

The relationships between foreign direct investment, export and economic growth

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ABSTRACT

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This study aims to examine the causal relationship between foreign direct investment, exports and economic growth in Dong Nai province, Vietnam from 1999 to 2019. The study uses several economic models such as Vector Auto Regression - VAR (p), Vector Error Correction Model (VECM) and Granger causality tests to evaluate relationships between research model variables. The results show that foreign direct investment and exports have the positive effects on Gross Regional Domestic Product (GRDP). Therefore, this study recommends some policy implementation to simulate the foreign direct investment. Particularly, the policy makers in Dong Nai province should be aware of the role of foreign direct investment and export incentive policies, which is an important driving force for the socio-economic development of Dong Nai province, Vietnam.

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1. Introduction

Vietnam has implemented the Law on Foreign Direct Investment since December 1987 in the context of socio-economic development with many difficulties, poor infrastructure, outdated science and technology, and poor quality of human resources, etc. Meanwhile, the need for socio-economic development requires investment capital, advanced technology, etc. Therefore, the application of the Law on Foreign Investment is considered an important solution for the country's socio-economic development at that time. Besides, in order to attract FDI capital in each period of Vietnam's socio-economic development, the Law on Foreign Direct Investment of Vietnam was continuously revised in 1990, 1992, 1996 and 2000. The FDI has been identified as one of the most important pillars of Vietnam's economic growth. The role of FDI is demonstrated by its contribution to important factors of Vietnam's economic growth such as complementing investment capital, boosting exports, transferring technology, developing human resources and creating employment opportunities. In addition, FDI also positively contributes to generating revenue for the national budget and promoting Vietnam's economic integration into the global economy (Law Library, 2021). According to the General Statistics Office of Vietnam, the realized capital of the FDI sector in 1997 was 3.1 billion USD, and as of December 20, 2019, newly registered capital, registered capital and the value of capital contribution and share purchase by foreign investors increased to 38 billion USD, achieving an average growth rate of 12.07% per year (Ministry of Planning and Investment, 2020).

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Dong Nai is the third most populous province in Vietnam (following Nghe An and Thanh Hoa provinces), located in the Southeast region of Vietnam, which makes a great contribution to the economy of Vietnam. This province is also a leading province in opening up and attracting FDI inflows into the province for socio-economic development. The FDI enterprises in Dong Nai province have contributed to boosting the province's industrial development. Since then, the economic structure has been gradually shifted towards increasing the ratio of industry - construction, services and reducing agriculture. Therefore, the foreign-invested sector has become an important constituent of the province's economy, making a positive and impressive contribution in many aspects in the process of socio-economic integration and development. According to the Department of Planning and Investment of Dong Nai province, the total newly registered capital and capital raising projects were 2,302 million USD until December 31, 2019, equal to 120% as compared to the same period in 2018 (1,915.54 million USD), and increased 230% of the year plan. In particular, 128 new projects with the total registered capital of 1,375.20 million USD are issued the licenses; 134 projects adjusted capital with the total registered investment capital increase of 927.23 million USD (Dong Nai Provincial People's Committee., 2020)

This article aims to examine the relationship between FDI, exports and economic growth in Dong Nai province, Vietnam in the period 1999-2019. The rest of the article is as follows. Section 2 presents the literature review. Section 3 provides the research methodology. Section 4 discusses the research results and discussion, followed by the conclusion and policy implications being provided in Section 5.

2. Literature review

In the neoclassical growth model, technological progress and labor force growth are two exogenous factors of foreign direct investment. By this model, the relationship is simply increasing the investment rate which leads to an increase in per capita income without any other effect on long-term growth. Meanwhile, the new growth theory developed in the 1980s considered technological progress as an endogenous factor and foreign direct investment has a significant impact on the socio-economic development of countries through technology transfer. It can be seen that although FDI has increased rapidly around the world over the past few decades, many discussions are still taking place regarding the effect of foreign direct investment on the host country's economic growth. This shows that there is still potential for further research on FDI. Most studies find positive effects of foreign direct investment on economic growth through accumulation and transfer of capital and technology (Basu et al., 2003). At the same time, in an open economy, technology and knowledge can also be transferred through exports and imports, and thus promote economic growth (Grossman & Helpman, 1997; Hobbs et al., 2021). On the other hand, some studies have shown that the above positive results may be insignificant or even harmful for the ability to accumulate domestic capital of FDI receiving countries (Carkovic et al., 2002). In recent years, the relationship between FDI, export and economic growth have been studying widely. In more detail, the research of Liu et al. (2002) found out the two-way causal relationship between GDP, export và FDI in China by using quarterly data from 1981 to 1997. Besides, Dritsaki et al. (2004) studied the relationship between exports, FDI and GDP of Greece in the period 1960-2002 and the results showed the long-term relationship and causal relationship between the variables. On the other hand, Ahmad et al. (2003) also found unilateral causal relationships between exports and GDP, FDI and GDP in the case of Pakistan by using annual data for the period 1972-2001. Moreover, the research of Eryigit (2012) considered these relationships in the case of Turkey through using panel-data cointegration tests in the period 2000-2010. The results showed that there existed a long-term relationship between FDI and exports, FDI and GDP, exports and GDP. Besides, there were several studies which use Granger causality tests in order to examine the causal relationship of these three variables across a group of countries. For instance, the study of Hsiao (2006) examined the relationship between FDI, exports and GDP for eight East Asian and Southeast Asian economies through using the Granger causality test and analyzing the panel data over the period of 18 years from 1986 to 2004. The results showed that FDI affects GDP both directly and indirectly through exports. In addition, this study also found that there was a two-way causal relationship between exports and GDP. Similarly, Yao (2006) investigated the effects of exports and FDI on economic efficiency by using a large panel data, including 28 provinces of China in the period 1978-2000. The research results showed that both exports and FDI have strong and positive effects on economic growth. There were some studies on the relationship between FDI, exports and economic growth in Vietnam. Particularly, Anwar and Nguyen (2010), Trang et al. (2019) and Tien et al (2020) considered the causal relationship as well as short- and long-term effects between FDI, exports and economic growth in Vietnam. However, the limitation of these studies is that the data series are short. The impact level of each dimension was not clear and these studies could not calculate at the provincial level.

The above literature review shows that empirical studies in Vietnam and the world found a causal relationship which depends on econometric methods and the time series. The results can be the unidirectional causal relationships, the two-way causal relationships or no causal relationship. However, in any case, studies have shown a positive relationship between exports, economic growth and FDI.

3. Methodology

3.1. Research model and hypotheses

In this research, we examine the causal relationship between FDI, exports and economic growth at the provincial level in Dong Nai province, Vietnam by using Granger causality test. Therefore, the research model is designed as follows:

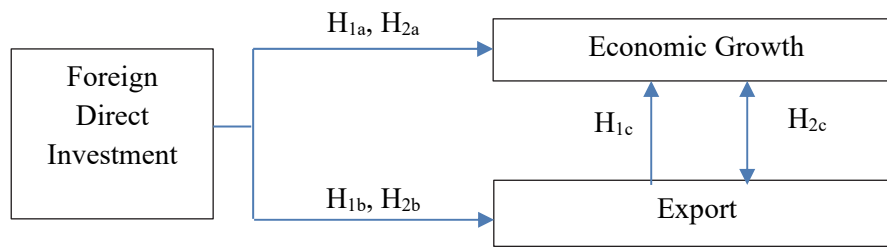


Fig. 1. Overview of the research model

From the proposed model, this study will consider research hypotheses:

Hypothesis 1: The relationship between FDI and economic growth; FDI and export; Export and economic growth are unidirectional causal relationships.

Hypothesis 2: The relationship between FDI and economic growth; FDI and export; Export and economic growth are two-way causal relationships.

3.2. Methodology

3.2.1. Research databases

In this study, the data is collected from the Statistical Yearbook related to FDI, exports and economic growth from 1999 to 2019 of Dong Nai province, Vietnam (Dong Nai Statistical Office, 1998-2020).

3.2.2. Data processing

To test the hypotheses of the research model, the variables of the research model include: implemented FDI is used to represent for FDI variable (FDI); Total Export Value (EXP); and Gross Regional Domestic Product (GRDP) used as a proxy for economic growth. FDI, EXP (in USD), GRDP are calculated at constant 2010 prices (in million VND). Accordingly, the order of inspection is as follows:

Firstly, we examine the stationary of three data series. When the estimated time series have a relationship such as autoregressive series (AR). If we use the ordinary least squares method (OLS), its results can be falsified. When random processes which are used in the model is a non-stationary process, the estimated results have no economic significance (Granger & Newbold, 1974). Because of the above reasons, the Dickey-Fuller test (ADF test) is used to indicate the properties of the time series.

The unit root test model is written as follows:

$$\Delta Y_t = \beta Y_{t-1} + \sum_1^p \beta_i \Delta Y_{t-i} + u_t \quad (1)$$

In which: Δ is the difference, Y_t are observations at time t (time series).

The results of the ADF test are often very sensitive to the length of lag k , so after implementing the model, AIC (Akaike's Information Criterion) is used to select the optimal k for the model. The k -value will be chosen if its AIC is minimum. The hypothesis of the ADF test: H_0 : Y_t is non stationary time series; H_1 : Y_t is stationary time series.

Secondly, this study implements the cointegration test of Johnsen.

Thirdly, we also examine causality through Toda and Yamamoto (1995)'s approach by applying a vector autoregressive model (VAR) with lag (k). Therefore, this thing is used to examine the long-term causal relationship between agriculture and economic growth, and it is implemented by applying the regression model:

$$Y_t = \alpha_1 + \sum_1^n \beta_{1i} X_{t-i} + \sum_1^m \gamma_{1j} Y_{t-j} + u_{1t} \quad (2)$$

$$X_t = \alpha_2 + \sum_1^n \beta_{2i} Y_{t-i} + \sum_1^m \gamma_{2j} X_{t-j} + u_{2t} \quad (3)$$

Explaining the causal relationship, Toda and Yamamoto (1995) showed that if Y time series is the cause of X time series and if the past of Y ($Y_{t-1}, Y_{t-2}, Y_{t-3}, \dots$) can be used to predict X (X_t). In other words, Y is the causal effect of X in long-term stability. Similarly, if X time series is the cause of Y time series, and if the past of X ($X_{t-1}, X_{t-2}, X_{t-3}, \dots$) can be used to predict Y (Y_t). On the other hand, X is also the causal effect of Y in long-term stability.

Fourthly, Variance decomposition of predictable error will be implemented by using the technique of Pesaran and Shin (1998). General variance decomposition can measure the exogenous and endogenous relative shock rates by predicting step n for variance (ϵ). In this research, General variance analysis is used to predict shock risk. This approach shows that the ratio of the variance of error can be explained through changing of another variable. The calculated results will determine future shocks in economic growth, FDI and exports, each variable responds to shocks through changing the others.

4. Empirical results and discussion

4.1. Results of Unit root test

Before performing the regression, it is necessary to specify the time series properties. The unit root test is used to check whether a series is stationary or not, and this study uses the ADF unit root test.

Table 1

Unit root test

Variable	Unit root test		Variable	Unit root test	
	T-test	p		T-test	p
GRDP	1.058162	0.9968	Δ^2 RGDP	-4.458210	0.0006
FDI	-2.499591	0.1197	Δ^2 FDI	7.149782	0.0000
EXP	1.823312	0.9997	Δ^2 EXP	-5.518988	0.0000
Δ GRDP	-1.733845	0.4102			
Δ FDI	-2.377324	0.1516			
Δ EXP	-1.941963	0.3117			

(Source: Authors' computation)

The results for the base unit are listed in Table 1. The results of the ADF unit root tests in Table 1 show that the series of GRDP, FDI and EXP are not stationary. After employing a test with the second-order differencing time series of observations, three series of Δ^2 GRDP, Δ^2 FDI, and Δ^2 EXP are stationary. In addition, based on the VAR(k) lag order selection criteria: Akaike Information Criterion standard (minimum AIC is 56.42791), Schwartz Information Criterion standard (minimum SC is 59.99338) and Final Prediction Error (minimum FPE is 9.21e+20). In this study, set lag = 12 (for quarterly-3 months data) is the lowest value of the optimal lag-selection.

Table 2

Lag length selection test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2128.428	NA	5.63e+22	60.89793	60.99429	60.93621
1	-2119.676	16.50356	5.67e+22	60.90502	61.29048	61.05813
2	-2119.177	0.896830	7.24e+22	61.14793	61.82248	61.41587
3	-2114.768	7.559858	8.29e+22	61.27907	62.24271	61.66184
4	-2065.624	80.03314	2.65e+22	60.13212	61.38486	60.62973
5	-2063.139	3.834005	3.23e+22	60.31827	61.86009	60.93070
6	-2062.862	0.403443	4.22e+22	60.56750	62.39842	61.29476
7	-2058.713	5.690876	4.96e+22	60.70608	62.82609	61.54818
8	-1953.922	134.7317	3.32e+21	57.96919	60.37829	58.92611
9	-1951.566	2.826542	4.19e+21	58.15903	60.85723	59.23079
10	-1950.785	0.869840	5.60e+21	58.39387	61.38116	59.58046
11	-1947.574	3.303175	7.10e+21	58.55926	61.83564	59.86068
12	-1863.977	78.82029*	9.21e+20*	56.42791*	59.99338*	57.84416*

(Source: Authors' computation)

4.2. Cointegration Test and Granger causality test

4.2.1. Cointegration Test

Table 3

Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.297756	40.09166	24.27596	0.0002
At most 1	0.118286	11.46020	12.32090	0.0694
At most 2	0.015475	1.263292	4.129906	0.3048

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.297756	28.63147	17.79730	0.0008
At most 1	0.118286	10.19690	11.22480	0.0754
At most 2	0.015475	1.263292	4.129906	0.3048

(Source: Authors' computation)

The Trace test gives $P_value = 0.0002 < 0.05$, rejects the null hypothesis $H_0: r \leq 0$. With the null hypothesis $H_0: r \leq 1$, $P_value = 0.0694 > 0.05$, accept the null hypothesis. Thus, the Trace test gives $r = 1$. Similarly, Max-Eigen test also gives $r = 1$, which means that there exists a co-integration in the research result.

4.2.2. Granger causality Test

After examined the causality relationship between variables, as the results in Table 3, followed by the results of the Granger causality test are as follows:

Table 4

Granger causality Test

Dependent variable: D(GRDP)			
Excluded	Chi-sq	df	Prob.
D(FDI)	167.4256	12	0.0000
D(EXP)	117.2717	12	0.0000
All	249.9188	24	0
Dependent variable: D(FDI)			
Excluded	Chi-sq	df	Prob.
D(GRDP)	8.407948	12	0.7525
D(EXP)	11.21789	12	0.5103
All	19.58724	24	0.7200
Dependent variable: D(EXP)			
Excluded	Chi-sq	df	Prob.
D(GRDP)	8.435716	12	0.7502
D(FDI)	16.97088	12	0.0507
All	23.52635	24	0.4889

(Source: Authors' computation)

The above results show that there are causal effects from FDI and exports to GRDP; FDI has causal effects on exports (significant 10%), but not in the opposite direction; The GRDP has no causal effects on FDI and exports. The effects can be generalized as follows:

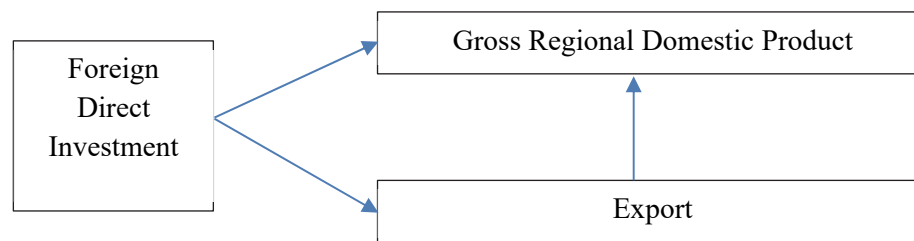


Fig. 2. Generalized model from research results

4.3. The result of variance decomposition

Table 5

The result of general variance decomposition

Variance decomposition of GRDP

Period	S.E.	GRDP	FDI	EXP
1	2272807.	100.0000	0.000000	0.000000
2	3569240.	98.17492	1.180286	0.644794
3	4802267.	93.22567	4.737772	2.036561
4	6108082.	84.83066	11.60417	3.565164
5	6589367.	73.19177	15.30001	11.50822
6	7025522.	64.40776	14.30135	21.29089
7	7554105.	55.72728	13.04592	31.22680
8	8514553.	44.06984	17.11884	38.81131
9	9702627.	35.98400	30.21697	33.79903
10	10993836	28.86630	43.75733	27.37637

Variance Decomposition of FDI:

Period	S.E.	GRDP	FDI	EXP
1	91.68596	1.049143	98.95086	0.000000
2	178.4069	1.206806	98.78072	0.012476
3	278.5814	1.299516	98.59408	0.106402
4	387.4839	1.276024	98.07968	0.644299
5	444.9353	1.494543	96.68816	1.817294
6	488.4622	1.421362	95.15819	3.420451
7	521.3896	1.254443	93.60203	5.143526
8	545.9149	1.222336	92.53305	6.244613
9	579.1304	1.376497	91.82929	6.794210
10	612.8943	1.404688	91.43457	7.160738

Variance Decomposition of EXP:

Period	S.E.	GRDP	FDI	EXP
1	119.4268	4.448822	26.60761	68.94357
2	237.7067	1.519465	29.87453	68.60600
3	386.7983	0.574401	31.70067	67.72493
4	570.2964	0.396512	32.95327	66.65022
5	695.2165	1.109890	33.43060	65.45951
6	802.6683	1.625925	33.59307	64.78101
7	891.8892	1.956989	33.78030	64.26272
8	961.0024	2.124497	34.19195	63.68356
9	1012.898	2.244436	33.81138	63.94419
10	1052.685	2.327733	33.23953	64.43273

Cholesky Ordering: GRDP FDI EXP

(Source: Authors' computation)

The results of the general variance analysis show that FDI shocks affect economic growth clearly after 9 quarters (30.21%), while export shocks have a clear impact after 7 quarters on economic growth (31.22%); GRDP and export shocks have a negligible impact on FDI; The impact of FDI shocks on the exports is very clear but the impact level is insignificant. Similarly, economic growth shocks also have a negligible impact on the export. This result suits with the Granger causality test in the previous section.

5. Conclusion and recommendations

In this study, we used Keynes's aggregate demand model in the open economy to examine the relationship between foreign direct investment, exports and economic growth by the VAR model and using the data of Dong Nai Statistical Office from 1999 to 2019. The main reason for selecting Dong Nai province as the case study is resulted from the fact that Dong Nai is one of the traditional foreign investment provinces in Vietnam and still maintains these activities for a long time.

The novelty of this study is that we have an important finding that foreign direct investment affects both exports and economic growth in Dong Nai province, Vietnam. Besides, the study also shows a causal relationship between variables like FDI, exports and economic growth. At the same time, the study results also show the impact mechanism of FDI and export shocks on economic growth in Dong Nai province, Vietnam. From this fact shows:

Firstly, foreign direct investment is a positive force for the economic growth of Dong Nai province in both the past and the upcoming years.

Secondly, in the long term, FDI and exports are the reasons leading to economic growth in Dong Nai province, so provincial authorities need to always appreciate the role of these factors. FDI not only directly affects GRDP but also indirectly affects GRDP through exports. Therefore, it is a very important factor in the economic development of Dong Nai province in the long term.

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