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Foreign Direct Investment and Economic Growth Evidence from Sri Lanka

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Abstract

This paper discusses the link between Foreign Direct Investment (FDI) and the economic growth of Sri Lanka together with, national investment, labour, trade openness, and university graduation in Sri Lanka from 1980 to 2016. The study confirms that there is a significant long-run association between real variables such as, Gross Domestic Product (GDP), national investment, employment, and trade with FDI and the short run co-efficient of FDI has also reported a level of significance. The model also indicates that, FDI can positively affect national investment, and employment but negatively affect trade. The reported model forecasts that the historical trend of low level of growth for FDI is expected to stay unchanged over the next few years. FDI may act as an important element to accelerate the economic development of Sri Lanka. Policy formulation should aim at improvements to the infrastructure, wider scope for gaining FDI spill-overs to domestic production, domestic labour market and encourage import substitute for FDI.

Key Words: *FDI, Economic growth, Vector Error Correction, Sri Lanka*

JEL Classification: *C2; E2; F4*

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1. Introduction

Capital is the most important factor of production in any economy. Capital accumulation can be through domestic sources as well as through foreign sources. FDI and foreign loans can create capital, which are foreign sources. However, FDI has manifold features which make it more preferable to other sources of capital such as foreign debt. These favourable features include, bundled benefits such as the ability of accessing international markets, production enhancement, technological expertise, creation of employment opportunities with superior managerial skills, support on gap filling of the country's savings-investment, and easing foreign exchange limitations. These in turn stimulate the economic growth in host countries.

FDI can be defined as "the net inflows of investment to acquire a lasting management interest (10 per cent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balances of payments."[2]

Apart from the favourable effects of FDI, there are negative impacts as well. FDI can adversely affect the balance of payment. If imports rise with the FDI inflow (import goods as project material, etc), that may lead to loss of domestic productivity advantage. Foreign firms are specialised in technology and it is possible that they capture the opportunities faster than local investors, especially in developing countries. Such opportunities lost will in the long term have adverse effects for local investments and development of a country, as imperfect competition might even force the local investors to exit the market (Ghazali, 2010).

A steady state represents the long run equilibrium of the economy (Mankiw, 2010). Countries below the level of steady state have high growth potential. Developing countries usually possess a level of capital below the steady state. Countries near or at the steady state, therefore, have no motivation to invest in their own country but seek investment opportunities in

[2] World Bank (2017, TCdata360)
http://tcdata360.worldbank.org/indicators/BX.KLT.DINV.WD.GD.ZS?country=GBR&indicator=1541&viz=line_chart&years=1970,2016

developing countries who are below the steady state level. Therefore, investing in countries like Sri Lanka could be attractive to foreign investors and such capital accumulation can lead the country towards growth and reach the long run equilibrium. This concept is analysed in the study done by Blomsrtom, Lipsey and Zejan, (1992). They claim that when compared to the United States if the initial per capita income is lower for a developing nation, they can have faster growth subsequently. They further state that the inflow of FDI has a significant positive impact on the income growth of developing countries and faster growth can be achieved, by countries which are already at a somewhat high level of development but not the very poor countries.

Sri Lanka is a middle-income country with a per capita GDP of USD 3,886 (2016) and a literacy rate of average 92.4 per cent (2016). Therefore, theoretically, Sri Lanka should have the potential of attracting FDI and using FDI as a source of economic growth.

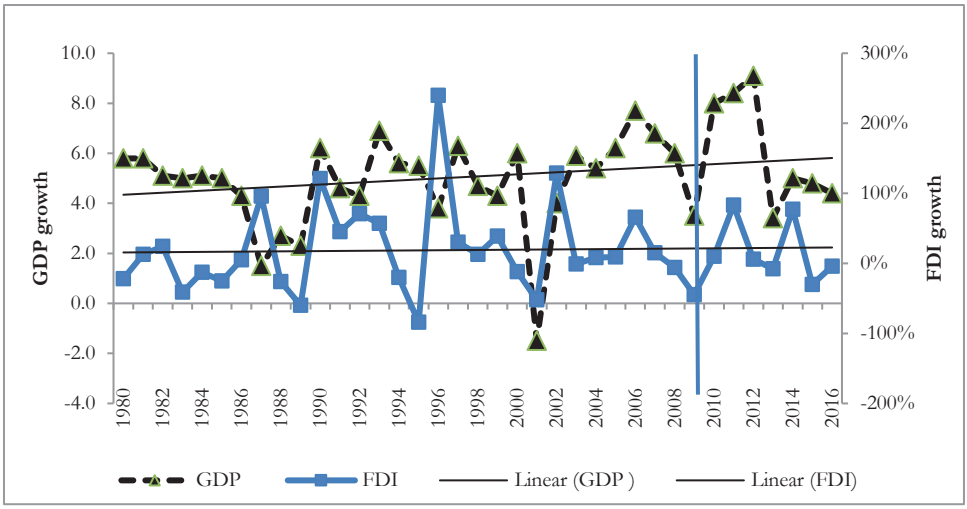
In 2016, 35 per cent of government recurrent expenditure was debt interest payment, which is the biggest portion of recurrent expenditure. Increasing public debt has adverse economic impacts such as high interest rates, collapsing of the domestic currency, tax burdens on the public and finally may threaten the sustainability of the economy. For Sri Lanka, therefore, there is an extreme need of an alternative way of attracting capital to the country, other than debt. FDI is the best alternative, given the government can reap the benefits of it by correctly articulating policies.

In the Sri Lankan context, during the period of post-independence and pre-economic liberalization, that is from 1948 to 1977 there were some attempts to implement policies to attract FDI to the country. With the identification of market oriented economic policies as the most beneficial for the growth, economists and politicians made it their policy priorities to create an FDI friendly economic environment in the late 1970s. Accordingly, with the regime change in 1977, the Foreign Investment Act 1978 was established in order to provide policy guidance in attracting more FDI to the country. Since then almost all successive governments and policy makers have supported market liberalisation and continued to relax trade and foreign exchange policies (Athukorala, 2003 as cited in Board of Investment Report 2002). There was a marked increase in FDI following the policy turn-around in 1977, followed by a

sharp collapse immediately after the escalation of the ethnic conflict in 1983. Nearly three decades of violence ended in 2009, which resulted in a remarkable increase in the GDP growth and the inflow of FDI.

It is evident that with the post war impact, GDP growth and FDI growth began moving towards a gradual divergence to trending association (Figure 1) and this association between FDI and GDP growth is also evident in the correlation estimation between FDI growth and GDP growth which has improved from 0.1000 correlations in the period of 1980 to 2008 to 0.4516 correlations in the period 2009 to 2016 which is the post war time. The reported correlations for both periods are significant.

Figure 1: The relationship of real GDP growth and the FDI growth



Source: The Central Bank of Sri Lanka and author's calculations

There are only a limited number of studies that analyse the effect of FDI on economic growth in the context of Sri Lanka in the recent past, especially in relation to post war impact. Lack of comprehensive studies to guide policy decisions on FDI may also contributed to the fact that Sri Lanka is attracting lesser amounts of FDI compared to its neighbouring Asian countries.

In this study, the focus will be on the time between 1980 to 2016 which also includes the post war era, and the research attempts to identify whether there is a significant relationship between FDI and economic growth in Sri Lanka. It will stress on the importance of promoting FDI for rapid growth of the economy of Sri Lanka.

The study confirms that there is a significant and long-run association between GDP, national investment, employment, and trade with FDI, and the short run co-efficient of FDI also reports a level of significance. The findings of this study would be useful for policy makers in general, for better calibration of macroeconomic policies, in attracting FDI to Sri Lanka and steering such investments towards development of the country.

The remainder of this paper is structured as follows: Part 2 contains a discussion of the theoretical outline of FDI related growth including justifications for using the production function in the study and a review of prior academic literature. Part 3 provides the model analysis and the related discussions are in Part 4, followed by the conclusion.

2. Literature Review

2.1. The Theoretical Foundation of FDI Led Growth

The Harrod-Domer model suggests that the economic growth depends on the level of savings and productivity of capital investment. Raising the level of saving may be difficult, especially for developing countries. Therefore, such nations are required to borrow 'savings' by ways of loans, grants and FDI.

The neoclassical model of growth and endogenous models of growth also provide theoretical support for FDI and its impact on economic growth. Endogenous growth theory holds that technological advancement and human capital are the key contributors to economic growth. As such, the main way in which FDI can affect growth is by increasing returns to production via externalities and output efficiency spillovers (De Mello, 1997). The main feature of the neoclassical model is the convergence property. That is, the lower the real per capita GDP the higher the forecastable growth level (Barro, 1996). That explanation theoretically supports developing countries utilising FDI flows originating from advanced countries.

FDI brings a bundle of advantages as capital, technology and expertise which can have an impact on the capital stock of the host country and it can enhance labour productivity by way of knowledge transfer and managerial practice (Hoang et al., 2010). That is, FDI can supplement the element of 'capital' in the production function and can influence the output or the GDP level.

2.2. Modelling Economic Growth Using Production Function and Determinants of Growth

Mankiw (2010) argues that the large increase in the factors of production, i.e. labour force participation, capital stock, and education, is attributable to exceptional growth levels in four East Asian countries. From 1966 to 1990, the real income per person grew about 2 per cent in the USA whilst in these countries it grew by 7 per cent per annum. Therefore, modelling growth in terms of capital, labour and qualitative human capital is suitable for testing the long run growth effects, and a model can be constructed in the form of the production function.

Barro (1996) argues that the growth rate tends to be much higher if the country initiates with a lower level of real per capita GDP. His findings further show that the highest standard in political democracy is not essential for the growth of GDP. Barro's findings are positive observations in relation to Sri Lanka as it is a country with a middle level of per capita GDP and has established democracy to a satisfactory level.

Romer (2011) explains, if L represents 'labour' and A represents 'effectiveness of labour' i.e. education, skill of the labour and attitude towards employment or quality of infrastructure, AL represents as 'effective labour', the progress of the technology included in this manner is known as 'labour augmented' or 'Harrod-neutral'. The Solow model[3] focuses on the properties of the production function and how the L, K (capital) and A link in the production function to produce the output (Y). Sahoo (2006) explains that the most significant and influential determinants of FDI in South Asia are labour force growth and market size. Coe, Helpman, Hoffmaister (1995) discuss that a properly educated workforce can increase productivity by

[3] Robert Solow and Swan (1956)

directly and indirectly attracting FDI and enabling the country to get advantage of advanced technology with its investing partners.

Mankiw, Romer and Weil (1992) tested a model by augmenting the Solow model and incorporated human capital as a supplementary explanatory variable in their cross-country regression. Knowing the importance of the labour and the effectiveness of the labour in estimating the production function, this study incorporates labour as an explanatory variable. Further, given the importance of the quality of education regarding productivity and attracting foreign capital, university education was also added as a variable in this model to capture such qualitative nature of the labour force of the country. Vacaflores (2011) found the positive effect of FDI on labour in Latin America. Vacaflores states that this effect is mostly important for less developed countries, with less inflow of FDI and larger informal sector workers.

However, a different result was observed by Raleva (2014) in the case of Bulgaria from 1992 to 2013. The study found the impact of labour to GDP was very negative after 2009 and 1998-2000 and a correlation was found between the negative effects of labour on GDP in the recession period except in 1996.

Many studies have shown that countries with externally oriented trade policies can benefit more from FDI than inwardly oriented trade policies in relation to growth of economy. Agrawal (2000) included 'trade' taking log of export to the model. Tiwari and Mutascu (2011) also expanded the production function by adding export to the model. Balasubramanyam, Salisu and Sapsford (1996) studied the role of FDI in growth process in the context of developing nations with different trade policy regimes. They measure trade by 'exports' and argue that exports lead to higher factor productivity, lessen foreign exchange constraints and result in a higher rate of technological advancements (as cited by Salvatore & Hatcher, 1991). Trade openness measures an economy's trade intensity (Pritchett, 1996). Trade openness can be said as 'free trade' in an economy where trade distortions are exterminated. Basu, Chakraborty, and Reagle (2003) claim that FDI and GDP can mutually reinforce each other in open economies. The study measured the trade openness using the index of trade.[4]

[4] (Import + export)/GDP

Kohpaiboon's (2003) results show that the growth impact from FDI is more when the country has an export promoting trade regime. This research used trade openness[5] for the tested model. Athukorala (2003), and Balamurali and Bogahawatte (2011), in the context of Sri Lanka, extended their models by including 'trade liberalisation' in the form of trade openness.

Ghazali (2010) found a positive correlation between FDI, GDP and national investment. Inflow of FDI enhances local investment via connected benefits like market access, technology and skills and domestic investment is one of the indications of the status of the economy for foreign investors. Agrawal (2000) explains the difficulty of measuring the accurate capital stock in developing countries and approximates capital stock by the ratio of domestic fixed investment to GDP. Athukorala (2003) also estimates the model taking domestic investment to GDP as a proxy for capital. Baharumshah, Slesman, and Devadason (2015) examine how the three types of foreign capital namely, FDI, portfolio equity and debt inflow affect growth, and claim that different type of capital effect the growth in different levels.

The inclusion of FDI as a variable in the production function can be validated as it represents an alternative source of capital to the model.

The capital stock is a fundamental factor of the economy's ability to produce and it causes growth of GDP. A contrasting result to such opinion is expressed by Choe (2003). The study found that domestic investment does not cause growth and concludes that domestic investment does not necessarily support economic growth.

Theoretically and empirically, capital is known as the central factor of production and the base of growth. However, the unavailability of reliable information on such may result in conflicting observations.

[5] (Import + export)/GDP

2.3. Arguments For and Against the Impact of FDI on the Growth of Economy

Agrawal (2000) claims that the increase in FDI in Asian countries is associated with increase in national investment. The findings are in line with implementation of free trade policies in many Asian countries in the 1980s, and the analysis shows that the influence of FDI on growth is negative prior to 1980 and increasingly positive in late 1980s. His study proves that the countries without trade distortions could have increased benefits from foreign capital. Agrawal's (2000) study also found a positive impact of net foreign borrowing as a share of GDP on growth, but the coefficient is smaller relative to the coefficient of FDI, and claims that FDI is more preferred for the economy compared to foreign borrowing.

Tiwari and Mutascu (2011) found that FDI and export have a positive impact on growth of Asian countries, and capital and labour support such development. Yao (2006) reveals that FDI and export can make a positive and strong effect on China's growth. Yao goes on to explain that the openness in the exchange market and allowing FDI are the reasons for the economic success in China. Chen, Chang, and Zhang (1995) also found a positive impact on growth by FDI. However, they go on to explain some of the negative social and political effects of FDI led growth such as uneven economic development in coastal and inland provinces causing unequal income distribution.

The positive impact of FDI on economic growth is theoretically expected and has been proven by many empirical studies; however, there is evidence of disagreement, too. For example, Herzer (2012) studied the effect of FDI on growth of 44 developing countries and states that FDI has on average, a negative effect. But there were large differences across countries. Further he suggests, the impact of growth from FDI can mainly be explained by country wise differences in independence on trade, less government intervention and business freedom.

Duasa (2007) found that there is no strong impact of FDI on growth of an economy. However, he says that FDI does contribute to the stability of growth. Pradhan (2009) studied the connection between FDI and the growth of five ASEAN[6] countries. He concluded that the relationship co-integrated at the panel level; however, at the individual level a significant

[6] Association of South East Asian Nations

effect on growth was shown only by Singapore and Thailand. Lensink, and Morrissey (2006) found some positive effects of FDI on GDP. However, the results were weaker for developing countries where volatility of FDI existed. Therefore, they concluded that FDI volatilities can negatively affect the growth of a country.

2.4. Factors Affecting FDI Inflows

There are several factors which affect the inflow of FDI to a country. Policy adoption should aim not only to attract FDI but also to drive foreign investment to yield expected growth targets. Therefore, it is important to identify such factors and focus on how FDI can be utilised to achieve growth objectives. Many studies identify factors influencing the inflow of FDI. Among those, there are some significant factors for Sri Lanka.

The existence of a strong domestic financial market is a positive factor when attracting FDI. Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2004) found that benefits gain from FDI are more for countries with well-developed financial markets. Durham (2004) found a similar result. His regression also included business regulations and property right indexes and concluded that the more superlative the corruption index rating, higher the effect of FDI on such countries. Zhang (2007) discusses that a liberalised trade regime, improved education and human capital conditions, macroeconomic stability, and export oriented FDI promote economic growth.

Infrastructure is a necessary feature for economic development. It is also a key requirement in attracting FDI. Yol and Tang (2009) found that there is a long run relationship between the real exchange rate, GDP growth and infrastructure. Thilakaweera (2012) also found that infrastructure has a greater influence on attracting FDI in the context of Sri Lanka.

A study by Kimino, Saal and Driffield (2007) suggests that political and economic stability, fair borrowing, labour costs and investor perception towards risk in the source country are determinants of inward FDI. Baharumshah et al. (2015, as cited in Prasad, Rajan and Subramanian, 2007) say that developing countries with underdeveloped financial markets should be careful in attracting forms of foreign capital. Balamurali and Bogahawatte (2011) in

their study state that Sri Lanka's protectionist trade policies and regulatory barriers have caused high cost of capital for foreign firms and loss of profits.

2.5. Studies in the Context of Sri Lanka

There are some studies done in order to identify the association between FDI and growth in Sri Lanka. These studies show mixed results on how FDI impacts the growth of the Sri Lankan economy, which lead to an inconclusive opinion on whether FDI has a positive impact on GDP. Athukorala (2003) found that FDI does not have a significant impact on economic growth and the causation is from GDP growth to FDI, not from FDI to GDP. The model has not captured the importance of labour. Ravinthirakumar et al. (2019), studied the causal relationship between tourism, FDI, political instability and other variables in the context of Sri Lanka and claim that there is a long run relationship among these variables. Balamurali and Bogahawatte (2011) suggest that there is a long run equilibrium association present and the direction of causality is towards FDI to GDP growth and GDP growth to FDI. Therefore, study concluded observing bidirectional causality between FDI and economic growth in Sri Lanka. Velnampy et al. (2014) found that there is a long run equilibrium relationship,however, there is no significant impact of FDI on growth. Deyshappriya (2012) claims that although the FDI shows a positive effect on GDP the degree of the effect is insignificant. The causality observed from FDI to GDP is reported as a one-way causality. The study claims that the insignificance of the impact of FDI is due to the lack of economic and political stability and poor infrastructure.

Conducting more studies on this aspect in the context of Sri Lanka has been discouraged due to the economic and political instability that has prevailed in the country for decades, which has caused less FDI flowing to the country. The importance of FDI for an emerging economy like Sri Lanka is enormous. Especially FDI can play a vital part in rebuilding the economy and society after conflict. It can provide non-debt capital, which is important to a country with a high debt level. Evidence of very limited analysis on this important aspect for Sri Lanka, especially with post war impact, creates motivation for further studies. This study also incorporates the educated labour force to the model, to the extent of available information, which was lacking in previous literature. The next section details the model construction and the sources of data.

3. Data, Model and the Methodology

This study was carried out using the data gathered mainly from the publications of the Central Bank of Sri Lanka and publications of other relevant institutions such as the Department of Census and Statistics, Sri Lanka. Time series data from 1980 to 2016 were extracted from the relevant sources for the analysis, which gives 37 observations.

The methodology of this study includes estimating an econometric model based on the production function framework. The level of output of an economy, in a given time is decided by the factors of production and the production technology. This study therefore considers five explanatory variables including FDI to structure the econometric model.

In growth related studies, research traditionally follows the Solow model (Romer, 2011). The Solow model considers capital, labour and effectiveness of labour as variables. At any given time an economy has some level of capital and labour which are combined to produce the output. The origin of the reported model is $Y = f(K, L)$, where Y denotes the output level or GDP measured in real growth rate terms.

Ghazali (2010) and Mankiw (2010) discuss the role of capital in producing output and the growth. Further, Ghazali highlights the positive correlation between national investment and FDI. Considering the difficulty of obtaining reliable data series on capital stock in developing countries, investment as a ratio of GDP is used to denote the capital stock (IN) in the reported model. This approach is similar to those of Agrawal (2000) and Athukorala (2003).

Mankiw (2010) stresses that openness to international trade can have a positive effect on economic growth. In this study 'TRAD' represents trade openness capturing the effect of openness of the trade policy regime. Athukorala (2003) and Balamurali and Bogahawatte (2011) followed the same approach of using trade openness to represent 'trade' as opposed to the use of 'export' by Agrawal (2000) and Tiwari and Mutascu (2011).

According to the Cobb-Douglas production function, if constant technology is assumed, labour and /or capital can increase the production level of a country. Hence, human capital can be considered as a key component of economic growth. Tiwari and Mutascu (2011)

suggests that FDI and exports support economic growth of Asian countries with the help of labour and capital. Considering the importance of human capital, the reported model uses 'employed persons as a ratio of mid-year population' denoted as 'EMP', as opposed to Athukorala (2003) 's model where labour was dropped from the estimation.

Coe et al. (1995) and Mankiw et al. (1992) explain the power of educated population on attracting FDI and promoting growth. 'University graduation as a percentage of mid-year population' (UNI) is used in this study to represent the quality of the labour force.

Inflow of FDI is represented by 'FDI', which is the ratio of FDI inflow to GDP.

By considering the explained variables, the augmented production function is constructed as follows:

RGDPG = (NI, TRAD, LEMP, FDI, UNI)

Where;

1. **RGDPG** denotes the *real GDP in growth rate terms;*
2. **NI** represents the domestic capital stock (*National Investment/GDP*);
3. **TRAD** represents the trade openness calculated by (*import + export) / GDP;*
4. *Log of employed persons per mid-year population* is denoted by **LEMP**;
5. **FDI** represents the inflation adjusted *FDI inflow to real GDP;*
   An additional estimation was carried out using *FDI growth rate*, denoted by **FDIG,** to check whether the level of statistical significance in long and short run adjustments could be improved.
6. *Log of* u*niversity graduation as a percentage of mid-year population* given by **LUNI;**
7. e_t is used as the error term to absorb the effect of all other factors affecting economic growth.

Given the above explanatory variables the regression equation can be as follows:
RGDPG = ($\mathbf{b_0}$ + $\mathbf{b_1}$ NI+ $\mathbf{b_2}$ TRAD+ $\mathbf{b_3}$ FDI+ $\mathbf{b_4}$ LEMP+ $\mathbf{b_5}$ LUNI + e_t)

The next section explains the method by which the model was tested and the rational of selecting the suitable methodology.

The stationarity property of the selected variable was tested using the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. Selection Order Criteria is used to specify the appropriate lag length which is based on Final Prediction Error (FPE), Schwarz's Bayesian information criterion (SBIC), the Akaike's information criterion (AIC), Likelihood Ratio (LR), and the Hannan and Quinn information criterion (HQIC).

The model was built with the Vector Error Correction (VEC). The stability and white noise were tested by conducting VEC stationary, residual autocorrelation and the test for normality.

4. Results and Discussion

4.1. Descriptive Statistics

The total number of observations is 37 in the sample from 1980 to 2016. All the variables have reasonable standard deviations. (descriptive statistics are in Table A1 of the Appendices).

4.2. Unit Root Test

Testing for stationarity is the initial step of building the correct model. As suggested by Becketti (2013) the unit root test was conducted in two lag levels, lag length 3 and 4[7]. With lag length 4 ADF test confirms the stationarity at first difference in 5 per cent level for all variables, except for TRAD and LEMP. The results were further confirmed by the PP test. The PP test was carried out for TRAD and LEMP and it confirmed stationarity at first difference. For RGDPG none zero drift term was added which represents the long run growth rate of GDP (Becketti, 2013). The stationarity assumption was not changed even with the drift term.

[7] Test results can be provided on demand

Similar results were evident with lag length 3. Stationarity at first difference was confirmed for TRAD by PP test, consequent to the ADF test. All other variables confirmed the first difference stationarity by both ADF and PP tests. It was observed that RGDPG is stationary even with the drift term.

The unit root test results for both lag length 3 and 4 confirms the variables are integrated at first difference. Further, uniformity of test results between two lag lengths strengthens the result and reduces the possibility of variation in outcome due to changes in the lag length. Having confirmed that variables will not lead to spurious regression, the study proceeded to test for appropriate lag length and co-integration.

4.3. Appropriate Lag Length Selection

Lag length selection results were conducted with FDI/GDP and with FDIG, with and without the maximum lag, which allows for identifying whether the variables are sensitives to the lag length. It was observed that with the maximum lag 8, the lag selection test is sensitive to the maximum lag specified.

Liew (2004) found that AIC and FPE give better predictions than other criteria if the number of observations is less than 60. He further explains that AIC and FPE lessen the possibility of underestimations and improve the chances of arriving at a true lag length. Balamurali and Bogahawatte (2011) in the context of Sri Lanka, used AIC to select the lag length. Lag 4 was selected as the appropriate lag length for testing co-integration and fixing the error correction model. This lag selection is also similar to Thilakaweera (2012) in studying the relationship among GDP, FDI and infrastructure in the context of Sri Lanka.

4.4. Testing for Co-integration

Johansen's multiple-trace statistic for co-integration was tested in this study. Two alternative test models were tested.[8] If the model includes FDI/GDP, there is a possibility of having one co-integration equation at a five per cent critical level, and if the model is constructed with FDIG

[8] Test results can be provided on demand

there can be one co-integration equation at ten and five per cent critical levels. The possibility of having a co-integrating vector can be interpreted as the presence of a long term equilibrium.

Having confirmed that the variables are stationary at first difference and the existence of a co-integration relationship lead to specification of a VECM. Athukorala (2003) also found a co-integration relationship at 5 per cent confidence level in a similar study on Sri Lanka.

4.5. Fitting the VECM

When there is a shock to the system the adjustment process works in the opposite direction. Therefore, a long run coefficient can be said to be stable if the value is negative and less than 1 (i.e. -1 < Coeff. < 0) (Athukorala, 2003 and Becketti, 2013).

The reported model estimated one co-integration relationship as suggested by the co-integration test. Table A2 of the Appendices shows the fitted VECM with the FDI/GDP. The model reports the long term coefficient of -1.9574. This is significant at the 5 per cent significance level, with the p value of 0.0000. Although the sign of the coefficient is negative and significant, it is greater than 1. This shows an oscillatory adjustment which is not usually interpreted as a long term adjustment.

Short run adjustments were measured by the coefficients of lagged individual variables. Similar to the long run coefficient, short run coefficients of FDI also display an oscillatory nature. However, coefficients are highly significant in LD, L2D and L3D. National Investment (NI) reported to be significant in lag 2 and 3, with a coefficient less than 1 in all lags. However, the correct sign was observed only in lag 1 and 3. Trade openness (TRAD) shows the correct sign with coefficient less than 1 in all levels. Significance is, however, observed only in lag 1. Labour (EMP) shows significance in lag 1 and 3. Although it is observed with less than 1 coefficient, none of them has the negative sign. Log of UNI reports significance in lag 1 and a coefficient of less than 1 in all three lags. The correct sign can be observed in lag 2 and 3.

The reported model was then tested with the FDIG instead of FDI/GDP, in order to test whether the results could be improved. Overall, the output shows the model fits well. VECM

reported similar results with both the trend terms 'Constant' and 'Restricted Constant'. This implies that co-integration equations are stationary around a constant mean (Becketti, 2013). The test results for the model with FDIG are reported in Table A3 of the Appendices. The error correction term was reported as -0.9692 with a very high significance level by reporting a p value of 0.002. Accordingly, the speed of adjustment can be interpreted as 97 per cent, which is close to one period. The findings show relative improvements compared to the studies done by Athukorala (2003) and Deyshappriya (2012) in the Sri Lankan context. As studying the relationship of FDI to GDP is the main objective of this research, the short run coefficient of FDIG is an important indication of this model. FDIG reports the correct sign and the value is less than one for all the lag levels. Statistical significance is observed for the L2D and L3D. Therefore, it is evident that FDIG has a short run effect on the error correction process. Therefore, the model reports both long run and short run significance.

NI although the reported coefficients are realistic, none of them shows a statistical significance in short run. Therefore, national investment can said to be 'weakly exogenous'. Engle, Hendry and Richard (1983) proposed a definition of weak exogeneity. A series of variables can be weakly exogenous if there is no loss of information of the parameters when the model condition on them. Further, Jacobs and Wallis (2010) explains that in VECM estimation, treating some variables as weakly exogenous permits efficient inference on the co-integration coefficient. TRAD also reports the correct coefficient but the significance can only be observed in lag 1. The variable EMP, however, only has a correct short term co-efficient in lag 2 and all the co-efficient are insignificant leading to weak exogeneity. Log of UNI shows the significance in Lag 2 and 3 levels with the correct coefficient. The short run effect of UNI on the error correction is therefore significant and efficient.

With the improved result on the long run adjustment term and the short run coefficient of the FDIG, the following co-integration relationship was established. The statistical significance is very high with all the variables and reported p values of 0.0000. The standard deviations also appear reasonable for all the coefficients. Table 1 reports the statistics related to the co-integration equation.

Table 1: Co-integration equation

Beta	Coef.	Std. Err.	z	P>|z|	95% Conf.	Interval
Rgdpg	1					
Ni	0.2067	0.0490	4.2200	0.0000	0.1106	0.3028
Trad	0.1137	0.0115	9.9300	0.0000	0.0913	0.1362
Fdig	-0.0344	0.0034	-9.9900	0.0000	-0.0412	-0.0277
LEMP	0.3339	0.0266	12.5400	0.0000	0.2817	0.3861
LUNI	-0.0353	0.0028	-12.8300	0.0000	-0.0407	-0.0299
_cons	0.0594					

The co-integration relationship is built as follows.

RGDPG = -0.0594 -0.2067NI -0.1137TRAD +0.0344FDIG –0.3339LEMP + 0.0353LUNI

The reported equation clearly indicates the expected sign, which is the positive effect of FDI on GDP growth. Such positive effect is in line with the findings of Agrawal (2000) and Tiwari and Mutascu (2011). For a 1 unit increase in the FDI, GDP will increase by .0344. The 3.44 effect in percentage terms is moderate, but this result is explainable considering the low FDI inflow to the country. The positive and significant impact FDI has on GDP growth is a promising sign of the economy.

The variable LUNI, which represents the qualitative nature of the labour force, also reports the expected sign. The positive impact of quality of labour on GDP is also confirmed by other research. In Coe et al. (1995) it was proven that developing countries with a higher enrolment rate for secondary education have a better productivity rate. The reported results in this study further prove the said claim. For 1 unit change in UNI the impact on GDP will be .0353. As per Dundar et al.(2017) the largest skill gaps which question the quality of the university education in Sri Lanka are communication, desire and ability to learn and ability to work as a team. Eliminating such skill gaps in university education will increase the impact the qualitative labour could have on the growth of the economy.

The effect of trade could not be determined before the estimation as it may have been affected by the status of the current account, exchange rate policy stance, etc. The reported result for TRAD shows a negative impact on GDP. The Central Bank of Sri Lanka (2016) states that the trade account deficit as a percentage of GDP increased to 11.2 in 2016. The current account balance was continuously in deficit from 1980 to 2016. Balamurali and Bogahawatte (2011), in the context of Sri Lanka, found the same negative relationship and go on to state that the growth of imports compared to exports is the reason for the negative impact of trade openness on GDP of Sri Lanka.

FDI generally plays an important role in the process of export oriented industries of a country. It is widely accepted that export oriented FDI (EOFDI) is an integral element of policy reforms towards growth. During 1967-77 out of total 82 foreign companies established, only 12 were export oriented companies. During 1978-92 out of 397 who signed for export oriented foreign firms, only 211 were in operations by end 1992 (Athukorala, 2007). Sectoral analysis of FDI inflow to Sri Lanka shows that, inflow of FDI to the infrastructure sector grew by 291 per cent by 2018, compared to 2015, whilst manufacturing and service sectors attracted only 13 per cent and 18 per cent growth, respectively in the same period (Central Bank of Sri Lanka, 2019). Further, sectoral distribution of export oriented manufacturing firms (in Export Processing Zone) shows that, compared to 1982, in 1991 the share of export of resourced based products[9] increased only to 11.5 per cent from 3.3 per cent regardless of the number of firms increasing from 4 to 29. Similarly, the export share of standardised consumer products[10] declined from 94.9 per cent to 79.6 per cent although the number of firms grew from 27 to 81, in the same period (Athukorala, 2007). According to data related to the Greater Colombo Economic Commission, considering the foreign exchange leakages, the share of imported inputs in gross export value is as high as 70 per cent, thus the net foreign exchange component represented in gross export earning is as low as 15 per cent (Athukorala, 2007). It is evident that the net impact of exports on balance of payments is not satisfactory to make a significant impact on growth. The negative impact of trade openness in the reported model can be attributed to such macro-economic factors.

[9] Process food, tobacco, rubber products, ceramic, gem

[10] Hand-looms, garments, knitting mills, leather and plastic goods, footwear, sport goods and jewelry

The study expected a positive impact of EMP; however, the model reports a negative impact of EMP on GDP. Similar results were observed by Raleva (2014) during the economic down turn in Bulgaria. Several factors affect economic growth; demand side factors and supply side factors. Real wage affects aggregate demand and if the real wage falls, it causes a decline in real income and spending. Central Bank of Sri Lanka (2016) states that the real wages of both the government and private employment categories decreased in 2016. This implies a decrease in spending. On the other hand, supply side growth impact comes from factors such as productivity of workers, training, motivation and flexibility in the labour market. Although this study has not conducted an extensive analysis on labour market of Sri Lanka, the effect of real wages, low productivity, unskilled nature of labour and lack of motivation can be identified as possible reasons for the negative impact of labour on GDP reported in the model. Further, three decades of civil conflicts have also caused brain drain in Sri Lanka, and providing skills to labour has become less of a priority. Central Bank of Sri Lanka (2016)[11] states that, high unemployment levels in youth and educationally qualified persons continue to be severe concerns in the Sri Lankan labour market. There has been a considerable increase in the number of employment opportunities created by EOFDI. However, the majority of jobs offered required no major skills and/or female workers with lower skills (Athukorala, 2007). Such unskilled/ semi-skilled labour certainly requires lower pay and hence the real wage effect of employment boost of EOFDI may not be significant on GDP. Skill gaps of employees also severely harm the potential for production. Substantial shortages in skills produce 43 per cent less than the usual capacity (Dundar et al., 2014). Therefore, the lack of sufficient skill levels prevents 'labour' functioning effectively and reaching the expected production potential. The youth unemployment[12] rate rose from 17.2 in 2011 to 21.6 in 2016, and the youth unemployment rate in 2016 indicates that one out of every five economically active youths is unemployed (Department of Census and Statistics, Sri Lanka Labour Force Survey,2016). These factors may be attributed to the negative impact of labour on GDP growth.

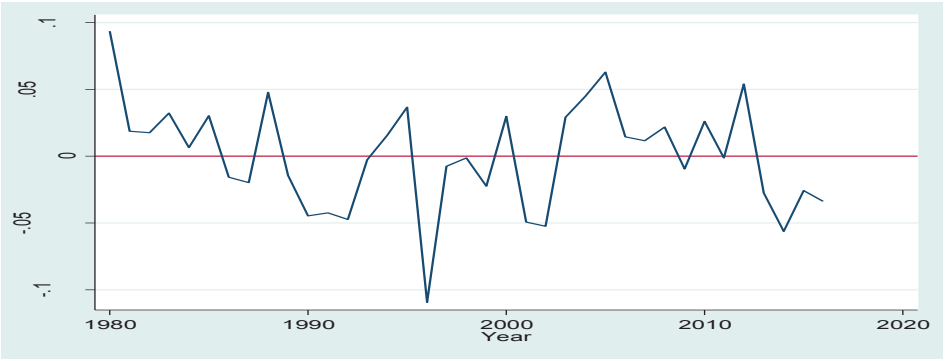
[11] Annual Report Chapter 4, p139

[12] Age between 15-24 years

The impact of NI on GDP was reported as negative. This contradicts the expected sign for national investment in this study. Choe, (2003) also found similar results in his study of 80 countries from 1971 to 1995. Being an agricultural and service oriented economy, Sri Lanka invests in plantations and agricultural projects. Dishaka and Ikemoto (2013) analyse the labour productivity in tea plantation sector of Sri Lanka. They claim that low social development, an aging workforce and the limited use of capital incentive methods create less productivity on investment in the plantation sector of Sri Lanka. Further, large scale investment in infrastructure projects such as harbours, airports and road developments took place in the last 10-12 years. The time taken to realise the return on investment for very large scale infrastructure projects is comparatively long. That may also be the reason the growth impact of national investment is not reflected in GDP numbers. Becketti (2013) explains that 'regime change' over the sample period may create problems. He further says that differences in monetary policy and regulations may change the dynamic relationship which the model tries to estimate.

Figure 2 shows the estimated co-integration relationship. There is a wide oscillation observed in the mid-1990s and early 2000s. However, after 2008 wide fluctuations started to settle down until 2015, when a regime change. Sri Lankan political history had regime changes in 1977, 1994, 2002, 2005 and 2015. It is clearly visible that the co-integration relationship has swings in those respective times. Therefore, it can be viewed that political stability, investor confidence and a 'development friendly' political stance affect growth potentials and stability of the economy.

Figure 2: Estimated Co-integration Relationship



Source: Author's calculations

4.6. Tests for Stability and White Noise

It is important to confirm that the model has correctly specified the number of co-integrating equations. Eigenvalues are strictly less than one if it has been correctly processed. In the tested model, all the eigenvalues are located inside the unit circle. However, there are two values plotted very close to the circled limit, specifying that some shocks will not die out in the short run. These test results confirm that the model is stable and hence, it is correctly specified.
The absence of autocorrelation in error term, indicate the consistence property of a time series. The Langrange-multiplier test results clearly accept the null hypothesis of no autocorrelation in lag order. The maximum order of autocorrelation to be tested is specified as 4. It is confirmed that from order 1 to 4 there is no autocorrelation; hence the model was further confirmed for correct specification.

The Jarque-Bera test result shows strong acceptance of the null hypothesis of normally distributed error terms. Considering each equation, except FDIG, all other variables report a probability of more than 0.05. According to the test interpretation the error of FDIG can be interpreted as skewed and kurtotic. The econometric assumptions of errors are iid (independently, identically distributed) and normally distributed, making the estimated model consistent and efficient. The reported model, therefore, is further confirmed for lack of non-normality.

4.7. Impulse Response Function and Forecasts

Orthogonalized IRF (IRF) results from the VECM shows (Figure A1 of Appendices: IRF Charts) that FDI has a permanent effect on GDP, which is positive. However, the faster positive impact of the impulse on period 2-3 will slow down after periods 7-8. National Investment shows a negative effect on GDP. National investment has an immediate negative impact and increases sharply. Trade openness has a declining effect from the impulse at the beginning and by period 4 it has a positive effect, and shows a permanent effect. However, the effect is negative overall. The impact of labour declines initially and then increases fast. However, the impact tends to decay over time. LUNI has a rapid positive impact of an impulse and tends to decay slowly.

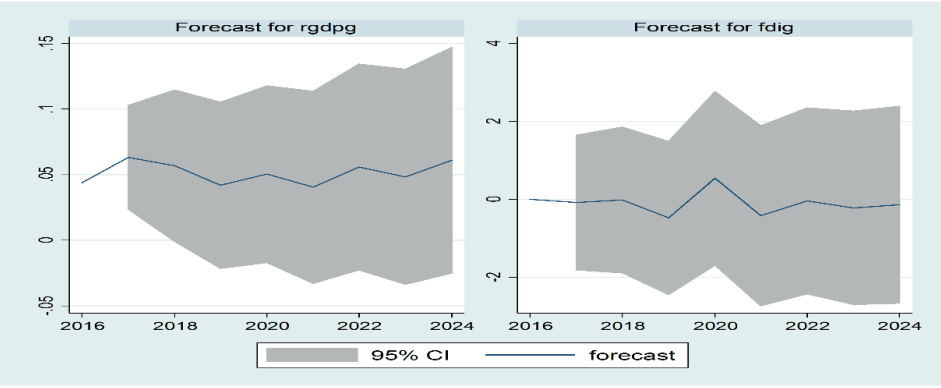
Secondly, the IRF was conducted to test how an impulse on FDI affects national investment, labour and trade. According to the result, an impulse on FDI will have a permanent and positive effect on national investment. The effect is immediate on national investment and slows down by period 5, then increases fast. The positive effect FDI can have on national investment has been confirmed in many previous studies. Agrawal (2000) found that 1 per cent increase in FDI is associated with 4-5 per cent increase in national investment. Athukorala (2003) also discusses the link between FDI and domestic investment of Sri Lanka. He observed a crowding in effect. The IRF of the reported model too can observes the positive effect of FDI on national investment.

Impulse on FDI has an immediate and permanent impact to labour. The sharp positive impact declines by period 2-3 and again starts improving by period 5-6. This proves the traditional view on FDI that it comes with a bundle of benefits including employment, skills and technology. This observation is in line with the claim of Vacaflores (2011). Vacaflores state that, FDI induces business operations in such a way that it converts informal sector to formalise employment activities. This finding can be true in the Sri Lankan context, too. Similar results were observed in the case of university education (LUNI) also, where the impact is positively increasing and permanent. This effect is also explainable as an inflow of FDI and related development activities have the ability to increase employment opportunities for well educated workers. Miningou and Tapsoba (2017) suggest that non resource rich countries can attract FDI by establishing quality in their education system which specially addresses the requirements of the economy.

The impact of impulse declines for trade and is negative. This effect is possible if the FDI inflow tends to increase imports, by way of material, machinery and other inputs, which certainly have an adverse impact on the trade account. Yousaf, Hussain and Ahmad (2008) shows FDI increases the real demand for import in the short and long run, whilst exports will decrease in the short run with an increase of FDI and increases in the long run. This suggests Sri Lanka to consider an import substitute policy for FDI, which will improve the trade account balance and create a demand for local inputs.

Figure 3 displays a forecast for the period from 2016 to 2024 at 95 per cent confidence interval. According to the reported model, the growth of GDP tends to be between 4 per cent to 6 per cent. The growth of FDI, however, shows a negative value in 2019 and positive in 2020. The historical trend of low level of growth for FDI is expected to remain unchanged. Therefore, policymakers must have a clear vision about the future of FDI in Sri Lanka.

Figure 3: Projected Growth of FDI and GDP



Source: Author's calculations

5. Conclusion and Policy Implications

The objective of this study was to identify the possible long run relationship between GDP growth and FDI in Sri Lanka. The reported model was constructed based on the production function, using capital, trade openness, labour and university graduation, with FDI growth to study the relationship such variables may have on GDP growth. The study examined data from 1980 to 2016.

The variables of the model were confirmed to be stationary at first difference. The appropriate lag length for the co-integration test and VECM was decided as 4. The Johansen test for co-integration confirmed the presence of a long run relationship by reporting one co-integrating equation. The stationarity at first difference and the presence of a co-integration relationship satisfy the necessary conditions to specify a VECM. The results were significant in the long and short run when tested with the FDI growth rate. The study found that there is a positive

and significant relationship between FDI and growth of GDP. The error correction term is highly significant and the co-efficient was correctly signed, with the model testing for lag 4. The short run coefficients of FDIG were also significant at lag 2 and 3 levels. This satisfies the fundamental objective of the study.

The positive impact of quality labour has been proved by many previous studies and it was further confirmed by the reported model. The findings assert the importance of a highly educated work force and the importance of investing in qualitative aspects of labour. The co-integration equation reports a negative effect of national investment on GDP, although the expectation was a positive impact. A close view of the equation shows that the long run effect has a sensitivity to regime change in Sri Lanka. The impact of national investment being negative can be explained as policy uncertainties of such transitional periods to some extent. The negative impact of trade openness can be attributed to the prolonged deficit in the trade account of Sri Lanka. The effect of labour on GDP also reported to be negative.

Tests for model stability and white noise reported that the model is correctly specified and there was no autocorrelation at lag order. Evidences of normally distributed errors are also satisfactory. According to the IRF, FDI has a permanent effect on GDP, which is positive. However, the faster positive impact of the impulse on period 2-3 will slow down after periods 7-8. The co-integration equation shows that for 1 unit increase in the FDI, GDP growth will increase by 0.0344. This positive and significant effect of FDI on GDP is an affirmative signal. The immediate, positive and permanent effect of impulse of FDI on NI, EMP and LUNI gives positive indications regarding FDI inflows. The TRAD, however, shows a negative effect and continues to decline.

Another important finding of the study is that the historical trend of low level of growth for FDI is expected to be unchanged in the next few years. The importance of formulating necessary policies to improve the level of FDI inflow is a crucial topic to be discussed by policy makers.

For any economy, FDI can provide an alternative source of capital. In the study by Agrawal (2000), he claims that FDI is preferable compared to foreign borrowing. For an economy like Sri Lanka where foreign and domestic borrowing are at the higher end, FDI can be the more

suitable form of foreign capital, which also comes bundled with other benefits like technology, market access and skills.

As observed by Alfaro et al. (2004) and Durham (2004) Sri Lanka should attempt to strengthen the domestic financial markets and improve their position in the Doing Business and Risk Indicator ranking which is a valuable indication to foreign investors about the security of properties and ease of operation in the country they intend to invest. Based on the observations and suggestions of Baharumshah et al. (2015), Sri Lanka too should have specific taxing and capital inflow/outflow policies. Based on Yol and Tang's (2009) findings on how infrastructure helps in attracting FDI, one of the initial and continuing tasks for Sri Lanka is to build necessary infrastructure. The study by Kimino et al. (2007) stresses the importance of political and economic stability to attract FDI to a country. The establishment of a stable political vision should be the foundation to any long term policy formulation.

Backward linkage to domestic inputs should be promoted rather than relying on imported inputs by export oriented foreign firms. Further, attention should be given to transferring skills and technologies from FDI, as most production functions come through foreign firms are assemble type activities which require low skilled labour.

Despite the high educational level in Sri Lanka, levels of technical skills and non-cognitive skills are low among university graduates. Therefore, strategic priorities and policy reforms should focus on technical and vocational education and training.

Trade policies should aim at reducing the anti-export bias. Introduction of para-tariffs leads to distorted input prices, which in turn leads to distortions in production patterns. High tariffs on final products rather than on material for productions, creates anti-export bias, as domestic producers may prefer to sell goods domestically. Trade barriers created by tariffs also make difficulties for local firms to access world-class material at competitive prices and integrate into Global Value Chains. Such an inward oriented nature of the economy may also affect the lower volumes of FDI in the long term.

Balamurali and Bogahawatte (2011) highlight the importance of liberalised policies in boosting foreign investment. However, it should be noted that, excessive concessions like long tax holidays, access to economically crucial sectors and unnecessary relaxation of labour laws can have adverse effects and hinder growth in the long term.

Although the impact of the reported model is statistically significant, the low level of FDI inflow has diminished the effect of FDI on growth. FDI is highly sensitive to fundamental macroeconomic factors. Therefore, ongoing policy directions are expected, which will provide the required drives to attract FDI and reap the full benefit of it.

Reliable data for FDI is available only from the 1980s; therefore, the study is limited to only 37 observations. A longer set of samples would have enabled a more predictable and conclusive outcome.

Future research may contribute more to these findings on the Sri Lankan context, by studying the postwar impact of FDI on growth. That will further strengthen the opinion on FDI and will help to articulate strong policies to drive the country towards rapid growth aided by FDI.

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Appendices

Table A1: Descriptive Statistics

Name	Variable	Obs.	Mean	Std. Dev.	Min	Max
RGDPG	Real GDP growth	37	0.0508	0.0195	- 0.0150	0.0910
NI	National Investment/GDP	37	0.2683	0.0408	0.2120	0.3910
TRAD	(Import + Export)/GDP	37	0.5773	0.1150	0.3700	0.7700
FDI	FDI/GDP	37	0.0128	0.0053	0.0025	0.0254
FDIG	FDI growth	37	0.3229	0.7062	- 0.8299	2.9421
LEMP	Log Employ./Midyear Population	37	- 1.0034	0.0636	- 1.0987	- 0.8800
LUNI	Log Uni.Grad./Mid-year Population	37	- 3.2589	0.7458	- 5.5994	- 1.9283

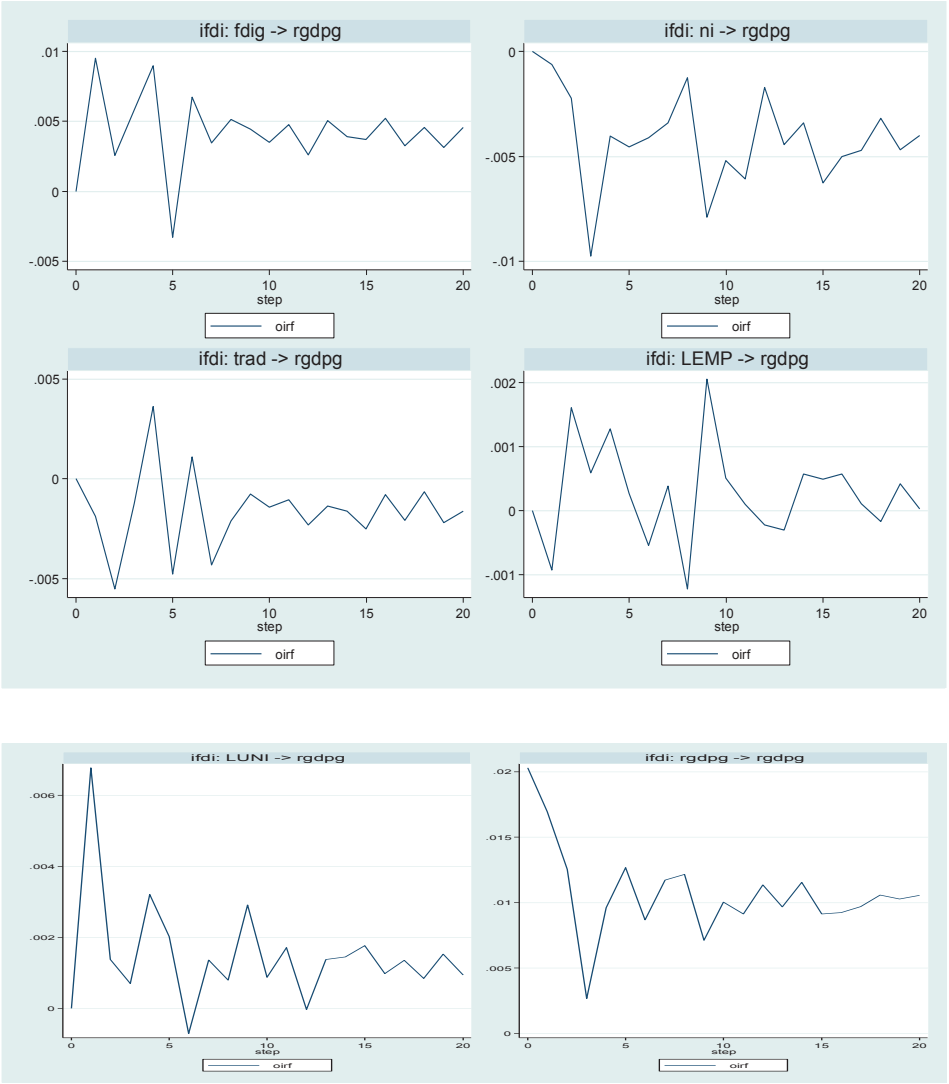
Table A2: VECM test result (with FDI/GDP)

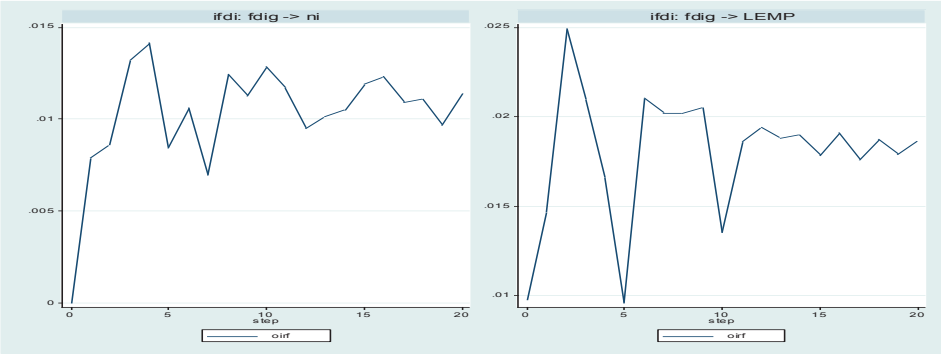
	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
D_RGDPG						
L1._ce1	- 1.9574	0.4697	- 4.1700	0.0000	- 2.8779	- 1.0368
RGDPG						
LD.	1.1033	0.4696	2.3500	0.0190	0.1830	2.0237
L2D.	1.0385	0.4103	2.5300	0.0110	0.2342	1.8428
L3D.	0.9889	0.3148	3.1400	0.0020	0.3719	1.6059
NI						
LD.	- 0.1076	0.2379	- 0.4500	0.6510	- 0.5738	0.3587
L2D.	0.5189	0.2258	2.3000	0.0220	0.0764	0.9614
L3D.	- 0.4188	0.1832	- 2.2900	0.0220	- 0.7778	- 0.0598
TRAD						
LD.	- 0.4438	0.1136	- 3.9100	0.0000	- 0.6665	- 0.2211
L2D.	- 0.0498	0.0933	- 0.5300	0.5940	- 0.2326	0.1331
L3D.	- 0.0755	0.0852	- 0.8900	0.3760	- 0.2426	0.0916
FDI						
LD.	- 3.4084	1.4793	- 2.3000	0.0210	- 6.3078	- 0.5090
L2D.	- 5.2750	1.1838	- 4.4600	0.0000	- 7.5952	- 2.9549
L3D.	- 3.1906	1.2451	- 2.5600	0.0100	- 5.6309	- 0.7503
LEMP						
LD.	0.3318	0.1317	2.5200	0.0120	0.0736	0.5899
L2D.	0.0933	0.1179	0.7900	0.4290	- 0.1379	0.3245
L3D.	0.4206	0.1367	3.0800	0.0020	0.1528	0.6885
LUNI						
LD.	0.0229	0.0098	2.3400	0.0190	0.0037	0.0421
L2D.	- 0.0121	0.0073	- 1.6600	0.0970	- 0.0264	0.0022
L3D.	- 0.0106	0.0075	- 1.4200	0.1550	- 0.0252	0.0040

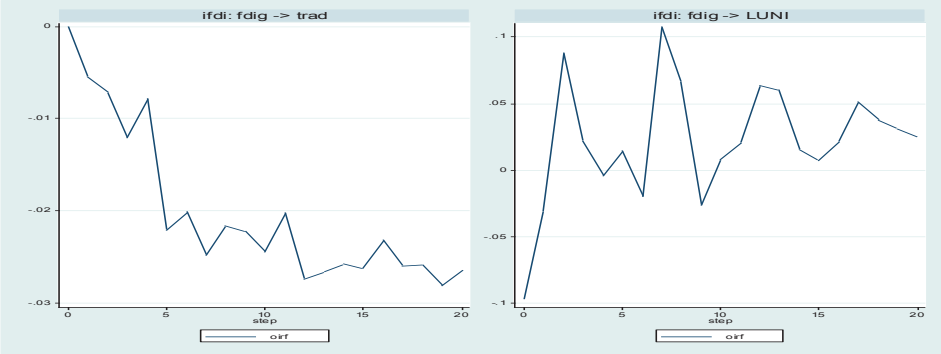
Table A3: VECM test result (with FDIG)

	Coef.	Std. Err.	z	P>|z|	95% Conf.	Interval
D_RGDPG L1._ce1	**-0.9692**	0.3085	-3.1400	**0.0020**	-1.5740	-0.3645
RGDPG						
LD.	0.7474	0.5425	1.3800	0.1680	-0.3159	1.8107
L2D.	0.9802	0.5074	1.9300	0.0530	-0.0144	1.9747
L3D.	0.8591	0.3531	2.4300	0.0150	0.1670	1.5512
NI						
LD.	-0.3499	0.2978	-1.1700	0.2400	-0.9337	0.2338
L2D.	0.1347	0.2513	0.5400	0.5920	-0.3579	0.6272
L3D.	-0.1495	0.2162	-0.6900	0.4890	-0.5731	0.2742
TRAD						
LD.	-0.2867	0.1161	-2.4700	0.0140	-0.5143	-0.0590
L2D.	-0.1237	0.1083	-1.1400	0.2540	-0.3360	0.0887
L3D.	-0.1361	0.1115	-1.2200	0.2220	-0.3547	0.0825
FDIG						
LD.	**-0.0182**	0.0096	-1.9000	**0.0580**	-0.0371	0.0006
L2D.	**-0.0181**	0.0086	-2.1100	**0.0350**	-0.0349	-0.0013
L3D.	**-0.0133**	0.0062	-2.1700	**0.0300**	-0.0254	-0.0013
LEMP						
LD.	0.1363	0.1350	1.0100	0.3130	-0.1282	0.4008
L2D.	-0.0088	0.1476	-0.0600	0.9520	-0.2980	0.2804
L3D.	0.1551	0.1345	1.1500	0.2490	-0.1085	0.4187
LUNI						
LD.	-0.0157	0.0148	-1.0600	0.2890	-0.0447	0.0133
L2D.	-0.0385	0.0124	-3.1000	0.0020	-0.0629	-0.0141
L3D.	-0.0263	0.0106	-2.4900	0.0130	-0.0470	-0.0056
_cons	-0.0035	0.0043	-0.8100	0.4210	-0.0119	0.0050

Figure A1: IRF from VECM (95 per cent confidence interval)







Source: Author's calculations