Impact of foreign direct investment on economic growth in Sri Lanka: A time series analysis

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Introduction

In Sri Lanka, the time duration from 1960 to 1976 is considered as a period which recorded a lower economic performance in terms of average economic growth rate. With the introduction of open economic policies in 1977, Sri Lanka invited Foreign Direct Investment (FDI) to the domestic economy via making an investor-friendly economic policy climate and thereby expected to the boost economic growth (Velnampy, 2014). The establishment of the Board of Investment (BOI) was a policy that was influential to attract the FDI (Athukorala, 2003).

Figure 1 presents the trends of FDI inflows into Sri Lanka since 1977. Although literature revealed that FDI is among the influential determinants of economic growth, it is questionable whether FDI contributes to the economic growth of Sri Lanka adequately, as modest economic growth rate (4.4%) has been reported during the period (1977 - 2016) with increasing trend of FDI inflows.

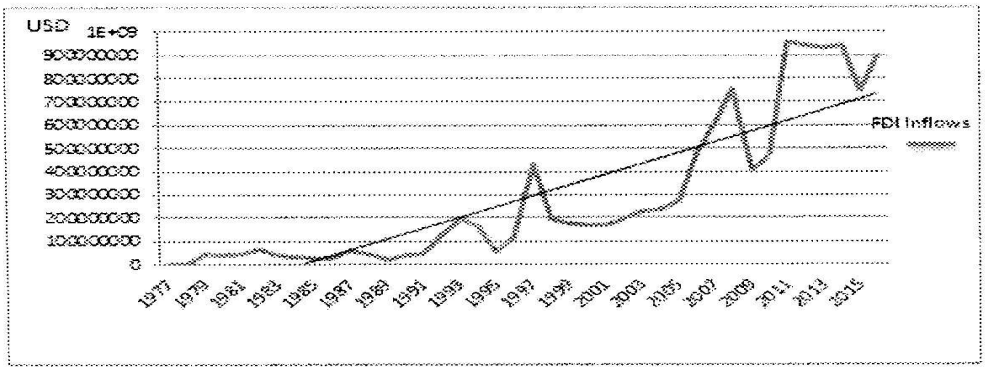

Figure 1 Trends of FDI inflows, 1977 - 2015

Moreover, the literature provides rather blended results on the relationship between FDI and economic growth. Using cross-country data, research confirmed that a strong relationship exists between economic growth and the FDI. Further, Alfaro (2003) examined cross-country data from 1981 to 1999 and found that the FDI in the primary sector and manufacturing sector have negative and positive impacts on economic growth respectively. Some studies have differentiated the impact of the FDI between developed and less-developed

countries. For instance, Brenner (2014) proved that prevails a positive effect of FDI on economic growth in developed nations while negative efefct in the less-developed nations. The study conducted by Mockevicius (2014) in Central and Eastern Europe using panel data modeling technique (1992-2012) revealed a positive impact of green field investment of the FDI, but mergers and acquisitions have no significant impact on economic growth. Some studies suggested that countries with a higher level of educational attainment, openness to international trade, stock market development, and lower rate of population growth, have the opportunity to gain benefits from the FDI (Xuan-Vinh, 2006).

In Sri Lankan context, a series of studies have attempted to study the relationship between the FDI and economic growth. Bogahawatta and Balamurali (2004) identified the bidirectional causality between FDI and economic growth. Using the time series technique, Mustafa and Santhirasegaram (2013) stated that the FDI influences positively and statistically to determine the economic growth in Sri Lanka. According to Deyshapriya (2010), though the FDI has a positive impact on economic growth in Sri Lanka, its contribution to the economic growth is less, compared to other determinants in the economic growth equation. Nevertheless, Athukorala (2003) discovered that, the FDI inflows do not exert an independent influence on economic growth and the impact of FDI on opportunities for domestic business and economic activities is positive. The same result, i.e. non-significant impact of FDI on the economic growth, was identified by Velnampy et al. (2013) in Sri Lanka. Studying the impact of FDI on economic growth is still the field of interest among the scholars in Sri Lanka because of optimized beliefs of governments on FDI in boosting the country's economic growth. Specifically, only limited studies have been performed in the field, which provide rather blend results. Thus, the general objective of this study is to identify the impact of FDI on economic growth in Sri Lanka.

Methodology

The data used in the study represent the annual time series for the period 1977 - 2016 (40 years) and are obtained from the annual reports of Central Bank of Sri Lanka. Following econometric model was specified to achieve study objectives:

$$Ln\, Y_{ti} = \beta_0 + \beta_1 Ln\, FDI_{ti} + \beta_2 Ln\, GFCF_{ti} + \beta_3 Ln\, OPR_{ti} + \beta_4 Ln\, EMP_{ti} + u_i \quad (1)$$

Where; Y is economic growth, FDI is foreign direct investment, GFCF is gross fixed capital formation, OPR is openness of trade, and EMP is employment rate. All variables are in the logarithm form.

The major concern of using time series data in economic analysis is that they can be non-stationary. Employing Ordinary Least Squares (OLS) method in

estimating non-stationary time series data leads to spurious results. Prior to empirical analysis, Augmented Dickey-Fuller (ADF) test was performed in testing the presence of unit root in time series. Akaike Information Criterion (AIC) helped to determine the number of lags to ensure that serial correlation in the time series is absent. Johansen Cointegration test helped to find out the long-run equilibrium relationship between FDI and economic growth. Using the Vector Auto Regressive (VAR) model, the relationship based on the integrations of the variable was identified. Granger causality test was focused in this study to check the causal relationship between FDI and economic growth, and other variables in the growth equation.

Results and discussion

Before moving to estimate time series analysis, stationary of the all variables was checked using Augmented Dickey Fuller (ADF) test along with the Akaike information criterion. The result indicated that all variables become stationary at their first difference (See Table 1). The optimal number of lag value, which is 3 for the Endogenous variables of GDP, FDI, GFCF, OPR, and EMP, was selected via Akaike Information Criterion.

Table 1 Result of the unit root tests – ADF

Variable	Constant		Trend + constant		None	
	Statistics	Critical value	Statistics	Critical value	Statistics	Critical Value
LnY_t	-4.8631		-4.8265		-0.8226	
ΔlnY_t	-9.7702		-9.6354		-9.9016	
$LnFDI_t$	-15.458		-3.7845		1.1130	
$\Delta lnFDI_t$	-7.9552		-7.8440		-7.9063	
$LnGFCF_t$	-0.6081		-1.9213		3.6033	
$\Delta lnGFCF_t$	-3.6852	-2.94	-3.6363	-3.54	-2.9792	-1.95
$LnOPR_t$	-3.6180		-4.3219		-0.9882	
$\Delta lnOPR_t$	-6.7230		-6.1102		-6.8239	
$LnEMP_t$	-0.6612		-3.7224		2.2630	
$\Delta lnEMP_t$	-6.1393		-5.9619		-5.4196	

According to the Cointegration test, both trace test and maximum-Eigen statistic were used to conclude the data on the FDI, GFCF, OPR, EMP, and GDP growth rate in the Sri Lankan context. The data were used in its initial form rather than the 1st or 2nd deference forms, to run the cointegration test.

Table 2 provides the test results where first column is the number of cointegration equation/s, which implies the null hypotheses of cointegration test.

Table 2 Results of the Cointegration test

	Unrestricted Co-integration Rank Test					
	Trace Test			Maximum Eigenvalue Test		
Number of co-integrating Equation	Statistics	Critical Value (5%)	Probability	Statistics	Critical Value (5%)	Probability Value
None*	145.243	69.818	0.000	54.212	33.876	0.000
At most 1*	91.031	47.856	0.000	42.972	27.584	0.000
At most 2*	48.058	29.797	0.000	33.621	21.131	0.000
At most 3	14.437	15.494	0.071	13.955	14.264	0.055
At most 4	0.482	3.841	0.487	0.4823	3.841	0.487

*Note: *Rejected Null Hypothesis*

Trace test indicates that the 3 null hypotheses; none, at most 1, and at most 2, were rejected because they indicate higher trace statistics than the critical value and the probability values are less than 0.05. Other two null hypotheses shows lower trace statistics than the critical values, and signifies a higher probability value than 0.05. Therefore, three cointegrating equations or three error terms exists at 0.05 level. In addition, the Max-eigenvalue test indicates the same result: there are three cointegrating equations at the 0.05 level. The trace test and Max-eigenvalue test indicate that all four variables are cointegrated or have a long-run association.

Since all variables are co-integrated, the researcher used Vector Error Correction Model (VECM) to assess the impact of the independent variables (FDI, GFCF, OPR, and EMP) on the dependent variable (GDP Growth). Table 3 provides the VECM results which imply the short-run impact of independent variables on the dependent variable.

According to this model, there is a positive impact of FDI, GFCF, and EMP on the dependent variable; however, there is a negative impact of OPR on the dependent variable. This study identified that the actual impact of FDI can be felt after a three year time lag. Also the actual impact of GFCF can arise after a time lag of two years, whereas the actual impact of OPR and EMP on GDP will happen after a one-year time lag.

$$Ln\ Y_{ti} = -0.595177 + 2.084656\ \Delta LnGDP_{t-1} + 1.254150\ \Delta LnGDP_{t-2} + 0.571646\ \Delta LnGDP_{t-3} + 0.180954\ \Delta LnFDI_{t-3} + 1.886971\ \Delta LnGFCF_{t-2} - 4.415748\ \Delta LnOPR_{t-1} - 3.891795\ \Delta LnOPR_{t-2} + 37.34746 \Delta LnEMP_{t-1} + u_l \quad (2)$$

The higher R-squared value (0.814766) indicates that the model has a better goodness of fit, and the F statistics (4.154224) is significant at the 0.05 significant level. Hence, the model has a better overall significance.

Table 3 VECM Coefficient

Model	Coefficient	Standard Error	t Statistics	Probability
Constant	-0.595177	0.210052	-2.833476	0.0115*
$\Delta LnGDP_{t-1}$	2.084656	0.601408	3.466290	0.0030*
$\Delta LnGDP_{t-2}$	1.254150	0.380429	3.296668	0.0043*
$\Delta LnGDP_{t-3}$	0.571646	0.217502	2.628233	0.0176*
$\Delta LnFDI_{t-1}$	0.054021	0.283886	0.190291	0.8513
$\Delta LnFDI_{t-2}$	-0.127314	0.231892	-0.549022	0.5901
$\Delta LnFDI_{t-3}$	0.180954	0.077210	2.343652	0.0315*
$\Delta LnGFCF_{t-1}$	-0.696889	0.889095	-0.783819	0.4439
$\Delta LnGFCF_{t-2}$	1.886971	0.710954	2.654138	0.0167*
$\Delta LnGFCF_{t-3}$	0.750474	0.745141	1.007158	0.3280
$\Delta LnOPR_{t-1}$	-4.415748	1.718336	-2.569782	0.0199*
$\Delta LnOPR_{t-2}$	-3.891795	1.736106	-2.241680	0.0386*
$\Delta LnOPR_{t-3}$	-1.407346	1.411766	-0.996869	0.3328
$\Delta LnEMP_{t-1}$	37.34746	11.90490	3.137150	0.0060*
$\Delta LnEMP_{t-2}$	15.78207	10.36440	1.522718	0.1462
$\Delta LnEMP_{t-3}$	9.907547	10.23400	0.968101	0.3466

*Note: *Significant at 5%*

To detect whether the models in which GDP is a dependent variable has any statistical errors, above three tests were used as in Table 4.

Table 4 Results of Errors checking of the model

Test	**Statistics**	**Probability**
Breusch-Godfrey Serial Correlation LM Test	1.874127*	0.5989***
Heteroskedasticity Test: Breusch-Pagan-Godfrey	16.76424*	0.6682***
Normality Test	0.507223**	0.775993***

*Note: *Observed R^2Statistics, **Jarque-Bera Statistics, ***Significant at 0.05 level*

According to Breusch-Godfrey Serial Correlation LM Test, the probability value (0.5989) is higher than 0.05, which denotes that this model is not suffering from a serial correlation problem. Considering the Heteroskedasticity Test, Breusch-Pagan-Godfrey indicates a higher probability value (0.6682) than 0.05. Therefore this model does not have heteroskedasticity. The normality test, i.e. Jarque-Bera

Statistics probability value (0.775993), which is higher than 0.05 means that the residuals of this model are normally distributed. Therefore this model has not suffered from any statistical error.

Granger causality test was employed to test the direction of the causality among the study variables and the results of the Granger causality test is presented in Table 5. The results indicate that FDI does not cause GDP, and GDP does not cause FDI; hence, the probability value is higher than 0.05. The same happens between GFCF and GDP, and OPR and GDP. However, EMP Granger causes GDP, but this causality is significant only at 0.10 significant level without any reverse relationship between these two variables. This indicates that this relationship is rather weak since it is only significant at 0.10 level.

Table 5 Results of the Granger Causality test

Variable	Direction	Number of Lags	F Statistics	Probability Value	Granger Causality
ΔY &ΔFDI	Y → FDI	3	0.84003	0.4830	No
	FDI → Y	3	0.51177	0.6773	No
ΔY &ΔGFCF	Y → GFCF	3	0.46303	0.7313	No
	GFCF → Y	3	0.43259	0.7313	No
ΔY &ΔOPR	Y → OPR	3	1.16256	0.5418	No
	OPR → Y	3	0.73127	0.5418	No
ΔY &ΔEMP	Y → EMP	3	1.00632	0.4041	No
	EMP → Y	3	2.63062	0.0689*	Yes

**Significant at 10% level*

Conclusion

This study focuses on finding the impact of FDI on economic growth in Sri Lanka, using data from the last 40 years. According to the Johansen test of co-integration, a long-run relationship exists among variables such as Economic Growth (GDP), Foreign Direct Investment (FDI), Gross Fixed Capital Formation (GFCF), Openness of Trade (OPR), and Employment (EMP). The short-run impact was identified by using Vector Error Correction model and it suggested a short-run positive impact of FDI, GFCF, and EMP on economic growth, but there is a negative impact of OPR on economic growth.

This study further identified that the actual impact of FDI can be felt after a time lag of three years. However the contribution of FDI on GDP is low compared to other variables. Granger Causality test analyses the causal relationship among the variables, and the result concludes the nonexistence of a bidirectional or unidirectional relationship between FDI and GDP. The same result was observed between GFCF and GDP, and also between OPR and GDP. However, there is a unidirectional relationship between EMP and GDP, and EMP Granger causes GDP. But the relationship is fairly low. Among the few studies related to Sri

Lankan context, result of this study reveals an identical outcome; a positive impact of FDI on economic growth with other four investigations of Bogahawatte and Balamurali (2004), Mustafa (2013), Deyshapriya (2010), and Athukorala (2003). Consequently, Velnampy et al. (2013) identified a negative impact of FDI on economic growth in Sri Lanka, which differ from the present results.

In the Sri Lankan context, there is a positive impact of FDI on Economic growth, which indicates the possibility to obtain higher economic growth by utilizing higher FDI inflows. Therefore, this study strongly suggests improving the factors affecting higher FDI inflows in Sri Lanka, in order to build and maintain adequate and supportable infrastructure facilities, to obtain economic and political stability, to increase the appropriate and skilled full human resource, to maintain tax rates, and to access raw materials smoothly.

Keywords: *Economic growth, employment, foreign direct investment, gross fixed capital formation, openness of trade.*

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