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THE RELATIONSHIPS BETWEEN FOREIGN DIRECT INVESTMENT, STATE-OWNED INVESTMENT, PRIVATE INVESTMENT, IMPORT, EXPORT AND ECONOMIC GROWTH IN VIETNAM

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A key component for economic growth is the foreign direct investment (FDI), which drew the attention of researchers worldwide. This study aims to examine the relationship between foreign direct investment (FDI), state-owned investment (SOI), private investment (PI), import (M), export (X) and Vietnam's economic growth (GDP) since the Renovation (1986) to now (2019). The Vector Autoregression Model (VAR) and Vector Error Correction Model (VECM) were utilized to realize the above-mentioned goals. The Johansen co-integration test confirmed that there exists a long-run relationship among the above variables. The Granger causal relationship test found one-way causal relationship from GDP to FDI and PI in the short-run. Besides, the similar causal relationship between export and GDP is confirmed. Also, the two-way causal relationship between PI and export in the short-run is also found in this study. In addition, the impact of a shock of SOI on GDP is more significant than that of an FDI or PI shocks on GDP. By contrast, the response of GDP to shocks of import and export seems are small. Finally, it is certain that FDI plays an essential role in Vietnam's economy.

Keywords: Foreign direct investment; state-owned investment; private investment; economic growth; Vietnam.

1. Introduction

Before 1986, Vietnam's economy followed a centrally-planned model. At that time, the directions and goals of the economy were determined by Vietnam's Government (Nguyen

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and Xing, 2008; Pham, 2008; Huy, 2018). Moreover, state-owned investment (SOI) was the only sector in Vietnam's investment market (Freeman, 2002; Dinh *et al.*, 2019). This economic model does not only discourage citizens from seeking profits but also prevents the operations of the private sector (Freeman, 2002; Thu, 2006; Phuong, 2017). However, the renovation reform plan in 1986 had dramatically transformed Vietnam's economy (Anwar and Nguyen, 2010; Dang, 2013; Thai-Ha and Tran-Nam, 2018). The presence of private and foreign invested sectors have spurred rapid economic growth and development (Freeman, 2002; Anh and Thang, 2007; Cuong, 2013). Besides, Vietnam's government had enacted policies on the private and foreign invested sectors to promote the economic growth (e.g., 1987 Foreign Investment Law; 1990 Enterprise Law; amended 2005 Enterprise Law) (Anh and Thang, 2007; Anwar and Nguyen, 2011; Dao *et al.*, 2017). Moreover, in recent years, Vietnam has become one of the fastest-growing economies in Asia, with the average growth rate of 6.18% over the 2010–2019 period (GSO, 2019; World Bank, 2019; Duong *et al.*, 2020). Notably, Vietnam's GDP grew by 7.08% in 2018, the highest in 12 years (Figure 1). These impressive results were gained partly thanks to the private and foreign invested sectors, especially the FDI into Vietnam (Hoang and Goujon, 2014; Vuong, 2014; Thach *et al.*, 2017). FDI inflow does not only have direct impacts on the national financial resource (Hanh *et al.*, 2017; Hoang Ngoc and Hai, 2019) but also indirect impacts on the recipient economy through the linkages with local firms (Dao and Sun, 2012; Dinh *et al.*, 2019; Huong and Huyen, 2019). In addition, import–export of Vietnam made tremendous contributions to the economic development, growth and modernization (e.g., diversifying economic activities, eliminating state monopolies, transferring technologies, improving domestic production, attracting foreign currency, etc.) (Nguyen and Xing, 2008; Dao and Sun, 2012; Nhung, 2017).

Over the last decades, the benefits from FDI to economic growth had been confirmed in the economic literature (Blomström, 1986; Firebaugh, 1992; Asiedu, 2002; Busse and Groizardb, 2006; Sumei Tang *et al.*, 2008; Anwar and Nguyen, 2010; Forte and Moura, 2013; Cozza *et al.*, 2015; Lin and Nelson, 2018). Thus, it has drew more and

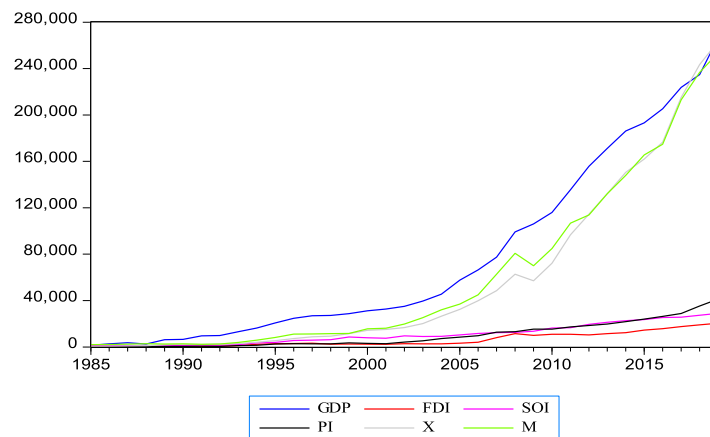


Figure 1. Vietnam's Economy from 1985 to 2019 (US\$ Millions)

more attention from worldwide researchers, including Vietnam. Specifically, Vietnam's Government had promulgated some specific laws (e.g., 1987 Foreign Investment Law; 2005 Enterprise Law; 2014 Revised Enterprise Law) and improved the domestic investment environment to attract more foreign capital (Freeman, 2002; Meyer and Nguyen, 2005; Thu, 2006; Hoang and Goujon, 2014; Hiep *et al.*, 2016; Thai-Ha and Tran-Nam, 2018; Huong Giang *et al.*, 2019). Moreover, thanks to the political stability, large market, low-cost labor, etc., Vietnam's market has become one of the most favored FDI destinations in Asia for international investors in recent years (Phuong, 2017; Hanh *et al.*, 2017; Ha *et al.*, 2019). The results of FDI in Vietnam were also recorded in some reports, as follows: the registered FDI inflows increasing from US\$ 1,603.5 million, with 211 projects during 1988–1990 to US\$ 29,560 million with 3,883 projects in 2019 (Freeman, 2002; Thu, 2006; Hoang and Goujon, 2014; Hanh *et al.*, 2017; Vo, 2018; World Bank, 2019). Therefore, FDI is considered as an important factor for economic growth in Vietnam (Dao and Sun, 2012; Anwar and Nguyen, 2014; Duong *et al.*, 2020). In addition, FDI has a positive contribution to the import–export growth in Vietnam (Anh and Thang, 2007; Nguyen and Xing, 2008; Dang, 2013; Huy, 2018). Notably, FDI does not only have a direct impact on import–export growth but also an indirect effect on import–export through the impact on domestic firms (Dao and Sun, 2012; Hoang and Goujon, 2014; Vu *et al.*, 2017). However, most of the previous research have not studied the response of FDI to the other factors in the economy and vice versa. Therefore, this study focuses on the impact and response of FDI on Vietnam's economy. Through the research findings, it is possible to forecast the future trend of FDI in Vietnam.

Since the economic reforms in 1986, domestic investment (State-owned (SOI) and Private (PI) investment) has made significant contributions to Vietnam's economy. Before the reforms, just like FDI, PI had not been recognized in Vietnam while SOI remained the only capital guaranteed by the Vietnam's Government (Freeman, 2002; Vu Le and Suruga, 2005; Anwar and Nguyen, 2010; Nguyen and Wongsurawat, 2017). However, after 1986, the PI sector flourished and became an important factor in Vietnam's economy (Thu, 2006; Dao and Sun, 2012). In 1988, when Vietnam's Government lifted a ban on the foreign-trade, private firms have achieved some remarkable achievements. Specifically, the PI increased from US\$ 238 million, with about 13,000 firms in 1987 to US\$ 41,292 million with 563,095 firms in 2019 (GSO, 2008 and 2019; Figure 1). Similarly, after the reform, SOI has also seen a dramatic increase (from US\$ 1,208.85 million in 1985 to US\$ 29,012.36 million in 2019) thanks to the strong economic growth. However, the leading role of SOI sector in the economy has gradually been replaced by FDI and PI sectors (Vuong, 2014; Vu *et al.*, 2017; Huong Giang *et al.*, 2019).

Finally, the Vietnam's import–export value has also risen rapidly since the economic reform in 1986. Specifically, the import value has increased from US\$ 2,752 million in 1990 to US\$ 253,513 million in 2019. Similarly, Vietnam's export has also had growth from US\$ 2,404 million in 1990 to US\$ 263,451 million in 2019 (Nguyen and Xing, 2008; Dao *et al.*, 2017; Ha *et al.*, 2019). Thus, import–export is considered an important component of Vietnam's economy. In addition, some previous studies (e.g., Nguyen and Xing, 2008; Dao and Sun, 2012; Huy, 2018) also indicated that FDI is a central motivation of the

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import–export growth in Vietnam. However, these studies have not paid attention to the role of the domestic investment sector in foreign-trade in the context of recent unpredictable fluctuations in the world economy (Mahutga and Smith, 2011; Tylecote, 2019). Therefore, this study is conducted to identify the trend of macroeconomic factors in Vietnam's economy.

The study aims to analyze the relationships between FDI, SOI, PI, import, export and economic growth in Vietnam. The Vector Error Correction Model (VECM) was adopted to analyze these correlations during period of 1985 and 2019. VECM helps determine the causal relationship between targeted variables and trace the dynamic responses of variables to exogenous shocks over time. Investigating the relationship between these above variables is of considerable significance from both analytical and policy perspectives. The research findings are significant for both Vietnam's Government and the investors. This study is divided into five parts. Section 1 is the introduction. In Sec. 2, the literature review is discussed. Section 3 presents the model and data of the study. Section 4 gives the findings and discussion are presented in the following part, and in Sec. 5, conclusions and policy implications are drawn.

2. Literature Review

Over the last decades, numerous empirical studies have been undertaken to determine the main factors that drive economic growth. However, these studies revealed different findings as they used different approaches (e.g., input data, methodology, time, location, etc.). Therefore, related literature to this study is presented in this section.

Firebaugh (1992) used penetration foreign capital (PEN) database to examine the effect of FDI on the less developed countries (LDCs)'s economy. The study revealed that LDCs with higher rates of FDI tend to experience faster economic growth rates and independence of domestic investment or exportation. Moreover, foreign investment brought up benefits for LDCs. Also, this study indicated that FDI promoted growth over the long-run and the short-run. Finally, Firebaugh did not find evidence of a general tendency for FDI to hinder growth in the PEN database, which is the opposite of the previous research (e.g., Barrett and Whyte, 1982; Bradshaw, 1988; O'Hearn, 1989). Bevan and Estrin (2000) examined determinants of FDI inflows to Central and Eastern Europe by a new database with the information on FDI flows from 18 established market economies to 11 transforming economies over the period of 1994–1998. The results show that FDI inflows are significantly influenced by risks, labor unit costs, host market and other factors. Besides, FDI plays a crucial role in fostering growth, technical innovation and enterprise restructuring. In addition, the weaknesses in the country's economic transformation will receive lower levels of FDI. Some other studies also have similar findings (e.g., Asiedu, 2002; Delaunay and Torrisi, 2012; Petrović-Randelović *et al.*, 2013). Gui-Diby and Loris (2014) used the system generalized method of moment (SYS-GMM) as proposed by Blundell and Bond (1998) to examine the impact of FDI on the growth in 50 African countries from 1980 to 2009. Their result indicated that FDI had a significant impact on these countries's economy. More specifically, during the period of 1980 and 1994, the effect of FDI on the African economic growth was negative because of the low capacity of local firms to

mobilize adequate resources to start production. However, this effect was positive (for the period of 1995–2009) thanks to the improved business environment and the contribution of resource-based industries to growth through exported goods in these countries. Similarly, study of Mijiyawa (2017) shows that FDI has a positive and significant effect on export. Also, this study reveals that African countries should define appropriate strategies and policies to attract more FDI in order to promote export. Besides, domestic investment stimulus could also contribute to the growth of African export. Lin and Nelson (2018) utilized a panel dynamic ordinary least squares model to evaluate the interaction between economic growth and FDI in Mexico, Indonesia, Nigeria and Turkey. The result shows that there exists a bi-directional causal relationship between them in Mexico, Indonesia, Nigeria and Turkey. Besides, this study confirmed that FDI has a positive effect on economic growth in the recipient economy. This is also supported by some other studies (e.g., Luziz and Mello, 1999; Sumei Tang *et al.*, 2008; Ghazali, 2010; Masoud Rashid Mohamed and Liew, 2013; Dinh *et al.*, 2019).

Alguacil *et al.* (2002) examined the relationship between trade, FDI, domestic income and economic growth in Mexico from 1980.I to 1999.IV. The result shows that the international capital is an important component of the outward national development policies, including FDI. Besides, FDI does not only have a positive impact on output in Mexico but also is one of the main forces influencing its economic performance. Finally, the positive causal relationship between FDI and exports is found; and also, the integration of Mexico in the world economy is being fostered by the export orientation of FDI firms. Sumei Tang *et al.* (2008) studied the relationship between FDI, DI and growth in China. This study concluded that FDI does not only play an important role in supplementing domestic investment but also has a significant effect on China's economic growth. Similar results are also presented by Sun *et al.* (2002), Liu *et al.* (2008), Yi *et al.* (2015). Besides, there exist a two-way relationship between DI and economic growth in China. However, there is only a one-way causal relationship between FDI and DI and between FDI and GDP. Finally, China's domestic investment had a greater impact on the growth than FDI does. Ghazali (2010) used Error Correction Model (ECM) to analyze the causal relationship between FDI, DI and growth in Pakistan. The findings show that there is bidirectional causal relationship between FDI and DI, DI and economic growth; unidirectional causal relationship between FDI and growth. Besides, FDI and DI play an important role in Pakistan's economy. Finally, Ghazali concluded that FDI does not only supplement domestic investment in Pakistan but also stimulates economic growth. Masoud Rashid Mohamed and Liew (2013) used VECM to analyze the causal relationship between FDI, DI and growth in Malaysia during 1970 and 2008. The study indicated that there is a long-run bidirectional causal relationship between DI and economic growth. Besides, a short-run crowding-in effect between FDI and DI was also found. However, it found no evidence of causal relationship between FDI and growth in Malaysia. Similarly, Al-Huda Abdul Karim and Fleming (2013) concluded that FDI has a positive effect on the market demand, labor productivity, socio-economic development of 13 states and 1 federal territory in Malaysia. Moreover, FDI inflow was seen as the most sensitive to labor productivity and economic development. Thus, FDI is also considered an important factor for Malaysia's economic growth.

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Aizenman and Noy (2005) investigated the connection between FDI and international trade in India. The result indicated that there are complex two-way positive responses between FDI and international trade. Besides, most of the linear response between trade and FDI (81%) could be calculated by Granger-causal relationship from FDI gross flows to trade openness (50%) and from trade to FDI (31%). Similarly, Behera *et al.* (2012) examined the FDI and technology spillovers across Indian manufacturing industries, based on panel data from 1990 to 2007. The result shows that FDI has a significant impact on the labor productivity of domestic firms. Moreover, FDI also played a significant role in lifting the level of technology of the domestic firms through technological spillovers. In addition, FDI is considered to be a key growth enhancer in India. Finally, FDI does not only bring capital but also introduces advanced technology to the India's firms. Additionally, the study of Malhotra (2014) presents that FDI has a positive impact on India's economic growth. FDI does not only supplement domestic capital, as well as technology and skills of India's firms but also helps establish new enterprises. Moreover, in order to attract more FDI, India's government needs to speed up the implementation of policies, rules and regulations. In addition, they must also focus on poverty reduction, trade liberalization, and banking and insurance liberalization. Bairagi (2017) confirmed the bidirectional causal relationship of FDI in India and Pakistan and the unidirectional causal relationship from Bangladesh to India and Pakistan. Besides, India could comparatively attract more FDI because they have better institutional quality, availability of large market and skilled labor force. Moreover, the FDI inflows to a nation could be positively influenced by its policy reforms. In other words, the positive reforms in an economy may also lead to greater-than-expected FDI. According to Petrović-Randelović *et al.* (2013), FDI is a prerequisite of successful implementation of the transition process and to achieve sustainable growth and development for Serbia's economy. In addition, if the host countries want to attract more FDI, they need to create a better business environment; reduce and simplify bureaucratic procedures at the national and local levels; intensify the fight against corruption because it is one of the most important issues in creating a healthy market economy.

Jung and Marshall (1985) used the regression method to analyze the causal relationship between export and growth of 37 developing countries. The result revealed that among 37 states, only four, namely Indonesia, Egypt, Costa Rica and Ecuador can present evidence in favor of export motivation for economic development. On the other hand, export slowed the economic growth rate in some countries. Similarly, Ahmad and Kwan (1991) investigated the link between export and the growth of 47 African countries. The result indicated that there is no causal relationship between export and growth in 47 African countries. Hsiao and Hsiao (2006) used the VAR model to examine Granger causality relations between FDI, export and GDP of the eight countries (Korea, Taiwan, Singapore, Hong Kong, China, Malaysia, Philippines and Thailand) from 1986 to 2004. The result revealed that there is a two-way causal relationship between FDI and economic growth in such countries as China, Singapore and Thailand, while there is no evidence for the relationship in other cases. Besides, the correlation between export and economic development is proved in China, Taiwan, Malaysia, Philippines and Thailand. Moreover, the positive impact of FDI on export is indicated in Taiwan, Singapore and Thailand. In contrast, there

is no evidence of the relationship between FDI, export and growth in the case of Korea and Hong Kong. Finally, FDI has a positive impact on economic growth either directly or indirectly through exports. In addition to a direct relationship between FDI and economic development, researchers argued that FDI has an indirect impact on growth through export (Alguacil *et al.*, 2002; Alici and Ucal, 2003; Seng, 2015; Silva and Forte, 2018). Silva and Forte (2018) analyzed the impact of FDI on exports over a large number of Portuguese firms (in manufacturing and services) in the period from 2006 to 2012. This study shows that the firm size, capital intensity, wages of foreign firms positively affect exports. Alici and Ucal (2003) used VAR methodology to analyze the correlation between FDI, export and growth in Turkey. The study did not find any significant positive spillovers from FDI to output or export. In addition, Turkey's export makes important contribution to the economic growth through their positive effect on consumption and investment. Seng (2015) studied the relationship between FDI, export and growth in 21 Asian countries over the period of 1980–2013, using the panel co-integration and Granger causal relationship analysis. This study shows that there is a long-run stable relationship between FDI, exports and GDP for the countries under study. Besides, FDI and exports have causal impact on long-run economic growth in these Asian countries. Finally, the government in the selected countries should build good macroeconomic environments, improve physical infrastructure, maintain social and political stability, remove all types of barriers and develop export-based development strategy to attract more FDI to promote economic growth. Vu Le and Suruga (2005) studied the interaction between FDI and public expenditures in determining the economic growth rate by data of 105 developing and developed countries for the period 1970–2001. The result shows that FDI, public capital and private investment (PI) play important roles in promoting economic development. Besides, the public non-capital expenditure has a negative impact on economic growth. Finally, excessive public spending can hinder the beneficial effects of FDI. More specifically, the effect of FDI on growth becomes weaker as the public investment ratio exceeds 8–9%. Besides, Forte and Moura (2013) confirmed that the effect of FDI on economic growth is positive or negative depending on the domestic conditions of the host country (e.g., economic and technological conditions, human capital, degree of economic openness). Moreover, if a nation wants to attract more FDI to develop its economy, it needs to design more appropriate FDI policies so that the country has necessary conditions to leverage the positive effects and mitigate the negative ones. In addition, Dinh *et al.* (2019) examined the impact of FDI on economic growth, both in the short run and the long run in developing countries in the lower-middle-income group (including Armenia, Bangladesh, Bhutan, Bolivia, Cameroon, Congo Rep, Cote d'Ivoire, El Salvador, Georgia and Ghana) from 2000 to 2014. This study indicated that FDI helps stimulate economic growth in the long run, although it has a negative impact in the short run. Besides, other macroeconomic factors also play an important role in explaining economic development in these countries. Moreover, money supply has a positive effect on growth in the short run while total credit for private sector has a negative effect. Thus, the impact of FDI on the economic growth is not always positive, as it depends on characteristics of the FDI investment, such as sectors, types, scopes, proportion of domestic businesses in the sector, duration and so on.

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However, some previous studies do not support the viewpoint of FDI-led growth (Leff, 1969; Jung and Marshall, 1985; Mencinger, 2003; Vissak and Roolaht, 2005; Salman and Hui, 2009). They indicated that FDI negatively affects the host countries' economic growth. For example, Vissak and Roolaht (2005) summarized the impacts of FDI on the Estonian economy. The result shows that FDI has a positive impact on the Estonia's economy such as promoting growth, supplementing investment capital, etc. However, this study also indicated FDI could have several negative effects such as the possible withdrawal of investments, cultural conflicts, fiscal and balance of payments deficits, uneven regional development and increased unemployment. Moreover, it is uncertain that foreign investors will transfer the necessary technology and knowledge and increase the branches' competitiveness in Estonia. Besides, Salman and Hui (2009) utilized co-integration and error correction techniques in estimating the long run behavioral relationship between FDI and the current account balance and different economic variables in Pakistan. The empirical results indicated that there exists a significant long-run relationship between FDI and Pakistan's gross national product (GNP). However, Pakistan's FDI has long been the prime factor in creating its current account deficit. Moreover, this study also confirmed that the FDI had a negative effect on the current account balance in the long run. Study of Mencinger (2008) also concluded that FDI deteriorates trade balance and current account balance in the host economy. In addition, FDI has some other negative impacts on the recipient economy, such as uneven regional development, cultural conflicts, exchange rate crisis, increased unemployment, etc. (Ahmad and Kwan, 1991; Mencinger, 2003; Vissak and Roolaht, 2005). Furthermore, Leff (1969) and Luziz and Mello (1999) indicated that FDI does not impact the long-run growth, but only the level of output because the increase of FDI just causes the rise in capital and income per capita temporarily.

In Vietnam, the relationship between investment, export and economic growth also attracted more attention of researchers. For example, Freeman (2002) examined the impact of FDI on Vietnam's economic growth. The result shows that FDI is not only an important element of the business community in Vietnam but also an equally important engine of economic development for the country. This was also supported by Anh and Thang (2007), Minh (2016) and Vo (2018). In addition, the weaknesses in the legal framework on foreign investment in Vietnam may partly explain why FDI inflows have not recovered since the Asian financial crisis. Thu (2006) stated that well-developed infrastructure is an essential factor to lure FDI because good infrastructure increases the productivity of investment and therefore, stimulates FDI inflows. Besides, labor and infrastructure are important determinants in attracting FDI (Anh and Thang, 2007). Similarly results also indicated by Binh (2013), Cuong (2013) and Dang (2013). The study of Hoang and Goujon (2014) shows that FDI has a positive impact on economic growth in Vietnam. Also, FDI is attracted thanks to market size, infrastructure, policies and participation of foreign and domestic firms in the host country. In addition, FDI is one of the major driving forces for the rapid export growth of Vietnam (Nguyen and Xing, 2008). In particular, the empirical analysis shows that a 1% increase in FDI inflows is expected to lead to a 0.13% increase in Vietnam's exports to these countries. Pham (2008) used Vector Auto-regression (VAR)

method and the database from 1986 to 2007 to determine which factors can become main drivers for Vietnam's economic growth. The result revealed that investment is the major factor for the economic growth in Vietnam. Besides, the impact of export on economic growth in Vietnam was proved to be very small. At that time, Anwar and Nguyen (2010) studied the relationship between FDI and Vietnam economic growth by panel dataset that covers 61 provinces of Vietnam from 1996 to 2005. The results indicated that while the direct effect of FDI on growth in Vietnam is positive, the indirect effect through the economy's absorptive capacity (as measured by such factors as the level of financial market development, spending on education and training and the extent of technology gap) is negative. Similarly, Anwar and Nguyen (2011) stated that a complementary relationship between FDI and import-export exists in Vietnam. On the other hand, FDI and net-export had a significant, positive relationship in the post-Asian financial crisis period. Still, the impact of FDI on net-export is insignificant. The study of Dao and Sun (2012) examined firms' export operations in the manufacturing sector in Vietnam, using a Heckman sample selection model which is estimated over corporate-level data in 2003 and 2004. This study concluded that corporate specific characteristics have significant impacts on their export operations. Besides, there exist significant export spillovers from FDI firms to domestic firms. Finally, the spillovers from FDI firms to local firms are unified and dependent on corporate characteristics. Van (2017) also shows that forward and backward linkages between FDI firms and local firms increase the productivity of domestic firms but the horizontal linkage has positive impact on these firms only if the neighboring countries also attract FDI in the same industries, otherwise this impact is negative. Moreover, the higher absorptive capacity of domestic firms from FDI firms, the higher productivity. Thus, FDI firms are seen to have spillovers effects on local firms in Vietnam (Manh Tien and Vuong, 2018). In addition, if Vietnam's firms want to have stable growth and sustainable development, they need to develop human resources towards specialization, high professional qualification and practical skills, focused training of experts and advanced management (Van, 2017; Ha *et al.*, 2019). The study of Huy (2018) indicated the difference in export volume of FDI firms and domestic ones in Vietnam. FDI firms made up a larger share of Vietnam's export than that of domestic enterprises, thanks to their advantages in terms of market availability in their home countries and the distribution channels in other foreign markets. Specifically, the gap between two groups of enterprises (FDI firms and domestic firms) in exports were expanding rapidly from 8.4% in 2010 to 28.6% in 2014 and tended to widen due to the increasing volume of FDI into Vietnam. Also, this study showed that FDI became an important factor to Vietnam's export growth. In particular, an increase of 1% in FDI made the export volume rise by 0.202%. Phuong (2017) examined the impacts of institutions on the performance of enterprises in Vietnam. The result indicated that improving economic institutional quality will result in higher revenues and added values of state-owned enterprises than those of FDI enterprises. Moreover, the improvement also leads to the increase in private enterprises' revenues but lower added values and added value ratios compared to those of FDI enterprises. In short, institutional reform will bring the greatest benefits to the SOI sector, followed by the FDI sector and the non-state sector will receive the least advantage. Hoang Ngoc and Hai (2019) confirmed that FDI has a

direct impact on Vietnam's economic structure. Particularly, FDI leads to the lower proportion of agriculture and industry and higher share of services.

Dao *et al.* (2017) used vector error correction (VEC) method to investigate the inter-relationships among GDP, FDI, international trade, the inflation rate and state investment in Vietnam from March, 2001 to December, 2011. By Johansen co-integration test, the study found a long-term relationship among the variables. Similar results are also presented by Nhung (2017), Thach *et al.* (2017) and Nguyen and Wongsurawat (2017). Moreover, the analysis of the short-term dynamics reveals that the impact of a shock to GDP on FDI is more significant than the impact of FDI on GDP. However, the impact of FDI on international trade appears to be minimal, which is unexpected. Finally, FDI exerts a stronger impact on exports than imports and Vietnam's inflation rate has a remarkable influence on the dynamics of some key economic variables. Hiep *et al.* (2016) stated that while the increased FDI inflows promote economic growth, and at the same time, greater growth could help the country attract additional FDI. Moreover, during the pre-crisis period, growth does not present a significant impact on FDI, while FDI is proved to be an important driver of growth. The study of Hanh *et al.* (2017) examined the impact of FDI on Vietnam's economy through statistical data from 1988 to 2016. It concluded that there are three main factors affecting the FDI attraction in Vietnam, namely resources, infrastructure and other supportive policies, in which supportive policies of Vietnam's government have the greatest impact. The study highly recommends the process of improving the state administration apparatus in provinces of Vietnam. Besides, Thai-Ha and Tran-Nam (2018) indicated FDI has a positive impact on Vietnam's economy. Vietnam's success in attracting FDI is mainly attributed to the country's relatively skilled workforce with low wages as compared to the neighboring countries. In addition, FDI investors in Vietnam are probably driven by the expected long-run cost differences between the host and alternative countries, rather than by those between the host and the home countries.

Ho *et al.* (2019) examined the determinants of investment location selection at the provincial level in Vietnam from foreign investors' perspectives. This study used panel data set on 63 Vietnam provinces from 2000 to 2015. The result indicated that foreign investors tend to focus on areas with fewer investment incentives. In addition, FDI into Vietnam increased after the financial crisis in 2008 as foreign investors could take advantage of lower currency value and lower cost in the areas with high investment incentives. Finally, Vietnam's policymakers should focus on improving the environment to attract the foreign investors in addition to offering more incentives in Vietnam. According to Huong and Huyen (2019), FDI is a substantial source of capital, which contributes to the total investment capital, as well as promotes economic growth of Vietnam. However, its impact is not as strong as that of domestic investment. In order to attract more FDI in Vietnam, it is necessary to continue improving its environment, as well as creating favorable conditions for enterprises, especially FDI firms. In addition, domestic investment and human resources are proved to have positive effects on Vietnam economic growth. Duong *et al.* (2020) concluded that there exists the relationship between FDI, free trade agreements (FTAs), and economic growth in Vietnam. In general, FTAs are associated with increased FDI inflows, with much greater impact in the current context. In addition, the three FDI

determinants (e.g., the real exchange rate, human capital and other factors) have more important roles following the FTAs.

This study aims to contribute to the existing literature by applying the VECM and the time series techniques of impulse response function (IRF) and variance analysis to investigate the empirical connection between FDI, SOI, PI, import–export and GDP in Vietnam. In addition, Granger Causal relationship test is also adopted to test the causal relationship between the mentioned variables.

3. Data and Research Methodology

3.1. Conceptual framework

Based on the above research gaps, the study formulated a model to test the association among GDP, FDI, SOI, PI, import and export in Vietnam from 1985 to 2019.

3.2. Data

This study's aim is to examine the relationship between FDI, SOI, PI, import, export and Vietnam economic growth (GDP) since the Reform (1986) to now (2019), with a time-series data over 1985–2019 (in million USD) from the World Bank and General Statistics Office (GSO) of Vietnam. The time period (from 1985 to 2019) was set to examine the change of Vietnam's economy since the Reform. The variables in this study include LFDI (FDI), LSOI (SOI), LPI (PI), LM (M), LX (X) and LGDP (GDP). All variables are converted into natural logarithms with the capital letter "L" before each time series' title. EViews 10 is used to conduct statistical analyses in this study.

Vietnam's economy has been growing rapidly in recent years (Anwar and Nguyen, 2010; Hoang Ngoc and Hai, 2019; World Bank, 2019), in which the investment (SOI, PI and FDI) is considered an important factor. This is also supported by the existing economic literature in Vietnam (Pham, 2008; Van, 2017; Dinh *et al.*, 2019; Ha *et al.*, 2019). Moreover, Solow (1956) pointed out that if a country devotes a significant part of its income to savings and investment, the economy would have considerable capital stock and a high level of output or stable growth. Similar results were indicated by Lucas (1988) and Romer (1990). Therefore, the LSOI, LPI and LFDI variables were selected as the main variables for this study.

Many previous studies indicated that import–export has an important role in Vietnam's economy because of their significant contributions (Thu, 2006; Nguyen and Xing, 2008; Huy, 2018). They do not only help improve domestic production but also open up international market access (Alguacil *et al.*, 2002; Seng, 2015; Silva and Forte, 2018). Moreover, the import–export is considered "the fundamental distinctive feature" among the developing countries such as Vietnam (Thach *et al.*, 2017). Therefore, the import–export is an indispensable variable in this study. In other words, two variables LM and LX are used to examine their impacts on the other variables in this study.

Gross domestic product (GDP) is the total monetary or market value of all the finished goods and services produced within a country's borders in a specific period. Through this factor, it is possible to understand the country's economic growth rate. Moreover, it has

Table 1. Descriptive Statistics for Different Variables

	LGDP	LFDI	LSOI	LPI	LX	LM
Mean	10.488	7.013	8.815	7.991	9.746	9.988
Maximum	12.493	9.922	10.275	10.628	12.481	12.443
Minimum	7.251	0.00	6.818	0.00	6.458	7.610
Std. Dev.	1.454	3.371	1.115	2.470	1.851	1.632
Skewness	-0.479	-1.450	-0.482	-1.898	-0.182	-0.048
Kurtosis	2.309	3.522	1.882	6.905	1.830	1.618
Jarque-Bera	2.033	12.668	3.178	43.246	2.190	2.800
Probability	0.362	0.002	0.204	0.000	0.335	0.247
Sum	367.092	245.457	308.510	279.700	341.107	349.595
Sum Sq. Dev.	71.875	386.428	42.266	207.462	116.485	90.601
Observations	35	35	35	35	35	35

Source: Results extracted from EViews 10.

been a topic of interests of Vietnam's policymakers in recent years (e.g., Pham, 2008; Anwar and Nguyen, 2010; Vuong, 2014; Dao *et al.*, 2017; Nguyen and Wongsurawat, 2017; Duong *et al.*, 2020). Thus, LGDP is also the selected variable in this study.

Descriptive statistics of the variables in the VECM are presented in Table 1. The mean values and standard deviations of all variables are positive. The skewness coefficient of all variables has negative values, showing that these variables have a left skew distribution. The *P*-value of the Jarque-Bera test shows that the variables are all standard distributions.

3.3. Research methodology

As mentioned in the previous sections, the main aim of this paper is to investigate the impact of FDI, SOI, PI, import and export on the economic growth in Vietnam. The econometric methodology in this study is VAR. The basic model in this study can be expressed as follows:

$$\text{LGDP} = f(\text{LFDI}, \text{LSOI}, \text{LPI}, \text{LX}, \text{LM}). \quad (1)$$

For this study, the single-equation regression would cause an estimation bias since all the variables are endogenous. Therefore, the authors use the VECM to determine the causal relationship between target variables and for finding out the dynamic responses of variables to exogenous shocks overtime. In other words, this study conducts the tests of VECM Granger causal relationship and impulse response to the one-unit shock under the VAR model estimation on the bilateral combinations between the variables in the model. Regarding the lag interval, the study takes a one-year lag in the VAR model.

VAR and VECM are adopted to test relationships among the variables in this study. The procedure is undertaken as follows:

- Unit root testing and Optimal lag length

Previous econometric studies indicated that most macroeconomic time series variables are non-stationary. The use of non-stationary variables can result in pseudo-regression (Granger, 1969). Thus, before choosing an appropriate econometric model, it is imperative to examine the unit root of all variables and to determine the degree to which they are integrated. Besides, panel data contribute to the increase in the number of observations, which in turn leads to an increase in the power of the tests. Moreover, many previous studies utilized panel unit root tests in order to increase the statistical power of the findings. In this study, the stationarity of each series was tested using Augmented Dickey–Fuller (ADF), Phillips–Perron (PP) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) methods to test their order of integration. If the series are integrated of the same order, there is probably the co-integration of the variables, with a significant test for co-integration. The KPSS test differs from the ADF and PP tests in the way that it involves examining the null hypothesis that the relevant time series is stationary. Consequently, inference from the KPSS test is complementary to unit root testing based on ADF and PP tests.

Determining the optimal lag length (p) for the model is essential in this study. If p is too small, the remaining serial correlation in the errors will bias the test or while p is too large, the power of the test will suffer. Hence appropriate lag lengths can be chosen by paring down the ‘lag length’ using the ‘likelihood ratio’ test and based on selection indicators suggested by AIC of Akaike (1973); HQ of Hannan and Quinn (1979) and SC of Schwarz (1978).

– Johansen co-integration test

After testing unit root and determining the optimal lag length, Johansen (1988) and Johansen and Juselius (1990) likelihood tests are applied to test the co-integration among the series variables, since it is a multivariate approach. The purpose of the maximum likelihood estimation is to test the number of independent co-integrating vectors in the VAR model. Moreover, the Johansen approach allows estimating more than one co-integration relationship if the data set contains two or more time series as well as giving the maximum rank (r) of co-integration. In this way, the Johansen procedure treats all variables as endogenous while testing the long-run parameters. The unrestricted co-integration r test is used to examine the long-run relationship between variables. The resulting model is known as VECM, as it adds error correction features to a multi-factor model VAR. In the 6-variable model of LGDP, LFDI, LSOI, LPI, LM and LX, Y_t serves as a 6×1 vector which consists of the 6 variables; in general the multivariate model can be shown as follows:

$$Y_t = \beta_0 + \sum_{i=1}^p \beta_i Y_{t-i} + \varepsilon_t, \quad (2)$$

where Y_t is a 6×1 vector that includes LGDP_{*t*}, LFDI_{*t*}, LSOI_{*t*}, LPI_{*t*}, LX_{*t*} and LM_{*t*}; β_0 is a 6×1 vector of constants; β_i is a 6×6 matrix of regression coefficients; ε_t is a 6×1 vector of error terms (white noise processes) and p is the lag length.

Two likelihood ratio (LR) test statistics used to determine the number of unique co-integrating vector in Y_t are constructed using residuals vectors β_0 and β_{it} , which are known as the trace test and maximal eigenvalue test.

The critical values for both λ_{trace} and λ_{max} statistics are calculated by Johansen and Juselius (1990) and later refined by Osterwald and Lenum (1992) in a Monte Carlo analysis, which had given the most comprehensive set of critical values for VAR model with up to 11 variables. If r is proved to be equal to n , it means none of the series is actually integrated. The vector Y_t is considered to be stationary. The VAR can be formulated at levels of all series. If $r = 0$, this means there are no co-integrating vectors or a long-run equilibrium relationship that makes the variables proportional in the long-run. If $0 < r < n$, there exists r co-integrating vectors, or $n - r$ common stochastic trend driving the series. Therefore, it is necessary to include r error correction terms involving levels of the series to apply VAR. The relevant test statistics are as follows:

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

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

where $\hat{\lambda}$ is the estimated values of the characteristic roots (i.e., Eigenvalues) obtained from the estimated error correction matrix (π) and T is the number of observations.

Trace statistics are based on the hypothesis until it fails to reject the null: Hypothesis H_0 : Trace statistic < Critical value = co-integrating equation. Hypothesis H_1 : Trace statistic > Critical value = At most co-integrating equation.

The Maximum Eigenvalue statistic is based on the hypothesis until it fails to reject the null, specified as follows: Hypothesis H_0 : Eigenvalue < Critical value = No co-integrating equation. Hypothesis H_1 : Eigenvalue > Critical value = At most co-integrating equation.

– Estimate the VECM, Granger causality relationship and Innovation Accounting

With reference to Kim and Seo (2003), given the assumption that FDI is determined to be independent of contemporaneous movements in macro-variables in the host country, this is not too restrictive as it may seem to allow full dynamics. Therefore, following Eqs. (1) and (2) for estimation and hypothesis testing, the unrestricted vector autoregressive (VAR) system can be written as follows:

$$\begin{aligned} \Delta \text{LGDP}_t = & \alpha_{10} + \sum_{i=1}^p \gamma_{1,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^p \theta_{1,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^p \delta_{1,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^p \varpi_{1,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^p \varphi_{1,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^p \phi_{1,i} \Delta \text{LM}_{t-i} + \varepsilon_{1t}, \end{aligned} \quad (5)$$

$$\begin{aligned} \Delta \text{LFDI}_t = & \alpha_{20} + \sum_{i=1}^p \gamma_{2,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^p \theta_{2,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^p \delta_{2,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^p \varpi_{2,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^p \varphi_{2,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^p \phi_{2,i} \Delta \text{LM}_{t-i} + \varepsilon_{2t}, \end{aligned} \quad (6)$$

$$\begin{aligned}\Delta \text{LSOI}_t = & \alpha_{30} + \sum_{i=1}^p \gamma_{3,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^p \theta_{3,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^p \delta_{3,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^p \varpi_{3,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^p \varphi_{3,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^p \phi_{3,i} \Delta \text{LM}_{t-i} + \varepsilon_{3t},\end{aligned}\quad (7)$$

$$\begin{aligned}\Delta \text{LPI}_t = & \alpha_{40} + \sum_{i=1}^p \gamma_{4,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^p \theta_{4,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^p \delta_{4,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^p \varpi_{4,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^p \varphi_{4,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^p \phi_{4,i} \Delta \text{LM}_{t-i} + \varepsilon_{4t},\end{aligned}\quad (8)$$

$$\begin{aligned}\Delta \text{LX}_t = & \alpha_{50} + \sum_{i=1}^p \gamma_{5,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^p \theta_{5,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^p \delta_{5,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^p \varpi_{5,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^p \varphi_{5,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^p \phi_{5,i} \Delta \text{LM}_{t-i} + \varepsilon_{5t},\end{aligned}\quad (9)$$

$$\begin{aligned}\Delta \text{LM}_t = & \alpha_{60} + \sum_{i=1}^p \gamma_{6,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^p \theta_{6,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^p \delta_{6,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^p \varpi_{6,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^p \varphi_{6,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^p \phi_{6,i} \Delta \text{LM}_{t-i} + \varepsilon_{6t}.\end{aligned}\quad (10)$$

Contemporaneous restriction cannot guarantee the exact identification. Thus, it can leads to invalid estimates while the long-run identifying assumption restrains the long-run dynamics in the absence of any economic theory which describes an equilibrium relationship (Kim and Seo, 2003). According to Engle and Granger (1987) if two series are co-integrated, there must be an error correction representation and in turn, if there is an error correction representation, two series must be co-integrated. A finding of co-integration by the Johansen test shows that there is a stable long run relationship among the variables in the system. However, the co-integration tests do not indicate the causal effect. In the co-integrated case, the VECM is appropriate for examining long run relationships and takes the following form:

$$\begin{aligned}\Delta \text{LGDP}_t = & \eta_1 + \sum_{i=1}^{k-1} \nu_{1,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k-1} \rho_{1,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^{k-1} \pi_{1,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^{k-1} \rho_{1,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^{k-1} \vartheta_{1,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^{k-1} \psi_{1,i} \Delta \text{LM}_{t-i} + \mu_1 \text{etc}_{t-1} + \varepsilon_{1t},\end{aligned}\quad (11)$$

$$\begin{aligned}\Delta \text{LFDI}_t = & \eta_2 + \sum_{i=1}^{k-1} \nu_{2,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k-1} \rho_{2,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^{k-1} \pi_{2,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^{k-1} \rho_{2,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^{k-1} \vartheta_{2,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^{k-1} \psi_{2,i} \Delta \text{LM}_{t-i} + \mu_2 \text{etc}_{t-1} + \varepsilon_{2t},\end{aligned}\quad (12)$$

$$\begin{aligned} \Delta \text{LSOI}_t = & \eta_3 + \sum_{i=1}^{k-1} v_{3,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k-1} o_{3,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^{k-1} \pi_{3,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^{k-1} \rho_{3,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^{k-1} \vartheta_{3,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^{k-1} \psi_{3,i} \Delta \text{LM}_{t-i} + \mu_3 \text{etc}_{t-1} + \varepsilon_{3t}, \end{aligned} \quad (13)$$

$$\begin{aligned} \Delta \text{LPI}_t = & \eta_4 + \sum_{i=1}^{k-1} v_{4,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k-1} o_{4,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^{k-1} \pi_{4,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^{k-1} \rho_{4,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^{k-1} \vartheta_{4,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^{k-1} \psi_{4,i} \Delta \text{LM}_{t-i} + \mu_4 \text{etc}_{t-1} + \varepsilon_{4t}, \end{aligned} \quad (14)$$

$$\begin{aligned} \Delta \text{LX}_t = & \eta_1 + \sum_{i=1}^{k-1} v_{5,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k-1} o_{5,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^{k-1} \pi_{5,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^{k-1} \rho_{5,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^{k-1} \vartheta_{5,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^{k-1} \psi_{5,i} \Delta \text{LM}_{t-i} + \mu_5 \text{etc}_{t-1} + \varepsilon_{5t}, \end{aligned} \quad (15)$$

$$\begin{aligned} \Delta \text{LM}_t = & \eta_6 + \sum_{i=1}^{k-1} v_{6,i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k-1} o_{6,i} \Delta \text{LFDI}_{t-i} + \sum_{i=1}^{k-1} \pi_{6,i} \Delta \text{LSOI}_{t-i} \\ & + \sum_{i=1}^{k-1} \rho_{6,i} \Delta \text{LPI}_{t-i} + \sum_{i=1}^{k-1} \vartheta_{6,i} \Delta \text{LX}_{t-i} + \sum_{i=1}^{k-1} \psi_{6,i} \Delta \text{LM}_{t-i} + \mu_6 \text{etc}_{t-1} + \varepsilon_{6t}. \end{aligned} \quad (16)$$

The coefficient of the etc_{t-1} represents the long-run causal relationship, while the joint F -test of the coefficients of the first differenced independent variables indicates the short-run causal relationship. The causal relationship can be derived through the multivariate Granger causal relationship/Block exogeneity Wald tests of the joint significance of the lags of the independent variables. In addition, this test results can be used to identify the temporal causal directions between pairs of variables. It can be bidirectional or unidirectional, or there may be no causal relationship.

– The variance decomposition and IRF analysis.

Finally, the authors investigate the dynamic interrelationships among the selected variables in the research model by the variance decomposition and IRF analysis. The forecast error variance decomposition allows inference over the proportion of the movement in a time series due to its shocks compared to the shocks to other variables, as well as the determinants and the causal directions among the variables in the model. The IRF analysis is used to determine how each endogenous variable responds over time to a shock to that variable and other variables in the model. Kim and Seo (2003) applied this technique in their study on South Korea to identify the complementary or substitution relationship between FDI and domestic investment, and its impact on the economic growth. Thus, it is reasonable to apply these analyses.

4. Results and Discussion

4.1. Unit root and stationary test results

The ADF, PP and KPSS tests result are presented in Table 2. The results of ADF and PP tests indicated that the LGDP, LSOI, LPI and LX series are stationary in the original series with a significance level of 1%, the remaining variables are non-stationary. The KPSS test rejects the null hypothesis that the series is stationary. However, after the first difference, all variables, both ADF test and PP test led to the rejection of null hypothesis (H_0) on the existence of unit root in the variables. Based on these results, it is possible to conclude that all variables in this study are significant at the first difference. Thus, all six variables under study are integrated at level one.

While there have been many methods for selecting lag for VAR model so far, this study presents the VAR lag order selection criteria to find the appropriate lag for the model. The results in Table 3 show that all criteria suggest the lags of two, including (1) FPE, (2) SC, (3) AIC, (4) HQ. After determining the optimal number of lags is two, the long-term equilibrium relationship exists between variables in the model and the co-integration tests proposed by Johansen are applied.

The results in Table 4 show that the P -value of lags 1 and 2 are higher than 5%. In other words, the residual serial of the VAR model does not suffer from autocorrelation.

4.2. Johansen co-integration test result

Because the variables in this study are integrated at level one, it is vital to examine the co-integration relationship among variables by Johansen and Jessulus (1990) and Johansen's

Table 2. Unit Root Test

Variables	ADF Test		PP Test		KPSS Test	
	Level	First Difference	Level	First Difference	Level	First Difference
LGDP	-2.981128 (0.0472)	-9.979 (0.0000)	-3.558450 (0.0122)	-10.67418 (0.0000)	42.67669 (0.0000)	3.963307 (0.0004)
LFDI	-2.237565 (0.1975)	-5.807220 (0.0002)	-2.010559 (0.2811)	-5.811095 (0.0002)	12.30681 (0.0000)	1.861456 (0.0719)
LSOI	-3.957392 (0.0056)	-3.489557 (0.0582)	-0.827673 (0.7983)	-4.966707 (0.0017)	46.77121 (0.0000)	2.167779 (0.0377)
LPI	-3.984844 (0.0041)	-6.454929 (0.0000)	-4.729682 (0.0006)	-6.454929 (0.0000)	19.13912 (0.0000)	2.577558 (0.0148)
LX	-1.509744 (0.5167)	-5.584424 (0.0003)	-4.566457 (0.0009)	-11.00653 (0.0000)	31.15028 (0.0000)	5.136446 (0.0000)
LM	-0.102485 (0.9413)	-4.225784 (0.0109)	-0.102485 (0.9413)	-4.178168 (0.0122)	36.19961 (0.0000)	2.707587 (0.0108)

Note: p -values are in parentheses.

Source: Results extracted from EViews 10.

Table 3. VAR Lag Order Selection Criteria

Lag	Log Likelihood	LR	FPE	AIC	SC	HQ
0	−523.7983	NA	9676886	33.11239	33.38722*	33.20349
1	−485.0265	60.58088	8495170	32.93916	34.86293	33.57683
2	−401.8197	98.80810*	573669.2*	29.98872*	33.56146*	31.17299*

Notes: *Indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike; SC: Schwarz; HQ: Hannan–Quinn.

Table 4. VAR Residual Serial Correlation LM Tests

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	48.87267	36	0.0745	1.511432	(36, 37.9)	0.1062
2	48.98769	36	0.0729	1.516810	(36, 37.9)	0.1042
3	42.21324	36	0.2202	1.218500	(36, 37.9)	0.2745
4	49.14301	36	0.0709	1.524091	(36, 37.9)	0.1017

Source: Results extracted from EViews 10.

(1998) test. After the careful search and trial, a model with two lags, constant, was selected for analysis. Table 5 presents the Johansen co-integration test results based on the data assumption of a deterministic trend. Accordingly, the null hypothesis of no co-integration ($r = 0$) can be rejected using the maximum eigenvalue or trace test statistics. The trace and maximum-eigen test results indicate that there exists a vector co-integration among the variables in this study. In other words, there is evidence of a long-term equilibrium relationship between FDI, SOI, PI, import, export and GDP in Vietnam. The long-run relationship between FDI, export and Vietnam economic growth have also been confirmed in some previous studies (e.g. Pham, 2008; Dao *et al.*, 2017; Nhung, 2017; Thach *et al.*, 2017).

Table 5. Johansen Co-integration Test

Hypothesized No. of CE(s)	Eigen-Value	H_0	H_1	Trace Test			Max Test		
				Trace	CV (5%)	p-value	Max-Eigen	CV (5%)	p-value
None*	0.927416	$r = 0$	$r \geq 1$	238.0799	95.75366	0.0000	81.31319	40.07757	0.0000
At most 1*	0.893134	$r \leq 1$	$r \geq 2$	156.7667	69.81889	0.0000	69.32158	33.87687	0.0000
At most 2*	0.736789	$r \leq 2$	$r \geq 3$	87.44516	47.85613	0.0000	41.37874	27.58434	0.0005
At most 3*	0.620665	$r \leq 3$	$r \geq 4$	46.06642	29.79707	0.0003	30.04944	21.13162	0.0021
At most 4*	0.282427	$r \leq 4$	$r \geq 5$	16.01698	15.49471	0.0417	10.28829	14.26460	0.1937
At most 5	0.168726	$r \leq 5$	$r \geq 6$	5.728688	3.841466	0.0167	5.728688	3.841466	0.0167

Note: *Denotes rejection of the hypothesis at the 0.05 level; CV is critical value.

After finding evidence for the existence of the long term equilibrium relationship between variables in the model, VECM model is used to estimate with one co-integration equation. The results are as follows:

$$\begin{aligned}\Delta \text{LGDP}_t = & 0.5298 \text{etc}_{t-1} - 1.24051 \Delta \text{LGDP}_{t-1} - 0.4422 \Delta \text{LGDP}_{t-2} + 0.0251 \Delta \text{LFDI}_{t-1} \\ & + 0.0237 \Delta \text{LFDI}_{t-2} + 0.0306 \Delta \text{LSOI}_{t-1} - 0.1117 \Delta \text{LSOI}_{t-2} - 0.0314 \Delta \text{LPI}_{t-1} \\ & + 0.0569 \Delta \text{LPI}_{t-2} + 0.6149 \Delta \text{LX}_{t-1} + 0.4066 \Delta \text{LX}_{t-2} - 0.1208 \Delta \text{LM}_{t-1} \\ & - 0.0261 \Delta \text{LM}_{t-2} - 0.0099, \quad (17)\end{aligned}$$

$$\begin{aligned}\Delta \text{LFDI}_t = & 2.4242 \text{etc}_{t-1} - 1.8550 \Delta \text{LGDP}_{t-1} + 3.8773 \Delta \text{LGDP}_{t-2} - 0.0043 \Delta \text{LFDI}_{t-1} \\ & - 0.3452 \Delta \text{LFDI}_{t-2} - 0.6705 \Delta \text{LSOI}_{t-1} - 1.0835 \Delta \text{LSOI}_{t-2} - 0.6463 \Delta \text{LPI}_{t-1} \\ & - 0.4999 \Delta \text{LPI}_{t-2} + 2.0718 \Delta \text{LX}_{t-1} + 1.4180 \Delta \text{LX}_{t-2} - 0.6645 \Delta \text{LM}_{t-1} \\ & + 1.1367 \Delta \text{LM}_{t-2} - 0.0516, \quad (18)\end{aligned}$$

$$\begin{aligned}\Delta \text{LSOI}_t = & 1.3216 \text{etc}_{t-1} - 0.6919 \Delta \text{LGDP}_{t-1} - 0.2967 \Delta \text{LGDP}_{t-2} - 0.0482 \Delta \text{LFDI}_{t-1} \\ & - 0.0071237 \Delta \text{LFDI}_{t-2} - 0.8629 \Delta \text{LSOI}_{t-1} - 0.5111 \Delta \text{LSOI}_{t-2} - 0.1036 \Delta \text{LPI}_{t-1} \\ & - 0.0650 \Delta \text{LPI}_{t-2} - 0.0653 \Delta \text{LX}_{t-1} + 0.0342 \Delta \text{LX}_{t-2} - 0.5982 \Delta \text{LM}_{t-1} \\ & - 0.3651 \Delta \text{LM}_{t-2} - 0.0155, \quad (19)\end{aligned}$$

$$\begin{aligned}\Delta \text{LPI}_t = & -1.443215 \text{etc}_{t-1} + 1.20451 \Delta \text{LGDP}_{t-1} + 0.8097 \Delta \text{LGDP}_{t-2} - 0.1874 \Delta \text{LFDI}_{t-1} \\ & - 0.0405 \Delta \text{LFDI}_{t-2} - 0.0527 \Delta \text{LSOI}_{t-1} + 0.10594 \Delta \text{LSOI}_{t-2} - 0.2344 \Delta \text{LPI}_{t-1} \\ & - 0.1444 \Delta \text{LPI}_{t-2} - 1.5522 \Delta \text{LX}_{t-1} - 1.7352 \Delta \text{LX}_{t-2} - 0.3154 \Delta \text{LM}_{t-1} \\ & - 0.6448 \Delta \text{LM}_{t-2} - 0.0195, \quad (20)\end{aligned}$$

$$\begin{aligned}\Delta \text{LX}_t = & 1.2836 \text{etc}_{t-1} - 0.68481 \Delta \text{LGDP}_{t-1} - 0.5203 \Delta \text{LGDP}_{t-2} + 0.01211 \Delta \text{LFDI}_{t-1} \\ & + 0.0168 \Delta \text{LFDI}_{t-2} - 0.1053 \Delta \text{LSOI}_{t-1} - 0.0617 \Delta \text{LSOI}_{t-2} + 0.0828 \Delta \text{LPI}_{t-1} \\ & + 0.1385 \Delta \text{LPI}_{t-2} + 0.0583 \Delta \text{LX}_{t-1} - 0.1868 \Delta \text{LX}_{t-2} - 0.1525 \Delta \text{LM}_{t-1} \\ & - 0.0961 \Delta \text{LM}_{t-2} - 0.0056, \quad (21)\end{aligned}$$

$$\begin{aligned}\Delta \text{LM}_t = & -1.2585 \text{etc}_{t-1} + 1.1303 \Delta \text{LGDP}_{t-1} + 0.6468 \Delta \text{LGDP}_{t-2} + 0.0109 \Delta \text{LFDI}_{t-1} \\ & - 0.0394 \Delta \text{LFDI}_{t-2} - 0.1064 \Delta \text{LSOI}_{t-1} - 0.1630 \Delta \text{LSOI}_{t-2} - 0.0895 \Delta \text{LPI}_{t-1} \\ & + 0.0322 \Delta \text{LPI}_{t-2} - 0.3264 \Delta \text{LX}_{t-1} + 0.3170 \Delta \text{LX}_{t-2} - 0.0522 \Delta \text{LM}_{t-1} \\ & - 0.27011 \Delta \text{LM}_{t-2} - 0.0097, \quad (22)\end{aligned}$$

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

$$\begin{aligned}\text{etc}_{t-1} = & 1.00 \text{LGDP}_{t-1} - 0.0793 \text{LFDI}_{t-1} + 0.060 \text{LSOI}_{t-1} + 0.2213 \text{LPI}_{t-1} \\ & - 0.5951 \text{LX}_{t-1} + 0.3680 \text{LM}_{t-1} + 0.0121. \quad (23)\end{aligned}$$

Equation (17) shows that the impacts of the independent variables (FDI, SOI, PI, X, M) on the dependent variable (GDP) are different. More specifically, when FDI increases by 1%, GDP rises by 0.0251%. Similarly, GDP rises by 0.0306% and 0.6149% when SOI and export increases by 1%. However, when PI and import increase by 1%, GDP declines by 0.0314% and 0.1208%, respectively. Also when FDI increases by 1%, import and export rises by 0.0109% and 0.0121%, respectively. These results show that FDI has a positive

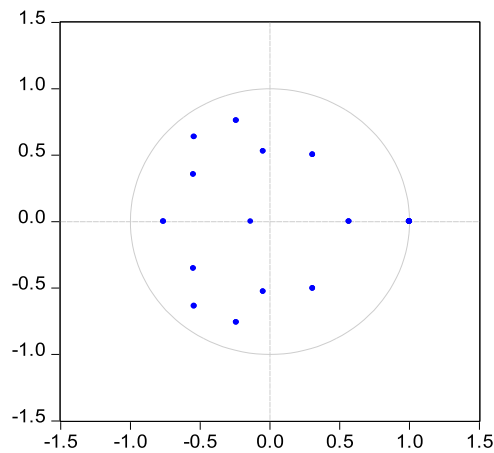


Figure 2. Stability Test of VECM

impact on Vietnam economic growth in the long-run. This conclusion is also supported by previous studies (e.g., Pham, 2008; Anwar and Nguyen, 2010; Dao *et al.*, 2017; Nhung, 2017; Hoang Ngoc and Hai, 2019). Moreover, the regression coefficient of (17) equation has a value of 0.5298, reflecting that 52.98% of the variation in the economic growth can be adjusted in the following year. In addition, Figure 2 shows this model is highly stable because most of the roots are inside the unit circle.

4.3. Estimate the VECM result

Multivariate Granger causal relationship/Block exogeneity Wald tests are used to examine the short-run dynamics among the variables for the VECM in this study. Table 6 presents

Table 6. Granger Causality Relationship Tests

Dependent Variable	Excluded Variables					
	LGDP	LFDI	LSOI	LPI	LX	LM
LGDP		1.2523 (0.5346)	2.3071 (0.3155)	4.2418 (0.1199)	6.8737 (0.0322)	0.7590 (0.6842)
LFDI	30.7091 (0.000)		3.0984 (0.2124)	11.9723 (0.0025)	3.1254 (0.2096)	7.0868 (0.289)
LSOI	3.5907 (0.1661)	1.4975 (0.4730)		4.0335 (0.1331)	0.0552 (0.9728)	8.6221 (0.0134)
LPI	6.2348 (0.0443)	11.2865 (0.0035)	0.3162 (0.8538)		19.2963 (0.0001)	5.6708 (0.0587)
LX	5.0706 (0.0792)	0.3037 (0.8591)	0.1869 (0.9107)	6.2488 (0.0440)		0.6518 (0.7219)
LM	6.8095 (0.0332)	1.1795 (0.5545)	0.6270 (0.7309)	3.6262 (0.1613)	1.5533 (0.4599)	

Source: Results extracted from EViews 10.

the test results, indicating some bidirectional and unidirectional causalities among the variables. Notably, export is proved to have a Granger causal relationship with GDP, but reverse causal relationship is not supported in the short-run. Similarly, in the short-run, one-way causal relationship is found between GDP and PI and FDI because it is possible to reject the null at the significance of 5%, but the reverse impact is not seen. Besides, a similar causal relationship is also found between import and SOI and between GDP and import. In addition, two-way causal relationship between PI and export is proved in this study. Though the other relationships of variables in this study are not evident, the results are entirely different from the previous studies in Vietnam. In short, the economic growth and PI can attract more FDI for Vietnam economy. Besides, this study confirms that there is existence the relationship between PI and export both in the short-run and long-run.

4.4. Variance decomposition analysis

After examining the short-run relationships between the variables in VECM, Cholesky forecast error variance decomposition technique is adopted to measure the contribution of each shock to the innovations of the GDP variable in the VECM system.

Table 7 indicates that the level of GDP growth mainly comes from endogenous shocks from the GDP variable. Specifically, the GDP variable explained from 80% to 90% for the innovations of Vietnam's economic growth. Besides, the SOI variable also explained from 1% to 11% for this innovation. In addition, in the short-run, the shocks of FDI, PI, import and export variables have not contributed to the economic growth in Vietnam. Still, in the long-term, the above variables explained from 1% to 6% on the variation in the innovations of GDP variable. Besides, the shock to the changes in the GDP of the SOI is more of a significant influence than the other sectors. It is attributed to the fact that Vietnam is a socialist republic nation, so SOI sector can get more benefits from Government. The conclusion is also supported by Phuong (2017) and Ha *et al.* (2019).

Table 8 presented the contribution of each shock to the innovations of each variable in VECM. Cholesky forecast error variance decomposition technique and a 10-period

Table 7. Variance Decomposition of LGDP Variable

Period	S.E	LGDP	LFDI	LSOI	LPI	LX	LM
1	0.075652	100.00	0.00	0.00	0.00	0.00	0.00
2	0.088215	88.17	1.49	1.49	6.65	1.63	0.57
3	0.106498	82.70	2.83	4.94	4.91	2.31	2.31
4	0.116280	79.58	2.84	8.55	4.42	2.58	2.03
5	0.125938	80.88	2.46	8.35	3.99	2.22	2.10
6	0.134352	81.72	2.57	8.22	3.69	1.96	1.84
7	0.144478	80.31	2.64	10.01	3.20	2.17	1.67
8	0.151176	80.50	2.73	10.21	2.95	2.08	1.53
9	0.159641	81.04	2.67	10.28	2.68	1.95	1.38
10	0.166694	80.62	2.71	11.01	2.49	1.91	1.26

Source: Results extracted from EViews 10.

Table 8. Variance Decomposition using Cholesky Forecast Error

Forecast Error Variance (%)	Typical Shock In					
	LGDP	LFDI	LSOI	LPI	LX	LM
LGDP	80.62	2.71	11.01	2.49	1.91	1.26
LFDI	57.80	19.54	1.36	1.17	1.24	18.89
LSOI	4.36	5.99	67.45	9.97	7.18	5.05
LPI	1.96	8.24	18.36	11.57	1.83	58.04
LX	21.52	13.44	20.23	29.81	9.24	5.76
LM	6.53	0.89	16.26	4.65	2.79	68.88

Source: Results extracted from EViews10.

forecast are chosen for analysis. The results indicate that the variance of Vietnam economic growth (measured by LGDP) is primarily explained by shocks from its own past performance (80.62%), followed by SOI (11.01%). The shocks of FDI (2.71%), PI (2.49%), export (1.91%) and import (1.26%) seem to exert minimal influence on economic growth in Vietnam. Based on these results, it can be concluded that the current performance of the economy plays a crucial part in forecasting the future economic growth of Vietnam. The similar conclusion are also indicated in some other studies (e.g., Dao *et al.*, 2017; Nguyen and Wongsurawat, 2017; Duong *et al.*, 2020).

In terms of the forecast error variance of the FDI inflow, the results show that shocks of GDP cause 57.80% of the fluctuations in FDI. This can be explained by the changes in Vietnam economy's direct impact on FDI inflow activity. Besides, the fluctuations in FDI by the shock of its past values are 19.54%. A shock of import is the third largest impact factor, accounting for 18.89% of the volatility in FDI. The shocks of SOI (1.36%), export (1.24%) and PI (1.17%) have a relatively low effect on the volatility of FDI inflow. The above results show that an economy with a stable growth rate could attract more FDI inflows.

The next issue is the forecast error variance of SOI. As shown in Table 8, 67.45% of SOI fluctuations are caused by shocks from its past values. Moreover, a shock from PI is the second-largest impact factor, accounting for 9.97% of the volatility in SOI. The shocks of GDP (4.36%), FDI (5.99%), export (7.18%) and import (5.05%) on the volatility in SOI are relatively small. This result shows that the changes in PI or export could significantly impact the investment decisions of Vietnam's government.

Regarding the forecast error variance of PI, the result suggests that shocks of import lead to 58.04% of the PI (see Table 8). Moreover, nearly 12% of the PI's variance is caused by changes in its past values. Besides, a shock of SOI is the second-largest impact factor, accounting for 18.36% of the PI's volatility. Finally, the shocks from GDP, export and FDI account for 1.96%, 1.83% and 8.24% of PI variations, respectively.

With regards to the forecast error variance of export, the results indicate that 9.24% of the export fluctuations are caused by shocks from their past values (see Table 8). However, the shocks of PI (29.81%), GDP (21.52%), SOI (20.23%) and FDI (13.44%) have

substantial impacts on the volatility of export in the research period. Besides, the shock of import (5.76%) makes a small contribution to fluctuations in export. Based on the above results, it comes to a conclusion that changes in the domestic investment sector lead to larger fluctuations in export than the foreign investment sector.

Finally, nearly 70% of the variance in import is caused by changes in its past values. A shock of SOI is the second-largest impact factor, accounting for 16.26% of the volatility in the import variable. Besides, the shocks of GDP and PI account for 6.53% and 4.65% of the variations in the import variable, respectively. However, the changes in FDI (0.89%) and export (2.79%) appear to make a relatively small contribution to fluctuations in import. The above findings show that the domestic investment sector still has more influence on the volatility of Vietnam import than the foreign investment sector.

4.5. Impulse response analysis result

In this section, IRF is applied to examine the dynamic feedback of the variables in VECM to unexpected exogenous shocks. Through this analysis, the past volatility of a variable is examined to explaining its current fluctuations. This result supports the conclusions of the above forecast error variance decomposition analysis.

The response of GDP to impulses in all variables is shown in Figure 3. The overall feedback of GDP is immediate and significant in all periods of analysis. SOI shocks in the past and current periods lead to positive responses in GDP. Besides, the shocks of PI and import in first two periods lead to positive changes in GDP; however, over the next periods, they are afflicted by the negative responses from GDP. Finally, the shocks of GDP to FDI and export are negative in all studied periods. In fact, the variance decomposition analysis also indicates that SOI is an important factor explaining the volatility of GDP (about 11%).

Figure 4 shows the response of FDI to shocks from its own past values and other variables. The result indicates that the past values of FDI make the biggest contributions to its current fluctuations. Moreover, compared to GDP, the feedback of FDI to various

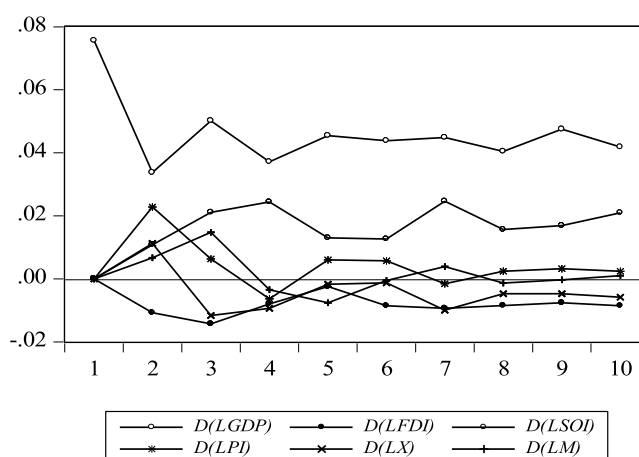


Figure 3. Responses of LGDP to Cholesky One S.D. Innovations

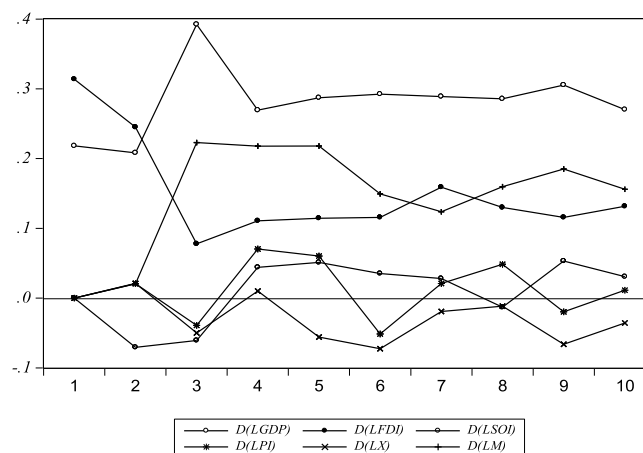


Figure 4. Responses of LFDI to Cholesky One S.D. Innovations

shocks is relatively diverse. More specifically, the response of FDI shocks to GDP is negative in the first two periods and remains steady in the next periods. However, the shocks from FDI shock on import result in positive changes in FDI. In addition, the feedback of FDI to shocks of SOI, PI, and export are less volatile.

Figure 5 shows the response of SOI to the volatility in all six variables. Like GDP, the past values of SOI seem to make substantial contributions to the current fluctuations in SOI variable. Notably, the shocks in the first four periods are strongest and remain steady afterward. A shock of GDP has a positive impact on SOI in all periods. In contrast, the shocks from FDI, PI, export and import apparently had negative effects on the volatility of SOI.

The PIs response to fluctuations in its past values and current values of other variables is shown in Figure 6. The PI responses are substantial in all periods, especially its shock in the first three periods. Compared to FDI and SOI, the feedback of PI to various shocks is relatively diverse. The PI responds sharply to a change in import and export in the first four

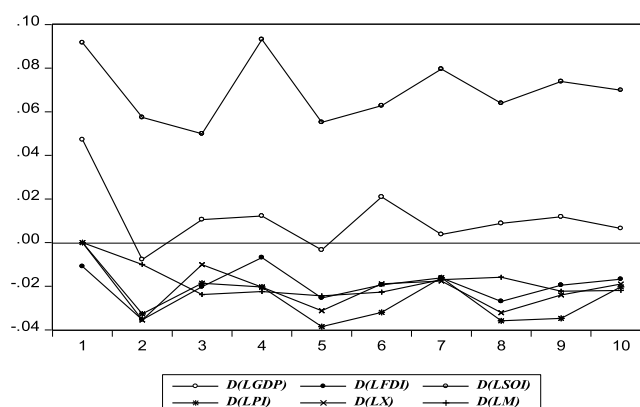


Figure 5. Responses of LSOI to Cholesky One S.D. Innovations

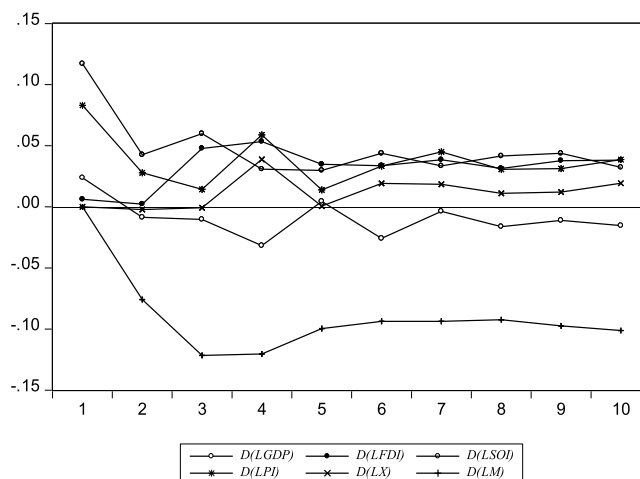


Figure 6. Responses of LPI to Cholesky One S.D. Innovations

periods. However, the PIs feedback to the shocks of GDP is negative in all analysis periods. In other words, private-investment can decrease when Vietnam's economy changes.

Figure 7 shows the response of export to the fluctuations in each of the six variables. Figure 7 indicates that there is no clear pattern but the responses are substantial, notably to the self-shock, in the first four periods. Similarly, the shocks of GDP and PI have a strong impact on export in the first three periods and less volatile afterward. Besides, except for the first-period response to SOI, most of the changes in export are positive. Finally, the shocks of FDI and import have negative impacts on export in all periods. Compared to the responses of the previous variables, the feedback of export to various shocks is less volatile.

Figure 8 shows that the response of the import varies considerably across the variables. Compared to the previous variables, the feedback of import to various shocks is less

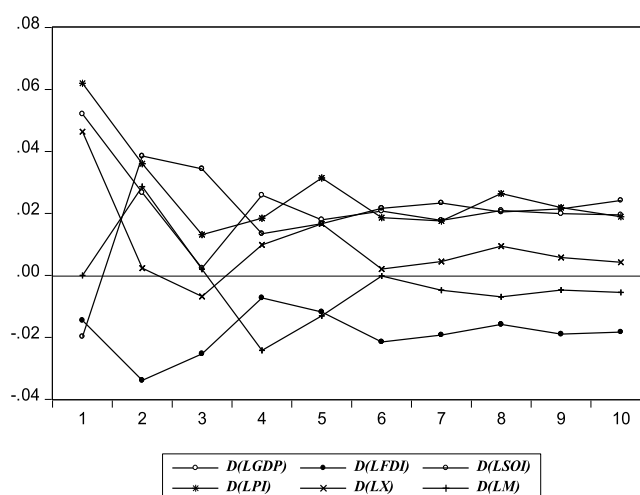


Figure 7. Responses of LX to Cholesky One S.D. Innovations

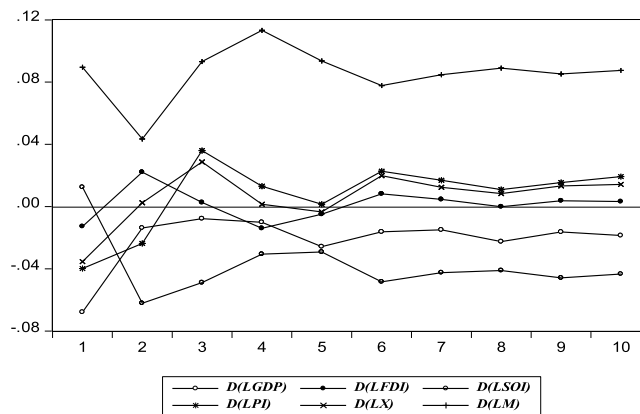


Figure 8. Responses of LM to Cholesky One S.D. Innovations

volatile. More specifically, the self-shock exerts the most substantial impact in the first four periods for the volatility in import and remains relatively steady afterward. Similarly, the feedback to an impulse in PI and export is positive over the first four periods and continues approximately constant later. In contrast, a shock of FDI has a negative impact on imports in the first two periods and less volatile in the remainder. Finally, except for responses to GDP and SOI variables in the first two periods, most of the imports' changes are negative. In short, the IRF analysis is used to support the results of the variance decomposition analysis.

5. Conclusion

This study investigated the relationship between economic growth, foreign direct investment (FDI), State-owned investment (SOI), Private investment (PI), Import (M) and Export (X) in Vietnam from 1985 to 2019. The Johansen co-integration test confirms the presence of a long-run relationship between the variables in this study. The multivariate Granger causal relationship test indicates that there exist some causal relationships between variables in the short-run, namely, one-way causal relationship between GDP and PI and FDI; between import and SOI; between GDP and import; and between export and GDP. In addition, two-way causal relationship between PI and export is proved in this study. The variance decomposition analysis and IRF results indicate that the short-run interrelationships' strength varies considerably across the variables. Thus, some interesting conclusions and policy implications can be drawn from the research findings:

First, the impact of shocks of SOI on GDP is more significant than that of FDI or PI shocks on GDP. Specifically, a shock of SOI explains a more substantial proportion of the forecast error variance in GDP than the impact of a shock of FDI or PI on the GDP. Besides, the shocks of import and export exert minimal influence on Vietnam's GDP. Moreover, GDP is more sensitive to shocks from its own past values and the investment (FDI, SOI and PI) than to import and export. This indicates that Vietnam's GDP growth (or the market size) remains a key determinant of investment in general and SOI in particular.

Thus, Vietnam's policymakers need to prioritize measures that would result in sustainable economic growth. These policies should focus on domestic firms' economic efficiency and competitiveness, promote economic restructuring, improving and cleaning up the state management apparatus. The previous studies (e.g., Cuong *et al.*, 2014; Phuong, 2017; Manh Tien and Vuong, 2018) indicated that the equitization of medium enterprises could significantly improve their productivity to stimulate the long-run economic growth in Vietnam.

Second, it can be realized that FDI inflow can hinder a country's economic growth in the short-run and have a positive effect in the long-run. Besides, FDI capital exerts a more substantial impact on import and export than on domestic investment (SOI and PI), which is not surprising as FDI firms are a significant contributor to Vietnam's import–export. Similar result was also presented by Nhung (2017) and Huy (2018). Therefore, it is certain that FDI is an essential factor for the economic growth in the long-run, especially for emerging and developing economies like Vietnam. Thus, to attract FDI for the economic development in the coming years, Vietnam Government should continue to improve the transparency of policies, adjust and invest in the infrastructure and access international practices and reform the administrative procedures. These policy implications are also relatively relevant to the current situation in Vietnam and the data from this study.

Thirdly, since the 1986 reform, the PI sector has been a critical factor in Vietnam's economy (Phuong, 2017; Huong and Huyen, 2019). It is the major cause for the variance in export and the second-largest factor of the fluctuations in SOI. Besides, it is also an essential bridge between FDI inflow and domestic investment in Vietnam's economic structure (Hoang Ngoc and Hai, 2019). Therefore, it is vital to promote the PI sector for economic growth in Vietnam.

Fourth, the import–export sector has played an important role in Vietnam's economy, as shown by its increasing share in GDP. Besides, the shocks of import–export also have significantly influenced the economic growth in Vietnam. Also, import–export growth also stimulates other factors in the economy, including investment (Dao and Sun, 2012; Nhung, 2017). Therefore, in order to achieve sustainable economic growth in the context of stronger integration into regional and global markets, it is imperative for Vietnam's Government to implement considerable reforms in the export strategies.

Despite the efforts put into the study, certain limitations cannot be avoided. The global economic crisis during the studied period may directly affect data in the research model. This potential issue has not been considered in this study. It is expected that subsequent studies should consider these essential issues to mitigate the limitations.

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