The Effect of Foreign Direct Investment on Trade: Empirical Evidence from Sri Lanka

NPG Samantha

School of Economics, Huazhong University of Science and Technology, Wuhan, Hubei, PR China

samanthanpg@yahoo.com

Abstract:

Foreign direct investment and foreign trade are vital factors in economic growth and development. The purpose of this study is to investigate the long run relationship and short-run dynamics between the two variables in Sri Lankan context. The study applies the ARDL co-integration and bound test for annual time series data covering the period from 1980 to 2016. The empirical test finds a significant positive relationship between FDI and foreign trade in the short run as well as in the long run. The bound test confirms the existence of co-integration relations among the variables. The error term of the ARDL ECM model is statistically significant with expected sign confirming convergence of short-run shocks into the long run equilibrium. All the diagnostic and stability tests confirm the validity of the selected model in policy formulating.

Keywords: Foreign direct investment, Foreign trade, ARDL approach, Complementary effect.

1. Introduction

Sri Lanka was under the British colonial rule over 13 decades and declared as an independent state in 1948. Since the independence, the elected governments from time to time employed different economic policies until 1977. The government, which came to power in 1977, entered a more liberal economic path as the first country in the South Asian region. The targets of the economic policy reforms that covered all the sectors of the economy were private sector-driven economic growth, export-led growth, and FDI promotion.

Just after the liberalization, Sri Lanka recorded substantial improvements in foreign trade as well as FDI. For instance, trade as a percentage of GDP increased to 74 percent in 1978 compared to 64 percent in 1977. The value of inward FDI recorded a remarkable improvement from 1.5 US $ million in 1978 to 47 US $ million in 1979. The first two decades after the liberalization, the 1980s and the 1990s, witnessed substantial growth in export earnings recording 7.4 percent and 11.1 percent annual growth respectively. Sri Lanka could not maintain continuous progress in export earnings that recorded in the 1980s and the 1990s and dropped to 5.11 annual average growths in the 2000s. Furthermore, the value of import expenditure compared to the export earnings has increased significantly over the previous decade by widening the trade deficit. Sri Lanka is experiencing external pressure at present due to high current account deficit and foreign debt services (CBSL 2016).

The impact of FDI on trade flows have been discussed theoretically and empirically in many studies. According to the early theoretical studies, the impact of FDI on trade can be negative in the presence of trade barriers. In other words, both variables can substitute each other. However, the

argument that FDI can be a complement to trade has empirically proved by the studies such as (Lipsey & Weiss 1981; Lipsey & Weiss 1984; Yamawaki 1991; Fukasaku et al. 2000). Markusen, (1997, 2002) have argued that the type of FDI determine whether it is a complement or substitute for trade. The vertical FDI, in its nature, divides the production process into stages and locates geographically different places. Such FDI can be a complement to trade. The other type, horizontal FDI that produce the same product in different locations can be a substitute for trade. Hence, the impact of FDI on trade could be different from country to country, region to region and industry to industry.

This paper is an attempt to investigate the relationship between FDI and foreign trade of Sri Lanka for the period from 1980 to 2016. Sri Lanka is a unique example in the South Asian region employing open economic policies over four decades. Sri Lankan government provided more intensives to the foreign investors establishing specific investment zones. The establishment of the Board of Investment (BOI) and the Export Development Board (EDB) are such steps taken by the government to provide institutional support for investors and exporters. The identification of the relationship between FDI and foreign trade in such a setting is vital in further action. Hence, the findings of the study will provide policy guidance to the policymakers, researchers and government officers to formulate economic policies to achieve economic growth and development. Further, the study will extend the existing literature by adding the result of the long-run relationship of FDI and foreign trade of a country, which employed open economic policies over four decades. This would be an added advantage for the other countries in formulating policies related to trade and FDI.

Following the introduction, the section two of this paper discusses existing theoretical and empirical literature related to FDI and trade relationship. Section three develops the theoretical model. Section four presents the results and discussion. Section five concludes the paper.

2.   Literature Review

The relationship between FDI and trade has long been extensively discussed in the economic literature. According to the Heckscher – Ohlin – Samuelson model (Samuelson 1953); the basis of international trade is the differences of factor endowment and factor prices of homogeneous products in different countries. Mundell (1957) argued that FDI reduces export because it moves capital from one country to another sinking difference of factor endowment and factor prices. According to Purvis (1972), FDI stimulates international trade in the presence of different production functions in different countries. Comparing Japanese and US FDI, Kojima (1973, 1985) showed that Japanese FDI is mainly focused on trade and meets the requirements of the principle of comparative advantage. Kojima also argued that US FDI, which primarily has an oligopolistic market structure, is anti-trade and detrimental in the long run to home and host countries. According to Kojima's macroeconomic approach, export-oriented FDI takes place when the home country invests in sectors where the host country has comparative advantages.

The relationship between FDI and trade can be substitute or compliment depending on the nature and motive of FDI. According to some researchers, there is a complementary relationship between FDI and trade in the presence of vertical FDI. By analyzing firm-level data Lipsey & Weiss (1984) Brainard (1993, 1997) Pfaffermayr (1996) and Clausing (2000) have found a complementary relationship between export and FDI. Analyzing the impact of FDI on the trade of Latin American and Southeast Asian countries, Fukasaku et al. (2000) found a substantial positive impact of FDI on trade in trade-oriented countries. Also, they found that export in Southeast Asian countries is more sensitive to FDI than Latin American countries. By examining FDI-trade interaction, Lane & Milesi-Ferretti (2004), Swenson (2004) and Rose & Spiegel (2004) highlighted that higher FDI inflow leads to higher trade. Further, they argued that larger FDI increases not only trade but also more benefits such as an increase in total factor productivity. Driffield & Love (2007) highlighted the positive

relationship between FDI and host country productivity; thereby increase of export. Using panel data, Anwar & Nguyen (2011) found a complementary relationship between export and FDI as well as import and FDI in Vietnam. Calegário, Bruhn, & Pereira (2014) found a positive long-run relationship between FDI and export only in export-oriented industries in which resource-seeking approaches are more powerful. More recent country-level studies (Akoto 2016; Shamim et al. 2016; Mijiyawa 2017; Clus-Rossouw et al. 2015) have found a positive relationship between export and FDI.

Some researchers have proved empirically the argument of FDI has a negative relationship with the trade. According to Blomström, Lipsey, & Kulchycky (1988), FDI had a negative impact on some industries, thereby FDI substitute to export. The relationship between FDI and trade depends on the nature of production. For example, Svensson (1996) found a negative relationship between FDI and export for finished goods and a positive relationship between FDI and intermediate export goods. Furthermore, FDI motivated to bypass trade barriers such as tariff likely to be negative with exports. According to Blonigen, Tomlin, & Wilson (2004), tariff-jumping FDI had a more negative impact on US domestic firm's exports than another kind of FDI.

By reviewing the existing literature on FDI-trade nexus, we can conclude that the impact of FDI on trade vary according to the country-specific characteristics and nature of FDI. Comprehensive studies related to Sri Lanka in this regard are very limited. Hence, the present study is an attempt to fill the literature gap by studying FDI-trade nexus of Sri Lanka.

3. Methodology and Data Description

3.1 Model specification

According to economic literature, foreign trade is determined by economic factors such as exchange rate, GDP, trade openness, foreign direct investment, interest rate, technology, and tariff. In order to analyze the relationship between foreign trade and FDI in Sri Lankan context, we selected five variables depending on the availability of continuance data. The basic model sued in this study is given by the equation 1.

$$FT = f(FDI, GDP, TOP, ER, \ldots \ldots) \tag{1}$$

Where, FT is the foreign trade, FDI is the foreign direct investment, GDP is the real per capita income, TOP is the trade openness, and ER is the exchange rate.

The econometric model for analyzing the impact of FDI on foreign trade can be written as,

$$FT = \beta_0 + \beta_1 FDI + \beta_2 GDP + \beta_3 TOP + \beta_4 ER + \mu_t \tag{2}$$

According to economic literature, the coefficient of FDI with trade can be negative or positive depending on the nature and motive of inward FDI. Hence, the expected sigh of β_1 may be negative or positive. We expect positive sigh for β_2 and β_3 and negative sigh for β_4 depending on economic theory.

To regress the equation 2, we use Auto Regressive Distributed Lag (ARDL) model developed by (Pesaran et al. 2001). The ARDL form of the equation 2 can be written as follows.

$$\Delta lnFT_t = \alpha_0 + \alpha_1 lnFT_{t-1} + \alpha_2 lnFDI_{t-1} + \alpha_3 lnGDP_{t-1} + \alpha_4 lnTOP_{t-1} + \alpha_5 lnER_{t-1}$$
$$+ \sum_{t-1}^{t-n} \beta_0 \Delta lnFT_{t-1} + \sum_{t-1}^{t-n} \beta_1 \Delta lnFDI_{t-1} + \sum_{t-1}^{t-n} \beta_2 \Delta lnGDP_{t-1}$$
$$+ \sum_{t-1}^{t-n} \beta_3 \Delta lnTOP_{t-1} + \sum_{t-1}^{t-n} \beta_4 \Delta lnER_{t-1} + \mu_t \qquad (3)$$

Where α_0 is the intercept, μ_t is the error term, α_1 to α_5 are the long-run elasticity, and β_0 to β_4 are the short-run dynamic of the selected variables.

3.2 Data description and sources

This study uses annual time series data for the period from 1980 to 2016. To find out long-run relationship and short-run dynamics between FDI and foreign trade of Sri Lanka, we use total trade volume as the dependent variable. The value of inward FDI, per capita income, trade openness (total trade as a percentage of GDP), and exchange rate are used as the independent variables. Data were extracted from the World Development Indicators (WDI) of the World Bank.

4. Estimation and Results

4.1 Unit root test

The objective of conducting unit root test is to check whether the variables under consideration are stationary or not. If the mean and variance of time series are infinite and independent of time, such variables are said to be stationary. Time series data have unit root problem if the mean and variance of variable change over time. We use the Augmented Dickey-Fuller (ADF) unit root test to check the stationary properties of the selected variables. The test results are incorporated in Table 1. Only the variable ER is stationary at level I(0) rejecting the null hypothesis of unit root at 5 percent level. Again, we run the unit root test by taking the first difference of all the variables in order to make variables stationary. The results presented in Table 1 indicate that all the variables are stationary at the first difference. Since the variables are stationary at different levels, we apply AEDL model to identify long-run relationship and short rung dynamics of the variables data.

Table 1. ADF unit root test results

Variables	Status	ADF test statistics	
		t-statistics	Critical value
lnFT	At levels	0.0805 (0.9597)	-2.9458
lnFDI	At levels	-0.9637 (0.7556)	-2.9458
lnGDP	At levels	2.1423 (0.9999)	-2.9458
lnER	At levels	-3.1263** (0.0334)	-2.9458
lnTOP	At levels	-1.1417 (0.6884)	-2.9458
lnFT	1st difference	-6.2154* (0.0000)	-2.9484
lnFDI	1st difference	-7.5409* (0.0000)	-2.9484
lnGDP	1st difference	-4.2126* (0.0022)	-2.9484
lnER	1st difference	-5.1852* (0.0001)	-2.9484
lnTOP	1st difference	-5.2275* (0.0001)	-2.9484

Note: p values are in brackets, * significant at 1% level and ** significant at 5% level

4.2   ARDL regression analysis

The equation 3 is regressed using ARDL model, and the results are incorporated in Table 2. Akaike Information Criterion (AIC) is used to select appropriate lag lengths. The selected ARDL model is 1,3,2,1,1. The probability value of F-statistics is highly significant indicating the overall performance of the selected model. Further, the Durbin-Watson value is higher than the R squared value rejecting the chance of spurious results, serial correlation, and autocorrelation.

The results of the short run model reviled that 1 percent change of FDI in Sri Lanka will cause to six percent change of total trade. The sigh of the coefficient of FDI is positive indicating complementary relationship between FDI and total trade in the short run. In the short run, per capita GDP shows a highly significant positive relationship with total foreign trade coinciding with the economic theory. The exchange rate has a significant negative impact on the aggregate trade of Sri Lanka in the short run. Furthermore, the short run coefficient of trade openness shows a highly significant positive relationship with the total foreign trade of Sri Lanka.

ARDL long form and bound test are applied to check the existence of a long-run relationship and long-run coefficient of the selected variables. Estimated results of the long-run coefficient are presented in table 3. Accordingly, there is a highly significant positive long-run relationship between FDI and total trade in Sri Lanka.

Table 2. Regression Results - FT as the dependent variable

Variables	Coefficients	T-statistic	Probability
C	-0.5505	-0.3477	0.7315
lnFT(-1)	0.4688*	3.1137	0.0054
lnFDI	0.0634**	2.2480	0.0354
lnFDI(-1)	0.0266	1.0023	0.3276
lnFDI(-2)	0.0416	1.7170	0.1007
lnFDI(-3)	0.0335	1.1724	0.2541
lnGDP	1.1847**	2.4459	0.0233
lnGDP(-1)	0.0799	0.1055	0.9170
lnGDP(-2)	-0.7952	-1.6812	0.1075
lnER	-0.5278**	-2.3583	0.0281
lnER(-1)	0.6290*	3.2251	0.0041
lnTOP	0.7276*	5.9618	0.0000
lnTOP(-1)	-0.5459*	-3.5153	0.0021
R - squared = 0.99 , Adjusted R – squared = 0.99, F-Stat = 1081.97, Prob(F) = 0.0000			
Durbin-Watson Stat = 2.4389			

Note:* significant at 1% level and ** significant at 5% level

The ARDL bound test can be applied to verify the presence of the long-run relation between the dependent variable and independent variables. The bound test assumes the null hypothesis of no long-run relation ($\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$) against the alternative hypothesis of long-run relation ($\beta_1 \neq 0, \beta_2 \neq 0, \beta_3 \neq 0, \beta_4 \neq 0$) among the variables of the selected model. The alternative hypothesis is accepted if the F-statistic value of the bound test is greater than the upper critical value given in the Pesaran table (Pesaran et al. 2001). The bound test results presented in table 4 confirms the presence of a long-run relationship among the variables under consideration.

Table 3. Results of long-run coefficients

Variables	Coefficients	t-statistic	Probability
lnFDI	0.3111	3.9858	0.0007
lnGDP	0.8838	2.2598	0.0346
lnER	0.1905	1.1305	0.2710
lnTOP	0.3419	1.6644	0.1109
Constant	-1.0390	-0.3652	0.7186

The results of the error correction version of the ARDL model are given in table 5. The coefficient of the error term (ECT) is negative and significant at 1% level indicating convergence towards equilibrium. The value of the speed of adjustment parameter is 0.53 meaning that 53 percent adjustments can be completed within the first period. The value of R^2 and adjusted R^2 of ECM indicates goodness of fit of the model. Further, the Durbin – Watson stat result confirms the lack of autocorrelation between the variables.

4.3   Diagnostic and stability tests

Breusch-Godfrey serial correlation LM test and Harvey heteroscedasticity test are applied for residual diagnostic. According to the results presented in table 6, the selected model is free from serial correlation, and heteroscedasticity. The error term is normally distributed, and the variance of selected variables is constant. The stability of the selected model is checked by applying CUSUM and CUSUMSQ tests, and results are shown in figure 1. The figure plots show the 5% critical bounds and CUSUM and CUSUMSQ lines. Regression parameter is unstable if the CUSUM and CUSUMSQ lines cross the critical bounds. This model is stable because none of the lines crosses the 5% critical bounds. Ramsey RESET also confirms the stability of the selected model. Hence, the results validate the use of the model in policymaking.

Table 4. Bound test Results (ARDL)

Bound test value		Bound critical value(n=35)	
Test statistics	Value	I(0)	I(1)
F-statistics	5.2158	4.09 (1%)	5.53 (1%)
		2.95 (5%)	4.09 (5%)
		2.46 (10%)	3.46 (10%)

Table 5. Error Correction Regression (ARDL)

Variables	Coefficient	t-statistics	Probability value
ΔlnFDI	0.0635	3.1952	0.0044
ΔlnFDI(-1)	-0.0752	-3.6305	0.0016
ΔlnFDI(-2)	-0.0335	-1.6449	0.1149
ΔlnGDP	1.1847	3.6002	0.0017
ΔlnGDP(-1)	0.7953	-2.5688	0.0182
ΔlnER	-0.5278	-4.5688	0.0002
ΔlnTOP	0.7276	7.3209	0.0000
ECT(-1)	-0.5312	-6.2246	0.0000
R - squared = 0.89, Adjusted R – squared = 0.86, Durbin-Watson stat = 2.4389			
S.E. of regression = 0.0359, Sum of squared resid = 0.0336			

Table 6. Diagnostics tests

Serial correlation LM test (Breusch-Godfrey)			
Test statistics	Value	Test statistics	Value
F-statistics	1.7822	Prob F(2,19)	0.1953
Obs R-squared	5.3709	Prob Chi-square(2)	0.0683
Heteroscedasticity test (Harvey)			
F-statistics	1.1368	Prob.F(12,21)	0.3840
Obs. R-squared	13.3888	Prob.chi-squared(12)	0.3414

Table 7. Ramsey RESET test

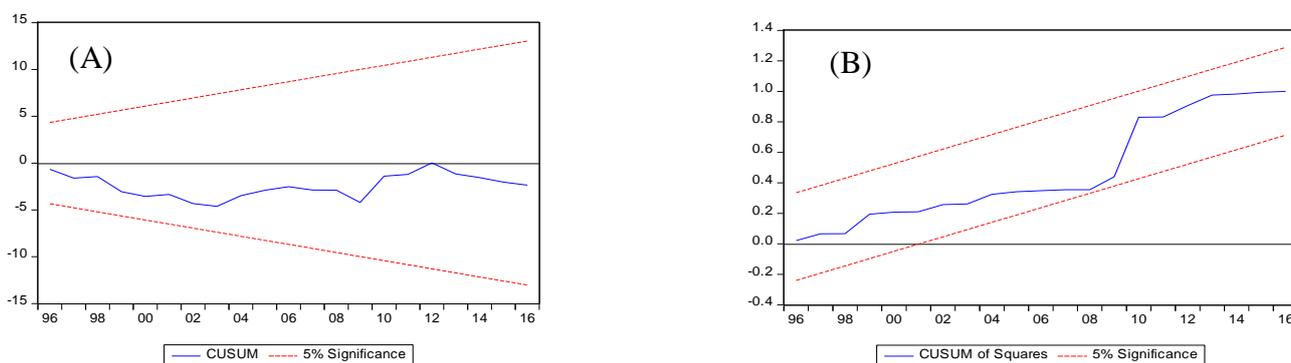| Test statistics	Value	Probability
t- statistics	0.6838 (20)	0.5020
F- statistics	0.4675 (1,20)	0.5020

Figure 1. CUSUM and CUSUMSQ tests

5. Conclusion

Foreign direct investment and foreign trade are generally considered as vital factors for economic growth and development. The purpose of this study is to investigate the long run relationship and short-run dynamics between these two variables in Sri Lankan context. The study uses annual time series data covering the period from 1980 to 2016. Augmented Dicky Fuller unit root test is applied to test the order of integration of variables data. Since the variables are integrated at different levels and considering advantages over other co-integration approaches, the study applied the ARDL co-integration approach and bound test to regress the variables data. The empirical test finds a significant positive relationship between FDI and foreign trade in the short run as well as in the long run in Sri Lankan context. The bound test confirms the existence of co-integration relations among the variables. The error term of the ARDL ECM model is statistically significant with expected sign confirming convergence of short-run shocks into the long run equilibrium. All the diagnostic and stability tests confirm the validity of the selected model in policy formulating.

Acknowledgments

References

[1] W. Akoto, 2016. On the Nature of the Causal Relationships between Foreign Direct Investment, GDP, and Exports in South Africa. Journal of International Development, 28, 112–126.

[2] S. Anwar & L.P. Nguyen, 2011. Foreign direct investment and trade: The case of Vietnam. Research in International Business and Finance, 25(1), 39–52.

[3] M. Blomström, R.E. Lipsey & K. Kulchycky, 1988. US and Swedish direct investment and exports.In: Trade Policy Issues and Empirical Analysis, Chicago, University of Chicago Press.

[4] B.A. Blonigen, K. Tomlin & W.W. Wilson, 2004. Tariff-Jumping FDI and domestic firm's profits. Canadian Journal of Economics, 37(3), 656–677.

[5] S.L. Brainard, 1993. An Empirical Assessment of the Factor Proportions Explanation of Multinational Sales,

[6] S.L. Brainard, 1997. An empirical assessment of the proximity-concentration trade-off between multinational sales and trade. American Economic Review, 87(4), 520–544.

[7] C.L.L. Calegário, Bruhn, N.C.P. & Pereira, M.C., 2014. Foreign Direct Investment and Trade: A Study on Selected Brazilian Industries. Latin American Business Review, 15(1), 65–92.

[8] K.A. Clausing, 2000. Does multinational activity displace trade? Economic Inquiry, 38(2), 190–205.

[9] D. Le Clus-Rossouw, Viviers, W. & Loots, E., 2015. Is there a link between BRIC foreign direct investment and SADC export performance ? Development Southern Africa, 32(6), 658–674.

[10] N. Driffield & J.H. Love, 2007. Linking FDI motivation and host economy productivity effects: conceptual and empirical analysis. Journal of International Business Studies, 38, 460–473.

[11] F. Fukasaku, R. Luiz, & J.R. De Mello, 2000. Trade and foreign direct investment in Latin America and Southeast Asia: temporal causality analysis. Journal of International Development, 12(7), 903–924.

[12] P.R. Lane & G.M. Milesi-Ferretti, , 2004. International Investment Patterns, Lefilleur.

[13] R.E. Lipsey, & M.Y. Weiss, 1981. Foreign production and exports in manufacturing industries. The Review of Economics and Statistics, 63, 488–494.

[14] R.E. Lipsey & M.Y. Weiss, 1984. Foreign production and exports of individual firms. The Review of Economics and Statistics, 66(2), 304–308.

[15] J.K. Markusen, 1997. Trade versus Investment Liberalization, No. 6231, NBER working paper.

[16] J.R. Markusen, 2002. Multinational Firms and the Theory of International Trade, Cambridge, MIT Press.

[17] A.G. Mijiyawa, 2017. Does Foreign Direct Investment Promote Exports? Evidence from African Countries. The World Economy, 1934–1957.

[18] M.H. Pesaran, Y. Shin & R.J. Smith, 2001. Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289–326.

[19] R. Pfaffermayr,1996. Foreign outward direct investment and exports in Austrian manufacturing: substitutes or complements? Welwirtschaftliches, 132(3), 501–522.

[20] A.K. Rose & M.M. Spiegel, 2004. A gravity model of sovereign lending: trade, default, and credit,

[21] M.A. Shamim, K.A. Ghais & E.A. Shaikh, 2016. FDI-Export Nexus in Pakistan: A Time Series Analysis. Global Management Journal for Academic & Corporate Studies, 6(1), 115–123.

[22] R. Svensson, 1996. Effects of overseas production on home country exports: evidence based on Swedish multinationals. Weltwirtscaftliches Archive, 132(2), 304–329.

[23] D.L. Swenson, 2004. Foreign investment and the mediation of trade flows. Review of International Economics, 14(2), 609–629.

[24] H. Yamawaki, 1991. Exports and foreign distributional activities: evidence on Japanese firms in the United States. Review of Economics and Statistics, 73, 294–300.

أثر الاستثمار الأجنبي المباشر على التجارة: دليل تجريبي من سريلانكا

NPG Samantha

كلية الاقتصاد– جامعة هواتشونغ للعلوم والتكنولوجيا– ووهان– جمهورية الصين الشعبية

samanthanpg@yahoo.com

الملخص:

الاستثمار الأجنبي المباشر والتجارة الخارجية هما عاملين حيويين في النمو الاقتصادي والتنمية. الغرض من هذه الدراسة هو دراسة العلاقة طويلة المدى وديناميات المدى القصير بين المتغيرين في سياق سريلانكا. تطبق هذه الدراسة اختبار ARDL المشترك والاختبار المُلزم لبيانات السلاسل الزمنية السنوية التي تغطي الفترة من عام ١٩٨٠ إلى عام ٢٠١٦. ويجد الاختبار التجريبي علاقة إيجابية كبيرة بين الاستثمار الأجنبي المباشر والتجارة الخارجية في المدى القصير وكذلك على المدى الطويل. يؤكد الاختبار المحدد وجود علاقات التكامل المشترك بين المتغيرات. يعتبر مصطلح الخطأ الخاص بنموذج ARDL ECM هامًا من الناحية الإحصائية مع وجود علامة متوقعة تؤكد تقارب الصدمات قصيرة المدى في التوازن طويل المدى. تؤكد جميع اختبارات التشخيص والاستقرار صحة النموذج المحدد في صياغة السياسات.

الكلمات المفتاحية: الاستثمار الأجنبي المباشر ، التجارة الخارجية ، نهج ARDL ، التأثير التكميلي