS tests were significant, to assess for unit roots. There was a preliminary differencing of the selected macroeconomic elements in their level forms, to resolve the issue of unit root, and the ADF unit root test, for instance, assumed the ensuing procedure:

$$\Delta n_t = \beta_0 + \delta n_{t-1} + \vartheta_1 \Delta n_{t-1} + \varepsilon_t$$

where *n* was the time series, *t* was the trend line, Δ was the first difference operator, β_0 was the constant, and e_t was the random error term. Table 1 is the results of the ADF, PP, and KPSS unit root results for the individual elements in the contemporary research after first difference, to establish their stationaries. The exceptions were the GDPgrowth and exchange rate elements, which endured second order differencing, to establish stationarity.

In Table 1, the ADF and PP findings encompassed the *Rho* and *Tau* columns, which offered the Ordinary Least Square *t*-values, and the equivalent *Pr<Rho* and Pr *< Tau* columns offered the probabilities associated with these *t*-values (Silvia et al., 2014). The *Rho* and *Tau* and their related probability levels offered the findings applied to reject or not to reject the presence of a unit root in the discrete elements of interest. The rejection level for the null hypothesis of a unit root for the ADF and PP tests was at *p* < .05 (Silvia et al., 2014). Simultaneously, Table 1 also shows the KPSS findings for the stationarity test. The *Eta* was the coefficient estimate for each element of interest and its associated probability level (*Pr > Eta*) utilized to reject the null hypothesis at the 5% rejection level. Distinctive from the ADF and PP tests, the KPSS null hypothesis for the unit root test advocates the element is stationary. A rejection of the null hypothesis is an indication the macroeconomic element is none-stationary. In Table 1, all the selected parameters were in their first difference with the exception of GDP and exchange rate, which endured second order differencing to establish stationarity.

Table 1

ADF, PP, and KPSS Unit Root (Stationarity) Tests

Parameter	ADF				PP				KPSS	
	Rho	Pr < Rho	Tau	Pr < Tau	Rho	Pr < Rho	Tau	Pr < Tau	Eta	Pr > Eta
ΔLFDI	-18.220	0.011	-2.528	0.115	-13.264	0.048	-2.639	0.091	0.125	0.477
ΔLTrade	-0.494	0.924	-0.079	0.946	-9.711	0.027	-2.263	0.024	0.160	0.363
ΔLGFCF	-63.030	0.000	-3.580	0.009	-12.157	0.013	-2.498	0.013	0.072	0.738
ΔLInfla	-13.531	0.044	-3.399	0.015	-16.076	0.021	-3.848	0.004	0.149	0.392
ΔΔLGDPgrowth	-30.125	0.000	1.896	1.000	80.151	1.000	5.933	1.000	0.405	0.070
ΔLIntRate	-25.912	0.001	3.028	1.000	21.550	1.000	1.063	0.997	0.233	0.212
ΔΔLExRate	-19.563	0.007	-2.655	0.089	-14.446	0.034	-2.651	0.089	0.115	0.517

According to the table, the ADF rejection of a unit root for the FDI element (ΔLFDI), for

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example, was statistically significant for the *Rho* test (*Rho* = -18.220, *p* = .011), and was complemented by the KPSS findings (*Eta* = .125, *p* =.477) of no unit root in the FDI element. Consequently, the ADF and KPSS unit root tests established the FDI element at first difference was stationary.

Similarly, in Table 1, the PP rejection of a unit root in the trade openness (ΔLTrade) element at first difference was statistically significant for both *Rho* and *Tau* (*Rho* = -9.711, *p* = .027; *Tau* = -2.263, *p* = .024). This was complemented by the KPSS stationarity test results of no unit root on trade openness (*Eta* = .160, *p* = .363). Therefore, the PP and KPSS tests confirmed that trade openness was stationary at first difference at the given *p* <.05. In addition, the table shows the totality of the ADF unit root test results on gross fixed capital formation (ΔLGFCF) (*Rho* = -63.030, *p* = .000; *Tau* = -3.580, *p* = .009), including the PP (*Rho* = -12.157, *p* = .013; *Tau* = -2.498, *p* = .013), and the KPSS (*Eta* = .072, *p* = .738) test results were statistically significant. The results indicated the macroeconomic gross fixed capital formation element was stationary in its first difference. The same was true for the inflation (ΔLInfla) element, which showed the totality of the ADF unit root test results (*Rho* = -13.531, *p* = .044; *Tau* = -3.399, *p* = .015), including the PP (*Rho* = -16.076, *p* = .021; *Tau* = -3.848, *p* = .004), and the KPSS (*Eta* = .149, *p* = .392) test results were statistically significant. The results indicated the inflation element was stationary at first difference.

Table 1 equally reveals the ADP, PP, and KPSS unit root test results for the GDPgrowth macroeconomic element. The element endured second order differencing to attain stationarity. Thus, from the table, the ADF rejection of a unit root for the GDPgrowth (ΔΔLGDPgrowth) was statistically significant for the *Rho* test (*Rho* = -30.125, *p* = .000), which was supplemented by the KPSS findings (*Eta* = .405, *p* =.070) of no unit root in the GDPgrowth variable. Consequently, the ADF and KPSS unit root tests confirmed the GDPgrowth element was stationary in its second order differencing. Also true from Table 1 is the realization that, the ADF rejection of a unit root for interest rate (ΔLIntRate) was statistically significant for the *Rho* test (*Rho* = 25.912, *p* = .001), which was supplemented by the KPSS findings (*Eta* = .233, *p* =.212) of no unit root in the interest rate element. Accordingly, the ADF and KPSS unit root tests established that the interest rate variable at first difference was stationary. With regards to exchange rate, the variable endured second order differencing to achieve stationarity. Thus, in Table 1, the ADF rejection of a unit root for the interest rate element (ΔΔLExRate) was statistically significant for the *Rho* test (*Rho* = -19.563, *p* = .007). The PP rejection of a unit root in the interest rate element was also statistically significant for the *Rho* test (*Rho* = -14.446, *p* = .034), including the KPSS null hypothesis test of no unit root in the exchange rate variable (*Eta* = .115, *p* = .517). In total, the ADF, PP, and KPSS unit root tests confirmed that the exchange rate element was stationary at second order differencing.

The succeeding segment is the analysis of the long-run causal relationship among the selected macroeconomic elements, applying the Phillips-Ouliaris (PO) cointegration procedure. The long-run relationship is a cointegration estimation, and the null hypothesis for the PO cointegration test specifies no cointegrating relationship between FDI inflows and its determinants. The alternative hypothesis points to at least one cointegrating relationship between FDI inflows and its determinants. The initial differencing of the selected

macroeconomic elements helped perfect the unit root preceding the examination of the long-run relationship among the variables. This is in addition to the realization that, the inclusion of two lags maximal on the autoregression procedure seemed noteworthy, which is consistent with the Akaike Information Criterion (AIC) endorsing two lags model (Goh & Wong, 2011). Tables 2 and 3 disclose the PO cointegration test findings, with the application of the autoregression procedure with two lags. In Table 2, the *Rho p*-value for the PO cointegration test was -17.0637, while the *Tau p*-value was -2.9964. When these values were compared with the PO cointegration test standard critical values (*p* = .05) accessible in Falk et al. (2012), the *Rho* (-17.0637), and *Tau* (-2.9964) statistics in Table 2 were lower than the test standard critical values for the *Rho* (-15.64), and *Tau* (-2.76) statistics at the 5% level of significance.

Table 2

Phillips-Ouliaris Cointegration Test

Lags	Rho	Tau
2	-17.0637	-2.9964

Therefore, the rejection of the null hypothesis of no cointegration relationship between FDI and its determining macroeconomic elements was complete for the *Rho* and *Tau* statistical test results, demonstrating that, at least, one determinant had a long-run relationship with FDI.

Table 3 contains the parameter estimates and the *t*-values of the specific elements in the PO cointegration model, alongside its ordinary least square regression estimates. The long-run parameter estimations of the PO cointegration assessment after differencing embraced the top part of Table 3. According to the table, trade openness (DTrade), for instance, had a positive long-run relationship with FDI inflows, which was significant (β_{DTrade} = 1.1673, *SE* = .3977, *t* = 2.93, *p* = 0051). Specifically, holding the remaining macroeconomic elements constant, a one-unit increase in trade openness resulted in approximately 1.17% upsurge in FDI inflows in the long-run, for the period under review. Similarly, the gross fixed capital formation

Table 3

The Phillips-Ouliaris Cointegration Coefficient Result Estimates

 Parameter Estimates

Variable	DF	Estimate	SE	t Value	Approx Pr > |t|
Intercept	1	.0008	.0568	.01	.9884
DTrade	1	1.1673	.3977	2.93	.0051
DGFCF	1	.3848	.1462	2.63	.0114
DInfla	1	-.5511	2.0931	-.26	.7935
DGDPgrowth2	1	-1.3630	.4929	-2.77	.0081
DIntRate	1	.5273	.1872	2.82	.0071
DExRate2	1	3.5176	2.6200	134	.1859

Parameter Estimates

Variable	DF	Estimate	SE	t Value	Approx Pr > |t|
	SSE	.575			
	MSE	.012			
Root MSE		.111			
	SBC	-64.154			
	AIC	-78.077			
Reg. R-square		.357			
Tot. R-square		.357			

(DGFCF) element had a positive and significant long-run relationship with the FDI inflow (β_{DGFCF} = .3848, *SE* = .1462, *t* = 2.63, *p* = .0114). This essentially implied, holding the supplementary variables in the model constant, a one-unit upsurge in the gross fixed capital formation caused an increase of about .38% FDI inflows into post-conflict Sierra Leone in the long-run, for the sampled period in examination. Meanwhile, Table 3 also revealed the inflation (DInfla) element, for example, had a negative long-run relationship with FDI, but this association was insignificant (β_{DInfla} = -.5511, *SE* = 2.0931, *t* = -.26 *p* = .7935). The GDP growth variable (DGDPgrowth2) had a negative but significant long-run relationship with FDI ($\beta_{DGDPgrowth2}$ = -1.3630, *SE* = .4929, *t* = -2.77 *p* = .0081), for the sampled period under review. Essentially, holding all other elements in the model constant, a one-unit increase in the GDP growth caused about -1.36% reduction in the inflow of FDI into post-conflict Sierra Leone in the long-run, for the period under examination. Correspondingly, the real interest rate (DIntRate) element in Table 3, showed a positive and significant long-run relationship with FDI inflows ($\beta_{DintRate}$ = .5273, *SE* = .1872, *t* = 2.82, *p* = .0071). In addition, the real exchange rate (DExRate2) had a positive but insignificant long-run relationship with FDI inflows ($\beta_{DExRate2}$ = 3.5176, *SE* = 2.6200, *t* = 1.34 *p* = .1859), for the period under review.

However, time series occasionally diverge from this long-run association to short-term dynamics. Therefore, the succeeding objective is the exploration of whether the departure from the long-run relationship is statistically significant, among other things. Consequently, the Error Correction Model (ECM) was appropriate in determining the conceivable short-run dynamics with the given *p*-value for the *null hypothesis* set at .05. Table 4 exhibits the findings of the ECM test. The top segment of the table is the coefficient estimates of the ECM procedure. Concerning the short-run dynamics, the regression coefficient estimates of the ECM model for the FDI inflows in Table 4 had many notable features. The lerrorECM element in the table is the lag of the residual ECM independent element included in the regression model, to evaluate the short-run dynamics. The coefficient value of errorECM was negative, as anticipated (Bari, 2013; Gwenhamo, 2011; Oladipo, 2010; Victor, 2013), and recognized the existence of a cointegrating association between the dependent variable and its determinants (Bari, 2013; Gwenhamo, 2011; Ismaila & Imoughele, 2015). Furthermore, the negative lerrorECM simply indicated how speedy was the restoration of the equilibrium once

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the ECM model endured disequilibrium (Ahmed & Pulok, 2013). Nevertheless, the coefficient approximation of the lerrorECM showed the short-run deviation from the long-run was statistically insignificant, signifying the change in the direction of equilibrium happened in the same reviewed period. This appeared to have compatibility with Ahmed and Pulok's (2013) conjecture that, when the ECM coefficient was insignificant, it inferred the adjustment ensued in the same period. Thus, the coefficient estimation of lerrorECM (-.1542) in Table 4 essentially deduced that, following the model's divergence from its equilibrium, it adjusted approximately 15% in the same reviewed period.

Additionally, a few of the macroeconomic elements in Table 4 had the expected coefficient estimation symbols, which is consistent with the findings of the cointegration model in Table 2. Trade openness (DTrade) (β_{DTrade}= 1.2068, *SE* = .3882, *t* = 3.11, *p* = .0032), for example, had a positive and significant relationship with FDI inflows in the short-term, which is consistent with its long-term relationship with FDI inflows. This essentially signified a one-unit increase in trade openness, for example, caused about 1.21% increase in FDI inflows into post-conflict Sierra Leone in the short-term, presumably in the twelfth quarter of the sampled period, assuming all other variables remained constant.

Similarly, real GDP (DGDPgrowth2) ($\beta_{DGDPgrowth2}$ = -1.4886, *SE* = .4850, *t* = -3.07, *p* = .00036) had a negative but significant association with FDI inflows in the short-term, which is also consistent with its long-term association with FDI inflows. Therefore, holding all other predictors constant, a one-unit upsurge in real GDP resulted in about 1.49% reduction in the inflow of FDI in the short-run. Likewise, the real interest rate (DIntRate) ($\beta_{DIntRate}$ = .5843, *SE* = .1849, *t* = 3.16, *p* < .0036) had a positive and significant relationship with FDI inflows in the short-term, which is consistent with its long-term relationship with FDI inflows.

However, gross fixed capital formation (DGFCF) (β_{DGFCF} = .1629, *SE* = .1855 *t* = .88, *p* = .3844), inflation (DInfla) ($\beta_{DIInfla}$ = .5661, *SE* = 2.1255, *t* = .27, *p* = .7912), and real exchange rate (DExRate2) ($\beta_{DExRate2}$ = 4.0946, *SE* = 2.5718, *t* = 1.59, *p* = .1182) individually had positive but insignificant relationships with FDI inflows in the short-run. The inflation element had a negative but insignificant relationship with FDI inflows in the long-run, which is inconsistent with its short-term dynamics. Also, inconsistent with the short-term dynamics is the positive and significant long-run relationship between the gross fixed capital formation element and the inflow of FDI into post-conflict Sierra Leone.

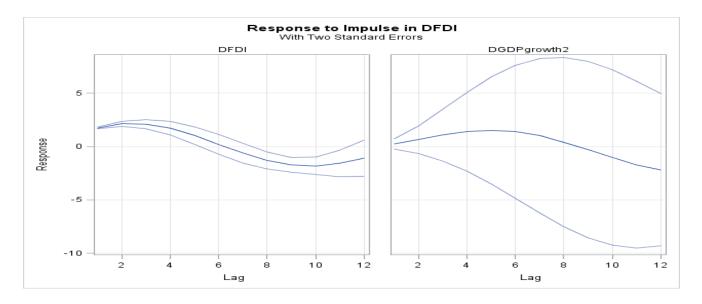Table 4
The Result Estimates of Autoreg Procedure of ECM

Parameter Estimates

Variable	DF	Estimate	SE	t Value	Approx Pr > |t|
Intercept	1	-.0309	.0579	-.53	.5966
DTrade	1	1.2068	.3882	3.11	.0032
DGFCF	1	.1629	.1855	.88	.3844
DInfla	1	.5661	2.1255	.27	.7912
DGDPgrowth 2	1	-1.4886	.4850	-3.07	.0036
DIntRate	1	.5843	.1849	3.16	.0028
DExRate2	1	4.0946	2.5718	1.59	.1182
lerrorECM	1	-.1542	.0825	-1.87	.0680
	SSE	.534			
	MSE	.012			
Root MSE		.108			
	SBC	-64.117			
	AIC	-80.029			
Reg. R-square		.403			
Tot. R-square		.403			

The bottom-half of Table 4 is the Ordinary Least Square (OLS) approximations of the autoregressive procedure of the ECM. The table had a number of OLS estimates (*SSE* = .534, *MSE* = .012, *Root MSE* = .108; *SBC* = -64.117, *AIC* = -80.029, *Reg. R^2* = .403, *Tot. R^2* = .403), which were significant in evaluating the goodness-of-fit of the model. For instance, the *SSE* was the sum of square error, and the *MSE* was the mean square error. The *Root MSE* exhibited the mean deviation of the projected FDI inflows from the concrete FDI inflows (the dependent macroeconomic element). The R^2 estimates (for both Total and Regress) of .403 were striking, indicating the independent variables in the regression model explained about 40.3% of variances in the dependent variable. Ultimately, the PO ECM tests established the presence of a short-run deviation from its long-run even when this was statistically insignificant, an indication the change in the direction of equilibrium happened in the current period under review.

The ensuing segment is the impulse response function of a shock to FDI, and the subsequent responses in FDI and GDP. Figure 1 is the impulse response of the short-and-long-run effects on FDI of a shock to FDI; and, the effects on GDP growth of a shock to FDI.
Figure 1
Response to Impulse in FDI

Response to Impulse in DFDI
With Two Standard Errors

According to Figure 1, the effect on FDI inflow of a shock to FDI (left diagram) with two standard deviations was positive in the short-run up to the sixth period. In the long-run, the impact on FDI inflow of a shock to FDI was negative beginning from the seventh period and up to the twelfth period. Similarly, in Figure 1, the impact on GDP growth of a shock to FDI (right diagram) with two standard deviations was positive in the short-run up to the sixth period; partially positive in the long-run up to the eighth period; and, completely negative in the long-run from the ninth period, and up to the twelfth period.

6. Analysis of Results

The chief focus of the contemporary research is the macroeconomic determinants of FDI inflow into post-conflict Sierra Leone, in addition to the possibility of a shock on FDI and GDP growth. The comprehensive findings of the recognized models, to investigate the macroeconomic determinants of FDI inflows exhibit the presence of a relationship between FDI and its determinants, including trade openness, gross fixed capital formation, and real GDP, among others, as anticipated. This seems consistent with the model specification of the contemporary research.

The consistency of the research finding with the model specification and the literature becomes more apparent in the cointegration results of Tables 2 and 3. The PO cointegration test presented in Table 2 indicated at least one determinant had a long-run association with FDI inflows. This essentially implies the presence of a long-run relationship among the selected variables of interest. Table 3 is the fractional findings regarding the conceivable long-run association between FDI inflows and its determinants in their first and second order differences. The PO cointegration model, utilized to study the long-run association, confirms there is at least one cointegration relationship between FDI inflows and its determinants. The inference here is the suggestion that, the selected elements shared a conjoint stochastic trend, and will advance proportionally. The results are consistent with the model's specification of the presence of cointegration among the selected elements. The results are similarly consistent

with some of the cointegration findings in the literature (Bekana, 2016; Dinda, 2014; Gwenhamo, 2011; Okurut et al., 2012). Furthermore, Table 3 also presents that the contemporaneous trade openness (DTrade), gross fixed capital formation (DGFCF), and real interest rate (DIntRate) separately hold positive and significant long-run relationships with FDI inflows. The findings on trade openness and gross fixed capital formation are consistent with the *a priori* expectation of a positive association among FDI, trade openness, and gross fixed capital formation. A 1% upsurge in trade openness, for example, creates an increase of about 1.17% of FDI inflows into post-conflict Sierra Leone in the long-term. This is consistent with similar findings in the literature (Babatunde, 2011; Okurut et al., 2012; Owusu-Antwi, 2013). The probable inference from this is the impulse that, the majority of FDI stakeholders in Sierra Leone are non-marketing pursuant and inclined to utilize the end-point as an export bastion. Dunning (1988, 2001) even argued that, most FDI inflows into developing nations were to natural resource mining segments and thus favored additional openness.

Similarly, a 1% increase in the contemporaneous gross fixed capital formation, for example, results in an increase of about .38% of FDI inflows into post-conflict Sierra Leone in the long-run. This is consistent with related findings in the literature (Awan et al., 2011; Chakraborty & Mukherjee, 2012). Thus, gross fixed capital formation is a significant long-run determinant of FDI inflows into Sierra Leone. In contrast, the finding on the real interest rate is inconsistent with the *a priori* expectation of a negative association between FDI and interest rate. In Table 3, a 1% increase in the contemporaneous real interest rate, for example, results in an increase of about .52% FDI inflows into Sierra Leone, for the period under review. The finding illustrates the real interest rate has a positive and significant impact on FDI inflows. It is possible the interest rate on investment in post-conflict Sierra Leone for the period under study was high, and because stakeholders frequently direct their funds from low interest rates to high interest rates, to take hold of a possible high yield on their investments, this is anticipated to upsurge FDI inflows. The argument is consistent with those of Anna et al. (2012), Singhania et al. (2011), and Siddiqui and Aumeboonsuke (2014) who noted that since high interest rates often delivered inducements to overseas financiers in search of higher earnings, therefore, high interest rates can make possible increased FDI inflows.

However, the contemporaneous real GDP growth (DGDPgrowth2) result in Table 3 has a negative and significant association with FDI inflows in the long-run. The result is inconsistent with the *a priori* expectation of a positive association between FDI and real GDP growth. A 1% increase in the real GDP growth, for example, causes a reduction of about 1.36% of FDI inflows into post-conflict Sierra Leone in the long-run. The result is consistent with comparable findings in the literature (Aitken, Hansen, & Harrison, 1997; Okurut et al., 2012). The plausible extrapolation from this is the compulsion that, the majority of FDI stakeholders in Sierra Leone are non-marketing pursuant and inclined to employ the end-point as an export bastion. Okurut et al. (2012) also said the majority of FDI inflows into developing nations were to natural resource extractions, and non-marketing, and therefore, FDI and GDP often had a negative relationship. Meanwhile, in Table 3, the contemporaneous inflation (DInfla) element has a negative but insignificant relationship with FDI inflows, which is consistent with the *a priori* expectation of a negative association with FDI, even when the association is irrelevant. The

result is, however, consistent with the findings of Niazi et al. (2011), and Koojaroenprasit (2013). This essentially means inflation is not a significant determinant of FDI inflows into post-conflict Sierra Leone. Additionally, the contemporaneous real exchange rate (ExRate2) has a positive (consistent with the *a priori* expectation) but insignificant long-run association with FDI inflows. Chakrabarti (2001) noted a stable real exchange rate had a positive association with FDI inflows. Given this, Sierra Leone appears to have a stable real exchange rate in its post-conflict years, but this is not a significant factor in inducing FDI inflows. This result is consistent with the findings of Bay and Sharma (2017) who similarly realized the real exchange rate had insignificant impact on FDI inflows into India.

Following the presence of a cointegration relationship between FDI inflows and its determinants, it seems obvious time series periodically deviate from this long-term association to short-run undercurrents. Thus, Table 4 is the results of the short-run dynamic of the association between the coefficient estimations of FDI inflows and the selected determinants in the current research, utilizing the ECM methodology. The findings in Table 4 reveal the coefficient estimate of the lagged error expression, lerrorECM, is negative, as projected (Bari, 2013; Gwenhamo, 2011; Oladipo, 2010; Victor, 2013), and endorses the existence of a cointegration relationship between FDI inflows and its determinants (Bari, 2013; Gwenhamo, 2011; Ismaila & Imoughele, 2015). Moreover, the negative lerrorECM simply indicated how speedy was the restoration of the equilibrium once the ECM model endured disequilibrium (Ahmed & Pulok, 2013). Nevertheless, the coefficient approximation of the lerrorECM notes the short-run deviation from the long-term is statistically insignificant, suggesting the change in the direction of equilibrium transpires in the same period under review. This appeared to have compatibility with Ahmed and Pulok's (2013) conjecture when they noted that, when the ECM coefficient was insignificant, it inferred the adjustment ensued in the same period. Therefore, the coefficient estimation of lerrorECM (-.1542) in Table 4 principally indicates that, following the model's divergence from its equilibrium, it adjusts at approximately 15% in the same reviewed period.

Table 4 also reveals that, trade openness (DTrade), and the real interest rate (DIntRate) determinants have positive and significant short-run associations with FDI inflows. This is consistent with the cointegration model in Table 3, where identical elements had positive and significant long-term associations with FDI inflows. This principally infers the determinants positively influence the inflow of FDI into Sierra Leone, even in the short-run. Concurrently, the real GDP growth (DGDPgrowth2) determinant in Table 4 holds a negative and significant relationship with the inflow of FDI in the short-run. This essentially suggests that, the real growth rate has a negative and significant impact on the inflow of FDI into Sierra Leone in the short-run. The short-run real GDP growth effect, for example, is consistent with the cointegration model in Table 3, which similarly had a negative and significant effect on FDI inflows into Sierra Leone in the long-run. However, the results on gross fixed capital formation (DFCF), inflation (DInfla), and the real exchange rate (DExRate2) individually hold positive but insignificant relationships with FDI inflows into Sierra Leone in the short-run. For instance, there was price stability and an absence of exchange rate volatility in Sierra Leone in the short-run, hence the positive associations among FDI, inflation, and real exchange rate, though these

associations are insignificant. In contrast, post-conflict Sierra Leone experienced price instability in the long-run (see Table 3), for example, though this had no impact on FDI inflows. In addition, the gross fixed capital formation has a positive and significant impact on FDI inflows in the long-run. Furthermore, Table 4 also shows the R^2 estimates (for both Total and Regress) of .403 were striking, indicating the independent variables in the regression model explained about 40.3% of variances in the dependent variable. These estimates seem moderate, even as the explanatory power of the R^2 is questionable (Moksony, 1990) in addition to the realization that, the robust stationarized dependent element (FDI inflows) supplemented these moderate estimates. The moderate R^2 estimates are consistent with similar findings in the literature (Anderson & Reeb, 2003; Crenshaw & Robinson, 2010; Eregha, 2015; Okafor, 2015). Crenshaw and Robinson (2010) had similarly noted there was the tendency of large-N studies to produce smaller-than-anticipated R^2 statistics.

Figure 1 of the current research is the impulse response effect on FDI inflow of a shock to FDI (left diagram). The effect with two standard deviations is positive in the short-run up to the sixth period. Siddiqui and Aumeboonsuke (2014), in their research on interest rate and FDI in five ASEAN economies, similarly realized concerning Indonesia that, the positive shock to FDI inflows had only short-run progressive effect on FDI. In Sierra Leone, however, in the long-run, the impact on FDI inflow of a shock to FDI appears negative, which begins in the seventh period and extend as far as the twelfth period. This result is hardly surprising, since Sierra Leone recently experienced the Ebola epidemic (2014 – 2015). The epidemic caused an exogenous shock to FDI inflows, which subsequently enhanced multinational flights away from the country, thus creating the negative effect on FDI in the long-run. Ilgun, Koch, and Orhan (2010) also noted a similar negative long-run effect on FDI of a shock to FDI regarding the Turkish economy. The negative impact was additionally prominent in the sixth to the ninth period, though this levelled off at zero in the tenth period. Moreover, for Sierra Leone, the shock to FDI further has a negative effect on GDP in the long-run, though this effect begins in the ninth period and runs through the twelfth period under review. The shock to FDI and its impact on the GDP is probably a derivation of the multinational flights away from Sierra Leone because of the recent Ebola epidemic in the country. Ilgun, Koch, and Orhan (2010) also showed a similar trend in the Turkish economy, where the GDP had a negative long-run respond to a shock to FDI, particularly in the seventh to the tenth period.

7. Conclusion

The purpose of the contemporary research was the macroeconomic determinants of FDI inflows and the possibility of an impulse response function in post-conflict Sierra Leone, with the application of selective macroeconomic elements. The designated elements were time series, and the primary econometric model was the log-log autoregression. There was a preliminary test for unit root on the selected elements, and a subsequent differencing of the elements to correct for possible unit root. Table 1 is the findings of the unit root test, which indicated a complete stationarity of all the selected elements applied in the current research. Tables 2 and 3 are the findings on the long-run association between FDI inflows and the selected determinants. Following the correction for unit root and the use of the cointegration

model, the results noted that, at least, one determinant had a long-run association with the inflows of FDI. This essentially established the *a priori* postulation of a long-term association between FDI and the selected macroeconomic determinants. Furthermore, Table 3 revealed that trade openness, gross fixed capital formation, and real interest rate exclusively had positive and significant long-run associations with FDI inflows, a suggestion that long-run flow and growth will persevere with the augmentation of these determinants. Therefore, trade openness, gross fixed capital formation, and real interest rate are the positive and significant long-term macroeconomic determinants of FDI inflows into post-conflict Sierra Leone, an essential objective of the contemporary research. These macroeconomic elements are, therefore, good predictors of FDI inflows into Sierra Leone. The result also underpins the significance of the international trade, the internalization, and the electric paradigm theories of trade openness in enhancing FDI inflows.

Nevertheless, in the short-run, subsequent to the deviation of the model from its long-run equilibrium, it adjusted by approximately 15% in the same reviewed period. Additionally, trade openness, and real exchange rate had positive and significant short-run associations with FDI inflows. Thus, trade openness and real exchange rate are equally significant determinants of the short-run FDI inflows into Sierra Leone. The research also noted a shock to FDI had a positive effect on FDI in the short-term, and a negative effect on FDI inflows in the long-run. The long-run negative effect on FDI inflow of a shock to FDI is hardly surprising, because Sierra Leone recently experienced the Ebola epidemic, which lasted from 2014 to 2016. The epidemic caused an exogenous shock to FDI inflows, which successively enhanced multinational flights away from the country, creating a double shock to FDI and a negative effect on FDI in the long-run. For the same reason, the impact on GDP of a shock to FDI was positive in the short-term, but had a negative effect on GDP in the long-term. Given this analysis, the ensuing are the endorsing policies for a conceivable sustainable FDI inflows and growth in Sierra Leone:

- Trade openness, gross fixed capital formation, and real interest rate had positive and significant associations with the inflows of FDI. Consequently, policy architects in Sierra Leone should stimulate policies that would tolerate these macroeconomic determinants, by utilizing development configuration and supportable policies to induce enhanced FDI, to stimulate growth.
- Add to this, Sierra Leone policy developers should stimulate policies to appeal to supplementary multinationals into the country, to capture practical labor at cost-effective rate, to expand the country's employment rate.
- The stimulation of policies, including business tax breaks, among others, is significant, to enlarge the opportunity of foreign investment in Sierra Leone, which can enhance business and development because these hold an overflow impact on economic achievement.
- The real interest rate had a positive and significant relationship with FDI inflows. Anna (2012), Singhania (2011), and Siddiqui and Aumeboonsuke (2014) had noted that high interest rates often delivered inducements to overseas financiers in search of higher earnings and, therefore, high interest rates can make possible increased FDI inflows. Consequently, the prompting of monetary policies to

embrace high interest rate on investments may encourage supplementary multinational investments, which may enhance the flow of FDI into Sierra Leone.

- Trade openness in the contemporary research was positive and significant in both the long-and short-run models. It appears conceivably that global trade upsurge multinational investments and trade across nations. Therefore, policy developers in Sierra Leone should engender policies to endorse global trade by reducing the tariff rates, for instance, to encourage additional trade and investment.

- The gross fixed capital formation was a positive and significant macroeconomic determinant of FDI Inflows into Sierra Leone in the short-term, but not in the long-term. The gross fixed capital formation is essentially the gross domestic fixed investment in land improvements, plants, machinery, and the construction of roads, among others. These are essential in augmenting multinational investments and economic growth. Therefore, policy makers in Sierra Leone should engender policies to enhance domestic investments in roads and rails, for instance, to encourage increased multinational trade and investment.

- The findings also noted the effect on GDP growth of a shock to FDI was negative in the long-run. The shock to FDI was probably the result of the Ebola epidemic experienced in the country at the time, which enhanced the flight of multinational investments away from the country, thus creating a double shock to the economy. Therefore, Sierra Leone policy makers should engender policies to improve the health and human resources of its population, to augment growth through domestic and multinational investments.

Despite the recommended policies, the research is not without its limitations. In general, the research was restricted to merely 14 post-conflict years (2002-2015), which may provide insufficiency in recognizing the comprehensive determinants of FDI inflows. Nevertheless, succeeding research considerations must embrace supplementary years and complementary macroeconomic elements, to realize their far-reaching effects on FDI inflows. In addition, there was the realization of the impulse response effect on FDI inflow and GDP of a shock to FDI in the current research, without any similar realization of the impulse response effect on FDI inflows of a shock to GDP. Even with these confines, the research exploration was robust and decisive. It facilitated the closure of the inadequate information gap in the current literature regarding the macroeconomic determinants of FDI inflows into post-conflict Sierra Leone with theoretical and empirical substructures. The findings also had applied insinuations for administrators, policy makers, and investors. In closing, the results achieved will complement a different knowledge of a country-specific contemporary research on the macroeconomic determinants of FDI inflows with applied econometrics realities.

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