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The Effect of Foreign Direct Investment Inflow on Exports: Evidence from Vietnam

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Abstract

Foreign direct investment (FDI) and export are now often regarded as two of the most important drivers of economic growth on a worldwide scale. The impact of foreign direct investment on Vietnam's exports is investigated in this study. The data for the time period 1985–2020 was obtained from the World Bank and the Vietnam General Statistics Office. The years 1985 to 2020 were chosen to evaluate the evolution of macroeconomic parameters since 1986. The impact of the Covid-19 epidemic on renovation reform. The Johansen co-integration test proved that FDI and domestic investment (DI) had a long-term positive impact on Vietnam's export growth. The Granger causality test revealed that there is a one-way relationship between FDI and export in the near term, but no such relationship exists between DI and export. The result of the variance decomposition study demonstrates that the FDI sector has a bigger impact on Vietnam's export growth than the DI sector. Furthermore, export activities are vulnerable to FDI sector shocks. As a result, in recent years, FDI has been regarded as the most important factor of export growth in Vietnam.

Keywords: FDI, Domestic Investment, Export, VECM, Vietnam

JEL Classifications Code: C32, C53, D22, E22, F21

1. Introduction

The rapid increase in FDI inflow and exports in emerging nations, particularly Vietnam, has piqued the interest of experts in recent years. According to numerous studies, these are the primary drivers of economic growth. FDI inflows, in particular, have a positive impact on economic growth due to capital accumulation, knowledge transfer, and technology transfers (Erum et al., 2016; Dinh et al., 2019). Meanwhile, the fundamental function of export is to move goods from one country to another. Furthermore, this activity contributes to the improvement of the host economy's good quality (Seng, 2015). Furthermore, it increases international ties, changes economic structure outward, and creates jobs in the economy, among other things, and therefore becomes a primary driver of economic expansion across countries (Barış, 2012; Abidin et al., 2021).

In addition, several studies have suggested that FDI is a key factor behind the export growth of the host countries. This is because FDI firms often bring high technologies, new knowledge, modern management skills, etc., to the recipient economy (Zhang and Bruce, 2001; Ha and Choi, 2019). These also lead to an increase in the production capacity of domestic firms. Furthermore, FDI can provide more export opportunities for the host countries by facilitating access to foreign markets through FDI firms' links (Soliman, 2003; Le and Pham, 2020). However, in some countries, whether or not FDI harms export is still controversial because it mostly depends on how to use the investment. Specifically,

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if the motive of FDI is to reap the benefits from the export activity by production at a relatively low cost in the host economy, FDI is seen as an export-oriented factor (Boqiang and Benjamin, 2018). On the other hand, if FDI firms are to bypass the recipient economy's trade barriers to gain access to other markets, then FDI may not promote export (Hsiao and Hsiao, 2006).

Before 1986, Vietnam was a centrally planned economy. At that time, the economic development was mostly dependent on import activity and Government investments. In addition, export activity and foreign investment were completely prohibited, which resulted in poor economic performance and low competitiveness (Sajid and Nguyen, 2010). However, since the Vietnamese Government launched economic reforms in 1986, the economy has significantly improved (Dao et al., 2017; Pham and Pham, 2020). In particular, the poverty rate has dropped from 60% to less than 5%, with the nation becoming a leading exporter (Ngo et al., 2017; Vo and Ho, 2021). Specifically, the export turnover jumped from US$ 11.7 million in 1985 to US$ 263451.28 million in 2019. In addition, amid severe impacts of the Covid-19 pandemic, the exports remain a spotlight of Vietnam's economy with an expansion of 5.3% year-on-year to US$ 281507.33 million in 2020, which resulted in a record-high trade surplus of over US$20 billion, and the only major Southeast Asian economy to avoid a recession in 2020 (Nguyen, 2021). Besides, the trade sector and manufacturing export from FDI projects have become a buffer against macroeconomic instability and momentum for the recovery of economic growth in Vietnam (Nhung, 2017; Nguyen and Nguyen, 2021).

The influence of FDI on Vietnam's exports, on the other hand, is still a contentious issue. As a result, the goal of this study is to fill up some gaps in the literature about the aforesaid link. The goal of the study is to assess and contrast the effects of FDI and DI on Vietnamese exports. To achieve the stated purpose, the variables FDI, domestic investment (DI), DI sector export (Xdi), FDI sector export (Xfdi), and total exports (X) are employed. The Johansen co-integration test is used to create the vector error correction model (VECM), and the Granger causality test is used to examine the data from 1985 to 2020. In addition, the variance decomposition and impulse response function analysis will be used to study the dynamic interrelationships among variables.

2. Literature Review

The relationship between FDI and export has drawn great attention from researchers worldwide. Unfortunately, no consensus on empirical findings has been reached among scholars. For example, Hsiao and Hsiao (2006) showed that FDI has a unidirectional impact on export growth in Taiwan, Thailand, and Singapore based on Granger causality tests. Also, they found the one-way impact of export on FDI in China. However, this effect was not found in the case of Korea, the Philippines, Hong Kong, and Malaysia.

Zhang and Song (2000) showed that export generated by FDI became more and more significant, as a share soared from 0.05% in 1980 to 12.58% in 1990 and 45.5% in 1999. Moreover, they also found a strong link between FDI inflow and export in China. Notably, a 0.29% change in export in the next year when FDI increased by 1% suggested an important role that FDI played in China's export activity. Njong and Raymond (2011) investigated the link between FDI and export in Cameroon from 1980 to 2003 with the Engle-Granger test. The study indicated that FDI contributed to higher export growth. FDI is a catalyst for local investment increase and technology updates. Besides, it also brought up a spillover effect that involved multinational enterprises and domestic enterprises.

Won et al. (2008) did another investigation on this link in seven Asian nations. As a result, a bi-directional relationship between export FDI inflows in China was discovered, with FDI being considered a key element in export growth. In the cases of Singapore, Korea, Malaysia, the Philippines, and Thailand, however, they discovered no connections. Similarly, Rahman (2007) concluded that FDI does not have effects on the export growth in Saudi Arabia, but, exports positively contributed to attracting more FDI inflows.

In Vietnam, numerous different conclusions also were stated. Specifically, Nguyen and Xing (2008) showed that FDI is one of the major factors promoting and facilitating the expansion of Vietnamese export to the international market, in which, a 1% increase in FDI inflow will lead to a rise of 0.13% in Vietnamese export to these countries. Dao et al. (2017) stated the long-term relation between FDI, export, and economic growth in Vietnam. However, in the short term, this relation does not exist. A similarly result also condicated by Nhung (2017). Moreover, FDI inflow exerted a more substantial impact on exports than imports since the annual exports of foreign enterprises were always higher than the annual imports.

The difference in the annual export output of FDI firms and domestic firms in Vietnam is stated by Huy (2018). FDI firms made up a larger share of Vietnam's export than domestic firms due to their advantages in terms of markets available in their home countries and the distribution channels in other foreign markets. Specifically, the gap between two groups of enterprises in exports expanded rapidly from 8.4% in 2010 to 28.6% in 2014 and tended to expand further because of the increasing FDI volume into Vietnam. In particular, an increase of 1% in FDI made the export volume rise by 0.202%.

Van et al. (2019) used firm-level data to test the impact of foreign investment in the exporting behavior of domestic enterprises in Vietnam. This study confirmed that foreign investment positively impacted domestic firms' export decisions in the same sectors. Moreover, the enterprises engaging in export activity in the previous year were more motivated to continue exporting the following years because they could reduce their costs for market search, thus expanding their exports. Dao and Sun (2012) found a significant positive effect of FDI enterprises on the export of domestic enterprises. They highlighted the decision by domestic enterprises in Vietnam to export was dominated by firm-specific characteristics (e.g., average wage, firm age, firm size, and types of ownership).

3. Data and Methodology

3.1. Data

The time-series data over 1985–2020 were collected from the World Bank and General Statistics Office of Vietnam (GSO). The period (from 1985 to 2020) was selected to examine the change of macroeconomic factors since the 1986 Renovation reform and the effect of the COVID-19 pandemic. The selected variables include LFDI (FDI), LDI (DI), LXfdi (X_{fdi}), LXdi (X_{di}), and LX (X). All variables are converted into natural logarithms with the capital letter "L" before each time series' title.

The result in Table 1 shows that the mean values and standard deviations of all variables are positive. The skewness coefficient of all variables is negative, showing that there is a left skew distribution. The P-value of the Jarque-Bera test shows that the variables are all standard distributions. These results confirm that the selected variables are appropriate for this study.

3.2. Methodology

Based on the study aims and previous literature, the basic equation to explore the relationship between the variables is described in the following form:

$$LX_t = f(LFDI_t, LDI_t, LXfdi_t, LXdi_t) \quad (1)$$

In this study, all the selected variables are endogenous, if using single-equation regression is not considered suitable, and hence the measurement results may be biased. Thus, the linear regression model was selected to examine the relationship between targeted variables. Moreover, the researchers use some exogenous shocks to trace out the dynamic responses of variables over time. Therefore, the VECM and Granger causality tests are applied in the study. In addition, the study takes a one-year lag for the VAR model estimation. The procedure is performed as follows.

3.2.1. Unit Root Test

According to previous research, the majority of macroeconomic time series variables are non-stationary. Pseudo-regression can occur when these variables are used. As a result, the chosen time series must be a stationary process before data can be analyzed. The stationarity of variables was investigated using the Augmented Dickey-Fuller (ADF), Phillips Perron (PP), and Kwiatkowski Phillips Schmidt Shin (KPSS) tests. The null hypothesis is

Table 1: Descriptive Statistics for Variables

	LX	LFDI	LDI	LX_{fdi}	LX_{di}
Mean	9.824	7.093	9.361	7.768	9.333
Maximum	12.548	9.922	11.174	12.223	11.315
Minimum	6.458	0.00	7.097	0.00	6.457
Std. Dev.	1.883	3.357	1.325	4.067	1.475
Skewness	–0.198	–1.480	–0.414	–0.882	–0.401
Kurtosis	1.825	3.632	1.882	2.563	1.977
Jarque-Bera	2.308	13.747	2.904	4.953	2.536
Probability	0.315	0.001	0.234	0.084	0.281
Sum	353.655	255.346	337.001	276.291	336.00
SumSq.Dev	124.117	394.474	61.470	578.976	76.214
Observation	36	36	36	36	36

tested using the KPSS test, which assumes the time series is stationary.

3.2.2. Johansen Co-Integration Test

The Johansen test is used to estimate the co-integration relation between the variables. At the same time, it also gives the maximum rank (r) of co-integration. In other words, all variables in the Johansen test are seen as endogenous variables. The unrestricted co-integration r test was used to draw out the long-term connection between variables in the study. The research model has 5 variables including LX, LFDI, LDI, LXfdi, and Lxdi. This study considers Y_t as a vector of the variables in the t time; the model can be shown as:

$$Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i Y_{t-i} + \varepsilon_t \tag{2}$$

Where Y_t is a 5 × 1 vector that includes LX_t, $LFDI_t$, LDI_t, $LXfdi_t$, and $LXdi_t$; β_0 is a 5 × 1 vector of constants; β_i is a 5 × 5 matrix of regression coefficients; ε_t is a 5 × 1 vector of error terms, and p is the lag length.

The residuals vectors β_0 and β_{it} are used to determine the number of unique co-integrating vectors in Y_t by the likelihood ratio (LR) test statistics. There are two types of LR tests including the maximal eigenvalue test ($\lambda_{\max}$) and the trace test (λ_{trace}).

$$J_{trace} = -T \sum_{i=r+1}^{n} \log(1 - \hat{\lambda}_i) \tag{3}$$

$$J_{\max} = -T \log(1 - \hat{\lambda}_{r+1}) \tag{4}$$

Where: $\hat{\lambda}_i$ are the estimated values from the estimated error correction matrix (π) and T is the number of observations.

The r values are found if $r = n$ when none of the series are integrated. In other words, the vector Y_t is stationary. If $r = 0$, there are no co-integrating vectors, or no long-term relationship between variables exists. If $0 < r < n$, there is a long-term relationship between variables in the study model. Therefore, r error correction is an essential factor for the studies using VAR.

Under the Trace test, the null hypothesis of r co-integrating vectors is against the alternative hypothesis n co-integrating vectors. At this point, hypothesis H_0: Trace statistic < Critical value = co-integrating equation. Hypothesis H_1: Trace statistic > Critical value = At least co-integrating equation. Under the eigenvalue test, the null hypothesis of the r co-integrating vector is against the alternative hypothesis of $r+1$ co-integrating vectors, while Hypothesis H_0: Eigenvalue < Critical value = No co-integrating equation. Hypothesis H_1: Eigenvalue > Critical value = At least co-integrating equation.

3.2.3. VECM and Granger Causality

FDI is determined to be independent of contemporaneous fluctuations in macro-variables in the economy, according to the study hypothesis. As a result, the unrestricted VAR system can be stated as follows, using Equations (1) and (2) for estimating and hypothesis testing:

$$\begin{aligned}\Delta LX_t = {} & \alpha_{10} + \sum_{i=1}^{p} \gamma_{1,i} \Delta LX_{t-i} + \sum_{i=1}^{p} \theta_{1,i} \Delta LFDI_{t-i} \\ & + \sum_{i=1}^{p} \delta_{1,i} \Delta LDI_{t-i} + \sum_{i=1}^{p} \varpi_{1,i} \Delta LXfdi_{t-i} \\ & + \sum_{i=1}^{p} \varphi_{1,i} \Delta LXdi_{t-i} + \varepsilon_{1t}\end{aligned} \tag{5}$$

$$\begin{aligned}\Delta LFDI_t = {} & \alpha_{20} + \sum_{i=1}^{p} \gamma_{2,i} \Delta X_{t-i} + \sum_{i=1}^{p} \theta_{2,i} \Delta LFDI_{t-i} \\ & + \sum_{i=1}^{p} \delta_{2,i} \Delta LDI_{t-i} + \sum_{i=1}^{p} \varpi_{2,i} \Delta LXfdi_{t-i} \\ & + \sum_{i=1}^{p} \varphi_{2,i} \Delta LXdi_{t-i} + \varepsilon_{2t}\end{aligned} \tag{6}$$

$$\begin{aligned}\Delta LDI_t = {} & \alpha_{30} + \sum_{i=1}^{p} \gamma_{2,i} \Delta LX_{t-i} + \sum_{i=1}^{p} \theta_{3,i} \Delta LFDI_{t-i} \\ & + \sum_{i=1}^{p} \delta_{3,i} \Delta LDI_{t-i} + \sum_{i=1}^{p} \varpi_{3,i} \Delta LXfdi_{t-i} \\ & + \sum_{i=1}^{p} \varphi_{2,i} \Delta LXdi_{t-i} + \varepsilon_{3t}\end{aligned} \tag{7}$$

$$\begin{aligned}\Delta LXfdi_t = {} & \alpha_{40} + \sum_{i=1}^{p} \gamma_{4,i} \Delta LX_{t-i} + \sum_{i=1}^{p} \theta_{4,i} \Delta LFDI_{t-i} \\ & + \sum_{i=1}^{p} \delta_{4,i} \Delta LDI_{t-i} + \sum_{i=1}^{p} \varpi_{4,i} \Delta LXfdi_{t-i} \\ & + \sum_{i=1}^{p} \varphi_{4,i} \Delta LXdi_{t-i} + \varepsilon_{4t}\end{aligned} \tag{8}$$

$$\begin{aligned}\Delta LXdi_t = {} & \alpha_{50} + \sum_{i=1}^{p} \gamma_{5,i} \Delta LX_{t-i} + \sum_{i=1}^{p} \theta_{5,i} \Delta LFDI_{t-i} \\ & + \sum_{i=1}^{p} \delta_{5,i} \Delta LDI_{t-i} + \sum_{i=1}^{p} \varpi_{5,i} \Delta LXfdi_{t-i} \\ & + \sum_{i=1}^{p} \varphi_{5,i} \Delta LXdi_{t-i} + \varepsilon_{5t}\end{aligned} \tag{9}$$

The two series are co-integrated if and only if there is an error correction representation. When it is co-integrated, the long-term relationship between the model variables will be found by the Johansen test. However, the analysis result does not indicate the causal effect direction between variables. Therefore, VECM is pertinent for the study and takes the following form:

$$\begin{aligned}\Delta \mathrm{LX}_t &= \eta_1 + \sum_{i=1}^{k-1} \nu_{1,i} \Delta \mathrm{LX}_{t-i} + \sum_{i=1}^{k-1} o_{1,i} \Delta \mathrm{LFDI}_{t-i} \\ &+ \sum_{i=1}^{k-1} \pi_{1,i} \Delta \mathrm{LDI}_{t-i} + \sum_{i=1}^{k-1} \rho_{1,i} \Delta \mathrm{LXfdi}_{t-i} \\ &+ \sum_{i=1}^{k-1} \vartheta_{1,i} \Delta \mathrm{LXdi}_{t-i} + \mu_1 etc_{t-1} + \varepsilon_{1t}\end{aligned} \tag{10}$$

$$\begin{aligned}\Delta \mathrm{LFDI}_t &= \eta_2 + \sum_{i=1}^{k-1} \nu_{2,i} \Delta \mathrm{LX}_{t-i} + \sum_{i=1}^{k-1} o_{2,i} \Delta \mathrm{LFDI}_{t-i} \\ &+ \sum_{i=1}^{k-1} \pi_{2,i} \Delta \mathrm{LDI}_{t-i} + \sum_{i=1}^{k-1} \rho_{2,i} \Delta \mathrm{LXfdi}_{t-i} \\ &+ \sum_{i=1}^{k-1} \vartheta_{2,i} \Delta \mathrm{LXdi}_{t-i} + \mu_2 etc_{t-1} + \varepsilon_{2t}\end{aligned} \tag{11}$$

$$\begin{aligned}\Delta \mathrm{LDI}_t &= \eta_3 + \sum_{i=1}^{k-1} \nu_{3,i} \Delta \mathrm{LX}_{t-i} + \sum_{i=1}^{k-1} o_{3,i} \Delta \mathrm{LFDI}_{t-i} \\ &+ \sum_{i=1}^{k-1} \pi_{3,i} \Delta \mathrm{LDI}_{t-i} + \sum_{i=1}^{k-1} \rho_{3,i} \Delta \mathrm{LXfdi}_{t-i} \\ &+ \sum_{i=1}^{k-1} \vartheta_{3,i} \Delta \mathrm{LXdi}_{t-i} + \mu_3 etc_{t-1} + \varepsilon_{3t}\end{aligned} \tag{12}$$

$$\begin{aligned}\Delta \mathrm{LXfdi}_t &= \eta_4 + \sum_{i=1}^{k-1} \nu_{4,i} \Delta \mathrm{LX}_{t-i} + \sum_{i=1}^{k-1} o_{4,i} \Delta \mathrm{LFDI}_{t-i} \\ &+ \sum_{i=1}^{k-1} \pi_{4,i} \Delta \mathrm{LDI}_{t-i} + \sum_{i=1}^{k-1} \rho_{4,i} \Delta \mathrm{LXfdi}_{t-i} \\ &+ \sum_{i=1}^{k-1} \vartheta_{4,i} \Delta \mathrm{LXdi}_{t-i} + \mu_4 etc_{t-1} + \varepsilon_{4t}\end{aligned} \tag{13}$$

$$\begin{aligned}\Delta \mathrm{LXdi}_t &= \eta_1 + \sum_{i=1}^{k-1} \nu_{5,i} \Delta \mathrm{LX}_{t-i} + \sum_{i=1}^{k-1} o_{5,i} \Delta \mathrm{LFDI}_{t-i} \\ &+ \sum_{i=1}^{k-1} \pi_{5,i} \Delta \mathrm{LDI}_{t-i} + \sum_{i=1}^{k-1} \rho_{5,i} \Delta \mathrm{LXfdi}_{t-i} \\ &+ \sum_{i=1}^{k-1} \vartheta_{5,i} \Delta \mathrm{LXdi}_{t-i} + \mu_5 etc_{t-1} + \varepsilon_{5t}\end{aligned} \tag{14}$$

The coefficient of the etc_{t-1} term infers long-term causality between variables, while the joint F-test of the coefficients of the first different independent variables shows a short-term relation between variables. The multivariate Granger causality/Block exogeneity Wald tests are used to examine the above relation.

3.2.4. Variance Decomposition and Impulse Response Function Analysis

The variance decomposition indicates the amount each variable contributes to the other variables in the autoregression. It determines how much of the forecast error variance of each variable can be explained by exogenous shocks to the other variables. Impulse response analysis is an important step in econometric analyses, which employ vector autoregressive models. Their main purpose is to describe the evolution of a model's variables in reaction to a shock in one or more variables.

4. Results and Discussion

4.1. Unit Root and Stationary Test Results

In Table 2, the result of the ADF test indicates that the LDI series is stationary in the original series with a significance of 1%, while the remaining variables are non-stationary, and the KPSS test rejected the null hypothesis (the series is stationary). However, the ADF and PP tests show that the selected variables are all stationary at the 1% significance level in the first difference. Therefore, the five variables in this study are integrated into the first order.

4.2. Johansen Co-Integration Test Results

In Table 3, the Trace and Maximum-Eigen test results show a vector co-integrating between the variables in this study. In other words, the long-term relation between FDI, DI, X_{fdi}, X_{di}, and X was confirmed in this study. So far, therefore, this is the first evidence for the economic literature in Vietnam. Next, VECM is used to estimate one co-integration equation. The results are as follows:

$$\begin{aligned}\Delta \mathrm{LX}_t &= -0.01131 etc_{t-1} + 0.3347 \Delta \mathrm{LX}_{t-1} - 1.0378 \Delta \mathrm{LX}_{t-2} \\ &+ 0.1624 \Delta \mathrm{LFDI}_{t-1} - 0.1759 \Delta \mathrm{LFDI}_{t-2} \\ &- 0.0888 \Delta \mathrm{LDI}_{t-1} + 0.1810 \Delta \mathrm{LDI}_{t-2} \\ &- 0.2060 \Delta \mathrm{LXfdi}_{t-1} + 0.2347 \Delta \mathrm{LXfdi}_{t-2} \\ &- 0.1239 \Delta \mathrm{LXdi}_{t-1} + 0.5063 \Delta \mathrm{LXdi}_{t-2} + 0.2311\end{aligned} \tag{15}$$

$$\begin{aligned}\Delta \mathrm{LFDI}_t &= -1.37001 etc_{t-1} + 1.8673 \Delta \mathrm{LX}_{t-1} + 4.7968 \Delta \mathrm{LX}_{t-2} \\ &+ 0.8389 \Delta \mathrm{LFDI}_{t-1} - 0.5638 \Delta \mathrm{LFDI}_{t-2} \\ &- 0.4962 \Delta \mathrm{LDI}_{t-1} + 0.6985 \Delta \mathrm{LDI}_{t-2} \\ &- 0.9725 \Delta \mathrm{LXfdi}_{t-1} + 0.2690 \Delta \mathrm{LXfdi}_{t-2} \\ &- 2.3861 \Delta \mathrm{LXdi}_{t-1} + 1.0804 \Delta \mathrm{LXdi}_{t-2} - 0.8526\end{aligned} \tag{16}$$

Table 2: Unit Root and Stationary Test Results

Variables	ADF Test		PP Test		KPSS Test	
	Level	First Difference	Level	First Difference	Level	First Difference
LX	–1.7026 (0.4212)	–5.3646 (0.0001)	–5.0707 (0.0002)	–5.4411 (0.0001)	31.3001 (0.000)	8.0419 (0.00)
LFDI	–2.0622 (0.2604)	–5.6476 (0.000)	–2.0682 (0.2581)	–5.6474 (0.0000)	12.6766 (0.000)	1.6251 (0.1134)
LDI	–2.1463 (0.2292)	–5.3749 (0.0002)	–1.2098 (0.6591)	–5.1674 (0.0002)	42.3821 (0.000)	5.0815 (0.000)
LXfdi	–2.2586 (0.1908)	–5.2464 (0.0001)	–2.0047 (0.2836)	–5.2239 (0.0001)	11.3219 (0.0000)	2.7943 (0.0085)
LXdi	–1.9837 (0.2923)	–6.0724 (0.000)	–4.5958 (0.0008)	–6.1732 (0.000)	37.9494 (0.000)	4.5961 (0.0001)

Source: results extracted from EViews 10.
(Note: *p*-values are in parentheses).

Table 3: Johansen Co-Integration Test Results

Hypothesized No. of CE(s)	Eigen-value	H0	H1	Trace	CV (5%)	*p*-value	Max-Eigen	CV (5%)	*p*-value
None *	0.7856	$r = 0$	$r \geq 1$	114.948	69.819	0.0000	52.353	33.877	0.0001
At most 1 *	0.6021	$r \leq 1$	$r \geq 2$	62.594	47.856	0.0012	31.335	27.584	0.0157
At most 2 *	0.4069	$r \leq 2$	$r \geq 3$	31.259	29.797	0.0337	17.761	21.132	0.1390
At most 3 *	0.2338	$r \leq 3$	$r \geq 4$	13.497	15.495	0.0978	9.057	14.265	0.2814
At most 4 *	0.1224	$r \leq 4$	$r \geq 5$	4.440	3.841	0.0351	4.440	3.841	0.0351

CV is Critical Value.

$$\begin{aligned}\Delta LDI_t = &-0.5086etc_{t-1} + 0.0166\Delta LX_{t-1} \\ &+ 0.1099\Delta LX_{t-2} - 0.0377\Delta LFDI_{t-1} \\ &+ 0.0458\Delta LFDI_{t-2} + 0.0173\Delta LDI_{t-1} \\ &- 0.2195\Delta LDI_{t-2} - 0.0828\Delta LXfdi_{t-1} \\ &- 0.0871\Delta LXfdi_{t-2} + 0.2697\Delta LXdi_{t-1} \\ &+ 0.2264\Delta LXdi_{t-2} + 0.1143\end{aligned} \quad (17)$$

$$\begin{aligned}\Delta LXfdi_t = &-1.3111etc_{t-1} - 0.1963\Delta LX_{t-1} \\ &+ 2.7121\Delta LX_{t-2} + 0.1771\Delta LFDI_{t-1} \\ &+ 0.4002\Delta LFDI_{t-2} + 0.7209\Delta LDI_{t-1} \\ &+ 0.1717\Delta LDI_{t-2} + 0.0736\Delta LXfdi_{t-1} \\ &+ 0.1262\Delta LXfdi_{t-2} - 0.5027\Delta LXdi_{t-1} \\ &+ 0.9092\Delta LXdi_{t-2} - 0.4960\end{aligned} \quad (18)$$

$$\begin{aligned}\Delta LXdi_t = &0.0670etc_{t-1} + 0.7657\Delta LX_{t-1} \\ &- 0.3660\Delta LX_{t-2} + 0.1470\Delta LFDI_{t-1} \\ &- 0.1247\Delta LFDI_{t-2} + 0.0080\Delta LDI_{t-1} \\ &- 0.0111\Delta LDI_{t-2} - 0.1853\Delta LXfdi_{t-1} \\ &+ 0.1472\Delta LXfdi_{t-2} - 0.4457\Delta LXdi_{t-1} \\ &- 0.0700\Delta LXdi_{t-2} + 0.1484\end{aligned} \quad (19)$$

Where: etc- Co-integrating equation (long-run model):

$$\begin{aligned}etc_{t-1} = &1.001LX_{t-1} + 0.1184LFDI_{t-1} - 1.5207LDI_{t-1} \\ &+ 0.1936LXfdi_{t-1} - 0.6661LXdi_{t-1} + 8.2764\end{aligned} \quad (20)$$

The equation (15) indicated that when LFDI increases by 1%, export increases by 0.1624%, and this positive correlation

is rightly expected. However, this equation finds a negative impact of the DI sector (minus 0.0880%) on Vietnam's export: a 1% increase in DI leads to a drop of 0.0880% in export. This result indicates that the FDI sector is affecting export growth more than the DI sector in Vietnam. Meanwhile, equation (16) indicates that if an export or domestic investment is in better growth, the economy will attract more FDI inflow. However, the increase of FDI inflow can cause a negative impact on the DI sector and is indicated by equation (17). Finally, equations (18) and (19) indicate that the investment (FDI or DI) development can motivate Vietnam's enterprises to export.

4.3. Granger Causality Test Results

The results in Table 4 indicate that there is a one-way relation in the short run from LFDI to LX. In other words, in the short run, the FDI sector has a positive effect on Vietnam's export, meanwhile, the DI sector does not found. This is a contrast to the conclusion of Dao et al. (2017) specifically, these studies do not find the impact of FDI on Vietnam export in the short run. Therefore, this could be a new suggestion for the later studies in this direction. However, similar relations between other variables are not found in this analysis.

4.4. Variance Decomposition Analysis

Table 5 indicates that the shock of export in the past could explain from 93.65% to 97.22 % for the innovation of Vietnam's export. Besides, the change from the export of FDI firms explains from 1.93 % to 3.38% for this innovation. However, only from 0.27% to 1.59% of the growth in Vietnam's export is explained by the export activity of DI firms. The results show that the shocks of the FDI sector have a greater influence on the Vietnamese export than the shocks of the DI sector.

Similarly, the past movements of LFDI account for 63.97 percent of the current volatility. LXfdi's shock has the second-largest impact, accounting for 17.98% of LFDI volatility. Next, a shock from LX causes 16.68 percent of the variance in the LFDI. Shocks in LDI and LXdi, on the other hand, only partially explain LFDI's current situation.

Next, LFDI shocks account for 67.95 percent of LDI fluctuations. Meanwhile, the LX shock is the second most volatile component of the LDI, contributing to 26.12 percent of the LDI's volatility. Furthermore, a shock from LXfdi only accounts for 3.15 percent of the variance in the LDI, which is small but bigger than its effect in previous values (1.87 percent).

Similarly, LXfdi's variance is largely explained by LFDI shocks (71.47 percent). Furthermore, the export shock is the second-largest, accounting for 22.53 percent of the total effect. However, a change in LXfdi's historical values only explains 4.23 percent of the variance. Finally, the shocks from LDI and LXdi appear to explain some of the variances in LXfdi.

Table 4: Granger Causality Tests Result

Dependent Variable	Excluded Variables				
	LX	LFDI	LDI	LXfd_i	LXd_i
LX		2.402 (0.301)	0.795 (0.672)	1.780 (0.411)	3.012 (0.222)
LFDI	6.191 (0.045)		0.294 (0.863)	0.756 (0.685)	1.661 (0.436)
LDI	0.234 (0.890)	0.389 (0.823)		2.473 (0.290)	4.923 (0.085)
LXfdi	2.677 (0.262)	1.223 (0.543)	0.585 (0.746)		0.489 (0.783)
LXdi	2.116 (0.347)	0.693 (0.707)	0.002 (0.999)	0.506 (0.776)	

Table 5: Variance Decomposition Using Cholesky Forecast Error

Forecast Error Variance (%)	Typical shock In				
	LX	LFDI	LDI	LXfd_i	LXd_i
LX	93.65	1.02	0.36	3.38	1.59
LFDI	16.68	63.97	0.51	17.98	0.86
LDI	26.12	67.95	1.87	3.15	0.91
LXfdi	22.53	71.47	0.88	4.23	0.89
LXdi	58.23	1.84	2.82	23.96	13.15

Finally, historical changes account for only 13.15 percent of LXdi variance. The shocks from LXfdi and LX, on the other hand, have the highest impact on LXdi's variance. Finally, shocks from LFDI and LDI have a negligible effect on LXdi fluctuations.

4.5. Impulse Response Analysis Results

Table 6 shows that LX's overall response is immediate and significant throughout all time periods studied. In the short term, its positive standard deviation shock will create a change of 0.132, while in the long run, it will cause a change of 0.106. As a result, LX's response to the DI sector's shock has been negative throughout the analysis. Meanwhile, LX's response to the FDI sector shock is negative in the short run, but positive in the long run. To put it another way, an increase in FDI intake is critical for Vietnam's export growth.

Following that, the response of the LFDI variable is worth noting. Its positive standard deviation causes changes of 0.84 in the short run and 0.90 in the long run. The short-term response of LFDI to the LX shock is negative, whereas the long-term response is positive. Meanwhile, in all periods

Table 6: Response of LX Variable

Variables	Typical Response in				
	LX	LFDI	LDI	LXfdi	LXdi
LX	0.132	0.00	0.00	0.00	0.00
	0.102	0.016	–0.001	–0.001	0.008
	0.106	0.016	–0.003	–0.017	0.018
LFDI	–0.206	0.840	0.00	0.00	0.00
	0.524	1.085	–0.078	–0.665	–0.167
	0.560	0.900	–0.091	–0.608	–0.072
LDI	0.045	0.037	0.059	0.00	0.00
	0.060	0.151	0.021	–0.002	–0.007
	0.115	0.177	0.014	–0.045	–0.017
LXfdi	–0.118	0.574	0.038	0.189	0.00
	0.468	0.809	0.045	–0.227	0.011
	0.507	0.752	0.040	–0.224	0.103
LXdi	0.136	0.004	–0.031	–0.099	0.090
	0.111	0.029	–0.021	–0.070	0.064
	0.117	0.025	–0.025	–0.073	0.056

of investigation, its responses to the shocks of LDI, LXfdi, and LXdi are all negative.

Meanwhile, LDI has a short-term reaction of 0.0587 and a long-term response of 0.01358. In all times of analysis, the response of LDI to the shock of LX and LFDI is positive. However, it has a negative short-term response to the shock of LXfdi and LXdi, but good long-term response. Table 6 summarises the above findings.

A positive standard deviation shock induces a change of 0.1888 in the LXfdi variable in the short run, while the response is negative (at –0.2244) in the long run. In contrast, this variable's response to the LX shock is negative in the short run but positive in the long run. Meanwhile, its responses to the LFDI, LDI, and LXdi shocks are favorable across the board.

Finally, the LXdi variable's reaction is positive throughout the investigation. In the case of the LX and LFDI variables, a similar conclusion is reached. In the all-period analysis, however, this variable's response to the LDI and LXfdi shocks is negative. This suggests that the growth of FDI firms' exports has a significant impact on the growth of DI firms' exports in Vietnam.

5. Conclusion and Recommendations

From 1985 through 2020, this study looked at the relationship between Vietnamese export, FDI, and DI. The Johansen co-integration test confirmed that the above variables had a long-term relationship. As a result, a one-way association between FDI and Vietnam's export is discovered in the short run; however, a similar relationship between DI and export is not identified in this study. The variance decomposition and impulse response functions revealed that the FDI sector has a bigger impact on Vietnam's exports than the DI sector. A change in FDI, rather than a change in the DI sector, explains a larger portion of the forecast error variance in Vietnam export growth. Furthermore, in the FDI sector, export innovation is more susceptible to shocks than in the DI sector. As a result, Vietnam's officials must provide greater incentives to promote long-term economic development. Furthermore, to achieve long-term economic growth, the Vietnamese government must pay greater attention to its export strategy.

Finally, despite the authors' best efforts, there are some limitations to this study that cannot be ignored. First, during the period of this study, the global economic crisis and the Covid-19 pandemic may have had a direct impact on the data collected and analyzed in the research model. Second, the impact of FDI inflow on the DI sector has yet to be investigated. As a result, future studies should take these aspects into account to alleviate the study's weaknesses.

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