The Nexus Between Economic Growth, Foreign Direct Investment and Environmental Pollution in Sri Lanka

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Abstract

Introduction - Globalization, liberalization and the exchange of capital flows are the most significant features in modern economics that have played a vital role in almost every economy. Meanwhile, in the recent past, the world heavily moves onto several manufacturing industries with highly pollution intensive. Therefore, the study focuses on the bidirectional and multidirectional nexus between these three variables over a long-time horizon.

Design/methodology/approach The sample is based on Sri Lanka covering the period from year 1978 to 2019. Data was collected through secondary data sources such as United Nations Conference on Trade and Development and the world development indicators. The data was tested using time series ARDL regression model.

Findings –Foreign Direct Investments and Gross Domestic Production has a significant impact towards each other's, while, Gross Domestic Production and Carbon Dioxide (proxy for the environmental pollution) and Foreign Direct Investment does not have a significant impact. Form the Bound test it was proven that Gross Domestic Production and Carbon Dioxide does not have a long-term relationship indicating no cointegration.

Conclusion – It is revealed that in the case of Sri Lanka, the significant economic opportunities to support economic development in the host economy are not brought by FDI inflows. It is not feasible to accept FDI inflows as the catalyst for economic growth, however the study offers evidence for a long-term correlation between GDP and FDI inflows. The instability of Foreign Direct Investments inflows and the home country's market cycle has reduced the effect of Foreign Direct Investments inflows on economic development of the country.

Keywords–Economic Growth, Environment Pollution, Foreign Direct Investment

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1. Introduction

In the recent decades, the world's economies have been changing drastically. Globalization, liberalization and the exchange of capital flows are the most significant features in modern economics that have played a vital role in almost every economy. In the near history, the world heavily went into manufacturing industries those were high pollution intensive. Then after identifying the effect of pollution on the environment, the whole world tends to concern about the environment simultaneously achieving economic performance goals. Therefore, the whole world understood the significance of the development with sustainability.

Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Therefore, this study is addressing the level of sustainable development achieved by Sri Lanka which is encouraged by Foreign Direct Investment (FDI) inflows. This study is focused on the relationship among FDI inflows, economic growth and the environmental effects in Sri Lanka as a developing country.

The capital inflows from foreign countries to the host economy in order to construct new facilities and for land business are taken into FDI and It is very different from the investments in stock markets. Stock market investments could be withdrawn easily when there are uncertainties in the host economy, but FDI has the characteristic of long lasting since investors cannot easily abandon buildings, lands and facilities. Therefore, FDI inflows are considered

very crucial for economic development. Throughout the period of late 80s and 90s, FDI inflows rapidly came to almost all the territories in the whole world. According to United Nations Conference on Trade and Development UNCTAD, (2013), the portion of the FDI inflows to developing economies had increased to 52% in 2013 from 17% in 1990s as a proportion of world's total FDI. UNCTAD, (2019) shows that Asia has absorbed 39% of global FDI inflows in 2018. The data show that more FDI inflows have been coming for recent two decades. Liberalization that has taken place in those countries was one of the major reasons for that FDI inflows increase and thereby countries themselves lead to a high growth. According to De-Mello, (1997), one of the most important factors that determines FDI inflows is privatization and liberalization in developing economies.

The relationship of these costs and benefits of FDI inflows have been separately identified in the past empirical studies. Chakraborty and Basu, (2002), Ericsson and Irandoust, (2001) and some others have studied the relationship between the economic growth and FDI inflows. The connection between pollution and FDI inflows has been studied by Merican, Zulkornain, Zaleha and Law, (2007). The relationship between the economic growth and pollution has been studied by Coondoo and Dinda, (2002). However, only in very recent studies, these three variables have been linked together (Lee, 2009; Neelakanta, Gundimeda, & Kathuria, 2014)

Previous studies had a huge limitation of only having short and limited time series data. That led to the inability to study the simultaneous impact of these three variables. Pesaran, Shin and Smith, (2001) has developed the bounds test by which the limitations of the work of existing literature can be overcome. It allows to have an integration of

the long run relationships and short run relationships of the given three variables in an empirical foundation. The relationship among economic growth, FDI inflows and environment in Sri Lanka can be studied by applying bounds test by employing data for the given period from 1978 to 2016 in this background.

Measuring the environmental effect is very crucial since there is no exact variable to measure pollution or the effect on the environment. In empirical testing, the researchers have taken air pollution and water pollution as the proxy for the environmental effect since dirty industries' operations cause them both to occur. Combining both these does not mean much more conceptual. However, air pollution is inevitable from economic activities, especially in productions when it is compared to water pollution since one can employ better water management systems. Therefore, arriving at air pollution is a better option for selecting the variable to determine the degradation of environment referring to FDI inflows. There are two categories of air pollution such as local and global air pollutants. Sulfur dioxide (SO2), carbon monoxide (CO) and nitrogen oxide (NOx) can be recognized as the main local air pollutants. However, carbon dioxide (CO2) is the worldwide recognized main global air pollutant. Therefore, selecting CO2 emissions as the proxy of environment is very appropriate in this background because research implications can be drawn far extending to the international environment as CO2 is in the global recognition. Many developing economies had a sharp growth after formulating macroeconomic policies. The awareness was pointed out to the influences of differences among environmental laws, regulations and executions. In that sense, selection of Sri Lanka is very important and appropriate since Sri Lanka has been ranked as the 88th

highest contributor to the total global carbon dioxide emissions in 2014 (Boden, Andres, & Marland, 2017). It has been a moderate measurable with regard to the population.

However, due to the complexity of the behavior of economic growth, FDI inflows and environment, no such specific relationships can be easily generalized for every country. On the other hand, there are no current researches comprising all these three variables in the Sri Lankan context, therefore, the current study contributes to the literature by examine the nexus between the economic growth, FDI inflows and environment in Sri Lanka.

2. Literature Review

2.1 Theoretical background

The conceptual relationships between economic growth and FDI inflows can be discovered back in early neoclassical growth models. Neoclassical growth models state that FDI inflows bring the capital to the host economy and the increment in the capital stock causes the stimulation of economic growth. Considering the New growth theory, the theory emphasizes that technological improvements accompanied by FDI inflows intensify economic growth in both long term and short term. In fact, FDI inflows bring new technologies and knowledge to host economies. The basic theoretical concept is that FDI inflows stimulate the economic growth. In other words, FDI inflows positively affect economic growth owing to the technology transfer and “knowledge spillovers”. In the literature, there are many studies that also ensure this basic concept.

2.2 Empirical evidence

Sufficient amount of literature has been published regarding the given topic throughout the recent decades. Many empiricists have strived to find out the level and aspects of sustainable development throughout the existing literature. Makki and Somwaru, (2004) have studied a sample containing 66 developing economies and came up with evidence that FDI inflows has a significant positive effect on economic growth. In examining for causality for 31 developing economies, Hansen and Rand, (2006) have found that FDI inflows positively affect GDP in the long term in the panel data setting. Hsiao and Hsiao, (2006) have studied some east and southeast countries. In the study the empiricists could find that there is a unidirectional relationship of FDI's impact on GDP.

A study conducted by Faruku, Asare, Yakubu, & Shehu, (2011) has revealed that FDI positively affects GDP in Nigeria and further emphasized that the government needs to formulate strategies to improve FDI incoming. Blomstrom, Lipsey and Zejan, (1994) have recognized that FDI inflows affect significantly positively on economic growth only for the developing economies having higher income but no effects on those having lower income. Borensztein et al. (1998) have studied 69 developing economies. Their results have suggested that FDI inflows have a more significant positive effect on economic growth only if the host economy has an adequate capacity to absorb the advanced technology brought by FDI inflows since FDI is an instrument for transferring the advanced technology.

However, in the literature, there are some studies that have questioned the basic theoretical concept of FDI promoting the economic growth. Carkovic and Levine, (2002) have stated that in developing economies, there is no applicable significant positive effect of FDI on economic growth. Belloumi, (2014) has proposed that in the short term, there seems not to have a causality between economic growth and FDI in Tunisia. Alfaro, (2003) has found that FDI negatively affects the growth in the primary sector, even though positively affects in the manufacturing sector. By analyzing a sample of 28 developing economies, Herzer, Klasen and Lehmann, (2008) have suggested that there could be a negative association between GDP and FDI assuming that a considerable amount of domestic investment is not crowded out by FDI.

On the other hand, the relationship between FDI and economic growth does not have to be unidirectional always. Economic growth may also stimulate FDI inflows due to new market opportunities created by the growth.

In the existing empirical studies, some empiricists have strived to recognize the relationship between environment and economic growth. In examining Granger causality relationship, Liu, (2006) found that there is a long-term association to CO2 emission running from GDP in Norway. Menyah and Rufael, (2010) have recognized that there is a unidirectional causality to economic growth from pollutant emissions in South Africa. Kim, Lee and Nam, (2010) have provided evidence that there is a mutual, two-way causality between economic growth and CO2 emission in Korea in testing the nonlinear Granger causality. Saboori, Sulaiman and Mohd, (2012) have found that there is no causality between economic growth and CO2 emissions in the short term but found a long-term unidirectional

causality relationship to CO2 emissions from economic growth in Malaysia. In the existing literature, a limited number of empiricists have investigated the relationship between FDI inflows and the environment. Merican et al. (2007) studied the relationship between FDI and pollution in the Philippines, Singapore, Indonesia, Thailand and Malaysia by using Autoregressive Distributed Lag (ARDL) approach. In the study, the empiricists have found that FDI inflows have become a cause to increase pollution in the Philippines, Thailand and Malaysia. However, that relationship could not be found in Indonesia since the study has depicted a negative relationship between pollution and FDI inflows. There are very few empirical studies which account for all these variables together.

Taking economic growth, FDI inflows and environmental quality together for the analysis is very important to identify the whole concept working behind the developing economies. That is also very significant to understand the level and trends of sustainable development, especially in developing economies since FDI inflows play a major role in the developing economies. Lee (2009) has investigated the relationship among the given variables in Malaysia by using the bounds test developed by Pesaran, Shin and Smith, (2001) to identify the long term relationships and using the Granger causality test to identify the causal relationships in the long term and short term. The empiricist has found unidirectional Granger causalities moving from FDI inflows to CO2 emissions, from FDI inflows to GDP and from CO2 emissions to GDP in the short term. A unidirectional Granger causality moving from GDP to FDI in the long term has also been found in the study. Neelakanta, Gundimeda and Kathuria (2014) have examined the relationship between economic growth, FDI inflows and pollution for India using ARDL

approach. The results have illustrated that there is a bidirectional Granger causality relationship between FDI inflows and CO2 emissions, a bidirectional Granger causality relationship between FDI inflows and GDP, and a unidirectional Granger causality relationship moving from GDP to CO2 emissions in the short term. On the other hand, the study has depicted unidirectional Granger causalities moving from GDP to CO2 emissions, from FDI inflows to CO2 emissions, and GDP to FDI inflows in the long term. Acharyya, (2009) has found that FDI inflows positively and marginally affect economic growth in the long term in India. The study has also depicted that FDI inflows positively and heavily affect CO2 emissions due to the growth led by FDI inflows in the long run.

Literature regarding the Sri Lankan context, there are very few limited numbers of studies carried out for examining the association between FDI inflows and economic growth. Balamurali and Bogahawatte, (2004) have studied the association between economic growth and FDI in Sri Lanka by using sample of data for the time period from 1977 to 2003. The empirical results have shown that FDI inflows have become a main factor in determining economic growth in Sri Lanka after the year 1977. Furthermore, the empiricists have shown that FDI inflows apply itself an independence impact on economic growth and suggested an equilibrium association between GDP and FDI inflows in the long term. The study has provided evidence for a bidirectional Granger causality relationship between the given two variables. However, in general the empiricists have suggested that FDI inflows have a supportive impact on economic growth in Sri Lanka and promoting FDI inflows may potentially be in effect of stimulating economic growth. Thilakaweera, (2012) has studied the relationship among economic growth, FDI inflows and level of

infrastructure in Sri Lanka for the time period from 1980 to 2011. The empirical results have indicated an association among real per capita GDP, FDI inflows and infrastructure level in the long term. The study has not shown a positive association between GDP and FDI in the long term for the given time period because of the insignificant estimated coefficient while having a negative sign itself. However, the empiricist has suggested that enhancement of income level in Sri Lanka might positively impact on attracting FDI inflows for infrastructure development and thereby in fact a unidirectional causality relationship runs to FDI from the level of infrastructure. Samantha and Haiyun, (2017) have studied the effect led by FDI inflows on economic growth in Sri Lanka for the time period from1978 to 2015 by adopting ARDL approach. The empirical results have indicated that FDI inflows positively, but weakly impact on economic growth in the long run. However, the empiricists have suggested that it alone is not a very important determinant for stimulating the economic growth in Sri Lanka. Furthermore, the empirical results have provided evidence for a unidirectional causation running from economic growth to FDI inflows. Konara and Wei (2017) have found that there are direct positive impacts of FDI even if negative "spillover effects" on local firms in Sri Lanka. Sriyalatha, (2019) has identified that there is a unidirectional causality running to CO2 emissions from economic growth in Sri Lanka.

The empirical results of the existing literature show complex and mixed relationships among economic growth, FDI and environment across various geographical areas and countries. On the other hand, empirical results in the case of the Sri Lankan context don't show the whole concept taking all the variables together into the study. Therefore,

it is obviously required to empirically observe these relationships, especially in the Sri Lankan context in order to render insights for Sri Lankan policy makers on how to better manage sustainable economic development led by FDI as a developing economy.

3. Methodology

3.1 Data, Population, and the Sample

The data sample consists of the data for the time period from 1978 to 2019. FDI data were collected from UNCTAD. CO2 emission data was collected from EDGAR and GDP data was collected from the world development indicators. All the data was publicly available on the given websites of the related international agencies. Annual data for the given three variables was used in the study. In order to examine their empirical relationships, the study uses a data set of 43 years beginning from 1978 to 2019 which is the time period of the study.

3.2 Empirical Model

In accordance with the existing literature, the ARDL cointegration approach was used to observe the association among the economic growth, FDI inflows and environment in Sri Lanka. Generally, in most cases, macroeconomic variables are stationary either at level or first difference [I(0) or I(1)].Augmented Dickey Fuller Unit Root Test was employed to test the stationarity of the given three variables. Wald statistic or the joint F-statistic provides the basis

for testing the cointegration among the given variables and the bounds test is used in the ARDL approach to check the null hypothesis of no cointegration in the below mentioned equations.

$$\Delta GDP = \beta_0 + \beta_1 GDP + \beta_2 FDI + \beta_3 \Delta FDI + \varepsilon \ldots\ldots\ldots\ldots\ldots\text{Equation 1}$$

$$\Delta GDP = \beta_0 + \beta_1 GDP + \beta_2 CO2 + \beta_3 \Delta CO2 + \varepsilon \ldots\ldots\ldots\ldots\ldots\text{Equation 2}$$

$$\Delta FDI = \beta_0 + \beta_1 FDI + \beta_2 GDP + \beta_3 \Delta GDP + \varepsilon \ldots\ldots\ldots\ldots\ldots\text{ Equation 3}$$

$$\Delta FDI = \beta_0 + \beta_1 FDI + \beta_2 CO2 + \beta_3 \Delta CO2 + \varepsilon \ldots\ldots\ldots\ldots\ldots\text{ Equation 4}$$

$$\Delta CO2 = \beta_0 + \beta_1 CO2 + \beta_2 GDP + \beta_3 \Delta GDP + \varepsilon \ldots\ldots\ldots\ldots\ldots\text{Equation 5}$$

$$\Delta CO2 = \beta_0 + \beta_1 CO2 + \beta_2 FDI + \beta_3 \Delta FDI + \varepsilon \ldots\ldots\ldots\ldots\ldots\text{ Equation 6}$$

$$\Delta GDP = \beta_0 + \beta_1 GDP + \beta_2 CO2 + \beta_3 \Delta FDI + B4CO2 * FDI + + \varepsilon \ldots\text{ Equation 7}$$

Where,

$\beta 0$= Constant variable $\beta 1 \ldots$n= Coefficient of constant term, FDI = Foreign Direct Investment, GDP = Gross Domestic Production, CO2= Environmental Pollution, ε= Error Term.

3.3 Hypotheses of the study

The following hypotheses were developed for this study in order to examine the relationship among dependent and independent variables.

H1: There is a significant impact from FDI on economic growth

H2: There is a significant impact from environmental pollution on economic growth

H3: There is a significant impact from Economic Growth on FDI

H4: There is a significant impact from Environmental Pollution on FDI

H5: There is a significant impact from Economic Growth on Environmental Pollution

H6: There is a significant impact from FDI on Economic Environmental Pollution

H7: There is a significant impact from Environmental Pollution and FDI towards Economic Growth.

4. Data analysis and discussion

4.1 Descriptive Analysis

As per the above table 1 outcome of GDP, among 41 observations the average value and the middle value of the series is 92.34 and 56.00 respectively. The highest and the lowest values are 466 and -175 respectively. Also, the standard deviation of this series is 126.28 and can see that the data series is not much deviated from the mean.

There is a positive skewness of 1.26 and GDP has a Leptokurtic distribution with a value of 4.73 and it's higher than 3.

According to table 4.1 outcome of FDI, among 41 observations the average value and the middle value of the series would be 0.88 and 1.00 respectively. The highest and the lowest values are 23 and -40 respectively. Also, the standard deviation of this series is 10.12 and can see that the data series is deviated from the mean. There is a positive skewness of 8.59 and FDI has a Leptokurtic distribution with a value of 8.59 and it's higher than 3. Environmental pollution (CO2) variable is consist of 41 observations, the average value and the middle value of the series would be 0.013and 0.010 respectively. The highest and the lowest values are 0.14 and -0.10 respectively. Also, the standard deviation of this series is 0.05 and can see that the data series is not much deviated from the mean. There is a negative skewness of -0.084 and CO2 has a Leptokurtic distribution with a value of 3.79 and it's higher than 3.

Table 1: Descriptive statistics

	GDP	**FDI**	**CO2**
Mean	92.34	0.88	0.013
Median	56	1	0.01
Maximum	466	23	0.14
Minimum	-175	-40	-0.1
Std. Dev.	126.28	10.12	0.05
Skewness	1.26	-1.31	-0.084
Kurtosis	4.73	8.59	3.756

Source: Authors' analysis, 2021

4.2 Unit Root Test

Stationarity were tested using Augmented Dickey-Fuller test (ADF) test.

- H0: Variable is stationery (Not Unit root)
- H1: Variable is not stationery (unit root)

As per the results of the table 2, the P-value of GDP was 0.00002 that means it's less than 0.05 and the null hypothesis is accepted and alternative hypothesis would be rejected. similarly, in FDI and CO2 P-values were 0.00010 and 0.0000 respectively, which means its stationery under the significance level of 95% and P-value is less than 0.05. Therefore, can accept the null hypothesis and accept the alternative hypothesis.

Table 2: Unit Root Summary Results

Variable	P-Value	Stationery Level	Null Hypothesis
GDP	0.00002	1st Level	Accepted
FDI	0.0001	1st Level	Accepted
CO2	0.0000	1st Level	Accepted

Source: Authors' analysis, 2021

4.3 Optimum ARDL Model Estimation

When selecting the optimum number of lag in ARDL model should select the determined by using lowest Schwarz Information Criterion (SIC) and Akaike info criterion (AIC). The following table would indicate the summary of optimum lags of all models of this study

Table 3: Optimum Lag Summary

Model	Equation	No of Lags	AIC	SIC
1	GDP = C+FDI	4,0	11.661	11.922
2	GDP = C+CO2	4,4	12.227	12.662
3	FDI = C+GDP	4,2	6.723	7.067
4	FDI = C+CO2	4,3	7.339	7.726
5	CO2 = C+GDP	1,0	-3.107	-2.98
6	CO2 = C+FDI	1,2	-3.231	-3.018
7	GDP = C+CO2+FDI	4,0,0	11.715	12.02

Source: Authors' analysis, 2021

4.4 Regression Analysis

As per the table 4 there is a positive relationship between Gross Domestic Production (GDP) and foreign Direct Investment (FDI) and which is significant at 1% level. The model 2 shows a positive relationship between Gross Domestic Production (GDP) and Environment Pollution (CO2) but the variable is insignificant. As per the Model 3 there is a positive relationship between Foreign Direct Investments (FDI) and Gross Domestic Production (GDP) and it is significant at 5% level. The model 4 shows a negative relationship between Foreign Direct Investments (FDI) and Environment pollution (CO2) but the impact is not significant. The model 5 shows a negative relationship between Environment pollution (CO2) and Gross Domestic Production (GDP) indicating an insignificant impact. The model 6 shows a negative relationship between Environment pollution (CO2) and Foreign Direct Investments (FDI) but FDI have an insignificant impact towards CO2.

The model 7 shows a negative relationship between Environment pollution (CO2) and Gross Domestic Production (GDP), while there is a positive relationship between Foreign Direct Investments (FDI) and GDP. Therefore, CO2 have an insignificant impact towards CO2 and FDI has a significant impact towards GDP.

Table 4: Regression analysis summary

Models	Coefficient	Prob.	R-squared	Durbin-Watson stat
Model 1: FDI on GDP (M1)	6.6279	0	0.7075	2.3143
Model 2: CO2 on GDP (M2)	498.3263	0.199	0.5849	2.1888
Model 3: GDP on FDI (M3)	0.059174	0	0.9126	2.4704
Model 4: CO2 on FDI (M4)	-30.52406	0.248	0.8465	1.9888
Model 5: GDP on CO2 (M5)	-1.93	0.7601	0.0926	1.9762
Model 6: FDI on CO2 (M6)	-0.00107	0.1927	0.2937	1.9494
Model 7: CO2 and FDI on GDP (M7)				
DCO2	-9.19243	236.8628	-0.0388	0.9693
DFDI	6.6268	1.3664	4.84962	0.0000

Source: Authors' analysis, 2021

Those previous empirical reviews on various countries have improve the understanding about the nexus between economic growth, foreign direct investments and environment pollution. In order to promote rapid economic growth, nations are increasingly becoming more interconnected and are opening up to free markets as a result of

globalization. Economic and technical forces drive foreign production expansion, which is encouraged by trade policy liberalization and expanded flows of FDI. Therefore, many countries are adopting liberal economic policies to promote more capital inflows from developed countries, particularly the least developed countries (Bengoa & Sanchez-Robles 2003).

Today, in the context of technology transition and business networks that can result in productive development and revenue internationally, the value of FDI has increased. In developed countries, FDI inflows have also risen remarkably over the past few decades. Global buyers benefit from the effective utilization of their money and services by FDI, while recipients are supposed to benefit from technological security and become active in foreign trading networks (Louzi & Abadi, 2011). Therefore, the question inevitably emerges as to whether these inflows of FDI have any influence on local growth, and vice versa. Therefore, this problem requires an empirical investigation (Figlio and Blonigen 2000). Since one of the indicators of the extent of growth is the gross domestic product (GDP), this analysis aims to examine the relationship between FDI and GDP in Bangladesh.

Brems (1970) added that FDI has historically been treated as an addition to the capital stock of the host country, according to the Solow-type conventional neoclassical growth model, hence increasing growth (Kotrajaras 2010). In the neoclassical development model, however, Solow (1956) regarded technical progress and labor as exogenous, and so FDI only raises the level of income, so it does not have a long run growth effect if it does not increase productivity because long-term growth can only be improved by technological and population growth, and

that means if FDI has a positive influence on technology, then it can (Miankhel, Thangavelu & Kalirajan 2009). Hoang, Wiboonchutikula and Tubtimtong (2010) have explained that under its commitment to capital accumulation, FDI can only influence the amount of revenue without affecting the long-term growth rate since, from a neoclassical viewpoint, under the presumption of declining returns to capital.

In the long run, GDP positively impacts FDI inflows. That means that GDP describes FDI inflows primarily in the long run. Economic growth offers optimistic signs on developing and sizeable opportunities for global companies. It is very likely for multinational firms to recover the fixed cost by benefiting from "economies of scale" as the host economy grows larger. The presence of adequate infrastructure, such as transport, electricity supply and telecommunications, promotes FDI inflows to increase the competitiveness of investments and reduce transaction costs. FDI inflows, on the other hand, are stimulated by public expenditure on human resources and technology. Provided that the volume of infrastructure and education spending is considered part of GDP, GDP growth tends to provide the resources needed for infrastructure funding and the production of human capital. Education achievements are also constructively influenced by better living conditions and rapid economic development. Therefore, in the local sector, the skills needed are more available to international companies. Human resources and infrastructural growth occur only with the economic development of the nation and impact FDI inflows favorably.

This analysis indicates no link between either FDI inflows and CO2 emissions, or GDP and CO2 emissions. CO2 emissions, on the other hand, are often explained by a country's energy usage, such as fuel consumption. Evidence for a high association between energy use and economic growth is given in the current literature (Ferguson, Wilkinson & Hill, 2000). In this research, however the evidence does not support that form of relationship. On the other hand, the report does not have proof that Sri Lanka is getting FDI inflows linked to dirty industries.

It is clear that the common belief that FDI is an economic growth engine could be wrong. Therefore, macroeconomic strategies should be developed by Sri Lankan policymakers in order to invest in emerging technology, schooling for the citizens of the country and its infrastructure. It is less constructive to encourage economic growth following "incentive schemes" offered under the categorization of (UNCTAD, 1996) such as "financial incentives", "fiscal incentives" and other incentives" to create a conducive atmosphere in order to catch more and more FDI inflows as there is a long-term partnership between FDI and GDP in Sri Lanka. To promote economic development, energy consumption should be carried out in a more thoughtful way. Environmental management is very important because of sustainable progress. The Sri Lankan authorities should take the requisite measures to resolve environmental problems and safeguard the environment, as environmental conservation does not in the long run, conflict with economic growth.

4.5 Bound Test

The study adopt the ARDL bound testing process, which is very successful even for various stages of integration and limited sample sizes of 30 to 80 observations, unlike other conventional co integration strategies. On the other hand, conventional approaches to co-integration are susceptible to small sample sizes. The ARDL bound research approach also takes endogenous repressors into account and also offers accurate estimates of the long-term and true significance of t-statistics (Harris & Sollis, 2003).

Table 4.6: Bound Test Results Summary

Variables	F-Stat	Lower Bound	Upper Bound	Decision
GDP and FDI	9.45	3.62	4.16	Cointegration
GDP and CO2	0.62	3.62	4.16	No cointegration
FDI and CO2	9.99	3.62	4.16	Cointegration

Source: Authors' analysis, 2021

If the Bound test F stat is higher than lower and upper bound, that there is cointegration and if the F-stat is less than lower bound which would lead to no cointegration. The following hypothesis of bound test can evaluate,

H0: There is no co-integration among Real GDP & FDI

GDP and FDI variable F-stat is 9.45 while upper bound is 4.16 under the significance level of 95%. Which means it's higher than the upper bound and will lead to a Cointegration. Therefore, can reject the null hypothesis and accept the alternative hypothesis.

H0: There is no co-integration among Real GDP & environmental pollution(C02)

GDP and CO2 variable F-stat is 0.62 while lower bound is 4.16 under the significance level of 95%. Which means it's lower than the lower bound and will lead to a no-cointegration. Therefore, can accept the null hypothesis and reject the alternative hypothesis.

H0: There is no co-integration among FDI & environmental pollution(C02)

FDIand CO2 variable F-stat is 9.99 while upper bound is 4.16nder the significance level of 95%. Which means it's higher than the upper bound and will lead to a Cointegration. Therefore, can reject the null hypothesis and accept the alternative hypothesis. Therefore, only GDP-FDI model and FDI – CO2 model has long term relationship, while GDP-CO2 model does not have a long-term relationship as per the results of Bound test.

5. Conclusion and Recommendation

The study only offers evidence for a long-term correlation between GDP and FDI inflows. The data does not support the beneficial impact of FDI inflows on economic growth in the long term. The findings of the analysis affirm the results (Vijayanathan, Chellakumar & Arul, 2014) and partly confirm with the results of Rajapakse (2016). Therefore, it revealed that in the case of Sri Lanka, the significant economic opportunities to support economic development in the host economy are not brought by FDI inflows. It is clear that, it is not feasible to accept FDI inflows as the catalyst for economic growth. Pursuant of (Lee, 2009). In the long run, FDI should not be assumed to function with the needs of the host economies. The political causes, the inconsistency and instability of FDI inflows and the home country. The above causes can contribute to the termination of operations of international firms, such that interruptions in the policies and preparations for economic development can take place.

Due to many reasons, such as war and insurgency, political instability, lack of law and order regulation, regulatory barriers, inadequate infrastructure, less trained labor force, high borrowing rates and less transparent trade policy, the perspective of both the local and foreign market sectors towards Sri Lanka's investment environment seems to be weak. The background of investment in Sri Lanka needs to be improved by the construction of infrastructure such as ports, highways, railways and telecommunications, the deregulation of economic activities and the preservation of a consistent commercial agenda, a stable labor market, an effective regulatory system and a tariff

structure (Rajapakse, 2016). A stronger collection of policies should be developed by policy makers if they plan to accomplish economic growth by consuming further FDI inflows.

Future studies could be conducted basing on all developed countries as a whole (Panel ARDL approach). Therefore, those empirical results can be more generalized to the entire set of developing countries. Empiricists, on the other hand, can observe short-term interactions as well.

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