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Information Content of Foreign Direct Investment: Evidence from Vietnam

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Abstract

This study decomposes the foreign direct investment (FDI) into registered and disbursed values. The difference between the two values reflects the absorption capacity of an economy toward foreign capital flows. Over a quarterly sample from Q1/2007 to Q1/2023 in the Vietnamese economy, the vector autoregressive model with time-varying coefficients (TVC-VAR) is employed to capture the potential changing macroeconomic regime. The evidence suggests that the disbursed FDI has a greater connection with macroeconomic fundamentals, while the registered FDI is more effective in forecasting the value of fundamental variables. Thus, the information content of registered FDI is different from that of disbursed FDI, and this result should be accounted for in both academic research and public policy design. As an implication, the disbursed FDI is more suitable for investigating the macroeconomic impact of FDI capital inflows, while the registered FDI is more useful as an indicator of future macroeconomic dynamics.

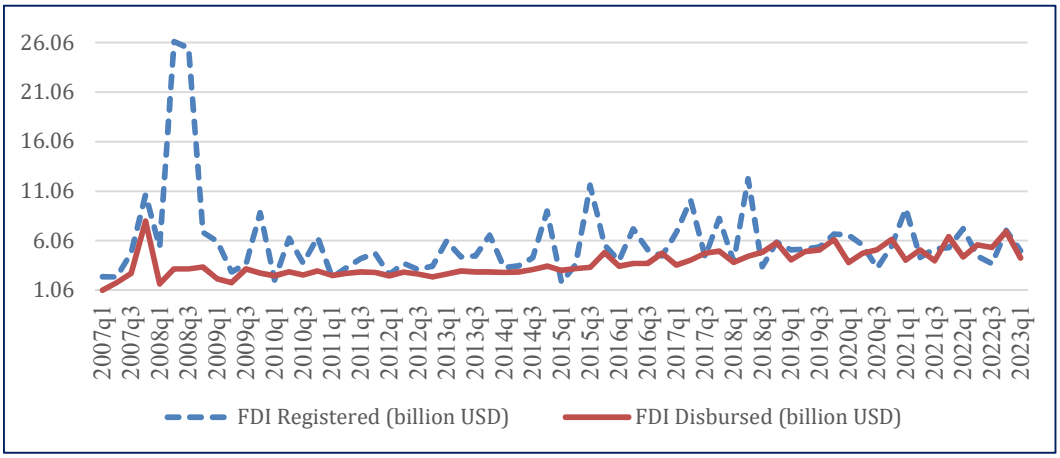
Keywords: foreign direct investment, economic growth, Vector Autoregression Model, Vietnam

1. Introduction

Foreign direct investment (FDI) is important for a developing economy to catch up with advanced economies. The FDI provides one additional financial resource for domestic capital accumulation to then stimulate economic growth. Moreover, for the economy following the management of the foreign exchange rate, the FDI is also a supply of foreign currency, subsequently affecting the equilibrium exchange rate. With these channels, the FDI is expected to have a high degree of interaction with macroeconomic fundamentals, especially their dynamic pattern over time. In other words, the FDI is expected to contain information about the domestic macroeconomic fundamentals, including economic growth, inflation, and exchange rate.

One key feature of the FDI pattern is the difference between the registered and disbursed value. As shown in Figure 1, the disbursed FDI is usually lower than the registered FDI since the transformation from the registered value into a disbursed value is affected by the strategy of foreign firms, changes in the global and domestic business environment, and the ability of the host country to fulfill its commitment.

Figure 1. Registered and disbursed FDI in Vietnamese economy 2007–2023



Source: Vietnam General Statistics Office (2023)

The difference in registered and disbursed FDI is also reflected by their trend over time. In Vietnam, the registered FDI has reduced substantially since the end of 2021, even in the exporting sectors such as manufacturing or textile, while the disbursed FDI still goes up during the whole year of 2022. For the recent months of 2023, both the registered and disbursed values of FDI were reduced together. Thus, a segmentation exists in the dynamic patterns of registered and disbursed values of FDI. This segmentation relies on the economic insight of each type: 1) the registered FDI captures the attractiveness of an economy toward foreign investors, while 2) the disbursed FDI reflects the absorption capacity of an economy toward foreign capital inflows.

The current paper employs the difference between the registered and disbursed FDI to analyze the macroeconomic information content of FDI, with a focal point on the Vietnamese economy. Over a quarterly sample from Q1/2007 to Q1/2023, the vector autoregressive model with time-varying coefficients (TVC-VAR) reveals that the disbursed FDI had a greater interaction with the macroeconomic fundamentals, while the registered FDI was more effective in forecasting the value of fundamental variables. As an implication, the disbursed FDI should be used to investigate the macroeconomic impact of FDI capital inflows, while the registered FDI should be used as an indicator for future macroeconomic dynamics.

The paper belongs to a large collection of literature on international capital flows. The capital flows can be measured by the negative value of the current account as a flow variable, i.e., as the first measure of capital flows, or by the change of net foreign assets as the change of stock variable, i.e., as the second measure of capital flows. When an economy has a great value of foreign asset accumulation over time, the fluctuation of the exchange rate can lead to a

significant difference between the first and second measures of capital flows (Pavlova & Rigobon, 2010).

Recent empirical evidence indicates that capital usually does not flow from the poor to the rich economy or even flow from developing economies to advanced economies, coined as an "uphill pattern" of capital flows (Lucas, 1990; Prasad et al., 2007). One reason for the uphill pattern is that the marginal product of capital adjusted for the existence of unproducible capital in the advanced economy is higher than that of the developing economy (Caselli & Feyrer, 2007). Another reason is the asymmetric supply of financial assets across economies that the advanced economies have in abundance, especially safe assets, which attract capital from the developing economies, which have an asset scarcity (Caballero et al., 2008; Farhi & Maggiori, 2018).

Our paper provides additional evidence on the determinant of foreign capital flows; in particular, the flow of foreign direct investment raises for a higher economic growth rate or a lower inflation rate. The impact of economic growth on the flow of capital is through the marginal product of capital, while that of inflation is through the macroeconomic stability. While the first impact is well-recognized, the second impact receives relatively little attention in the literature. Complementing the literature, however, we show that the mechanism that economic growth and inflation exert on capital flows only works for the disbursed value of FDI and not for the registered value of FDI.

The paper is also related to the literature on the information content of macroeconomic variables. In general, the information content of a macroeconomic variable is the ability of that variable to predict other macroeconomic variables. Thanh et al. (1999) mention the information content of foreign exchange rate as the fraction of future fluctuation of economic growth

and inflation rate that the exchange rate can predict. Recently, Hung (2022) reported that FDI is also a determinant of the long-run economic growth rate.

Tille and Wincoop (2014) build up a theoretical two-country model of dispersed information, in which the information affects the capital flows through asset prices directly. The results show that private information can lead to a disconnect of capital flows from observed macro fundamentals and imply that capital flows contain information about future macro fundamentals.

On accounting for the adjustment of the exchange rate, Gourinchas and Rey (2007) show that the net foreign assets can be decomposed into subcomponents, including the net exports, which finance directly the net capital inflows, and the valuation terms, which grow out from the differential rate of returns on foreign assets compared with domestic assets. Based on an autoregressive model over a quarterly sample of Q1/1973–Q1/2004, the authors show that net foreign assets can predict the net foreign portfolio return from one quarter to two years ahead and net export growth further out.

Using a weekly sample of 25 countries from 1994 to 1998, Froot and Ramadorai (2008) suggest that only the institutional cross-border capital flows are linked to the macroeconomic fundamentals. The closed-end fund flow is not connected to the fundamentals but is a source of price pressure in the short run. This result is contradicted by Griffin et al. (2004) and Dvorak (2005), who uncover evidence that domestic investors are better informed than foreign investors about equities.

The common feature of these papers is the employment of the registered value of FDI, which is also similar to the papers focusing on some Southeast Asian regions, such as Nguyen et al. (2022) and Su et al. (2019) for Vietnam or Teeramungcalanon and Chiu (2020) for Thailand. As shown in Figure 1, there is

a gap between the registered value and disbursed value of FDI, which reflects the absorption capacity of an economy. Moreover, the registered FDI usually has a lag in time when converted into the disbursed value. Thus, the use of registered FDI can misunderstand some potential interactions of FDI with macroeconomic fundamentals.

Our evidence contributes to these aforementioned papers by differentiating the registered value from the disbursed value of FDI. The registered FDI has limited connection to the macroeconomic fundamentals but is strong at predicting the fundamentals. Only the disbursed FDI exerts a significant effect and has a close connection to the macroeconomic fundamentals but has a limited role in predicting the fundamentals.

The paper is also closely related to the literature on the tradeoff between economic growth and inflation. The empirical evidence on the tradeoff is first established in an annual time series sample of 18 countries over the 1951–1967 period (Lucas, 1973). The tradeoff is also affected by the average rate of inflation (Ball et al., 1988) and has a positive correlation with globalization, as measured by trade and financial openness (Badinger, 2009). However, the tradeoff can also be reduced for the existence of FDI capital (Hung, 2021) and for the worker's market power in a dynamic stochastic general equilibrium model (Justiniano et al., 2013).

There is also some evidence of the existence of tradeoffs in developing economies. In the Indian economy, there is a structural break in the correlation between economic growth and inflation (Behera & Mishra, 2017). If the inflation rate exceeds 4%, it will negatively affect economic growth. By simulating a small macroeconomic model, Imai (2007) shows that each additional percentage point of output growth is associated with a 2.6% increase in the inflation rate. In China's economy, the output gap, i.e., the difference between actual and potential

output, tends to co-move with the inflation rate (Gerlach & Peng, 2006). The main mechanism for this tradeoff can rely on fixed investment, in which a higher investment raises the economic growth and inflation rate by bringing about a higher wage cost.

Compared with these papers, our evidence shows that the tradeoff between output and inflation can exist but only in the short run. Both the registered and disbursed FDI raise the economic growth rate, but their impact on the inflation rate tends to fluctuate by first decreasing and then increasing. Thus, the negative correlation between economic growth and the inflation rate exists in the short run (within one year), while the tradeoff, i.e., a positive correlation between economic growth and inflation, only exists in the longer run (more than one year).

The remainder of the paper is structured as follows. The second section on Framework presents the data and empirical model. Then, the third section on Evidence shows the estimated results. The fourth section of the Conclusion summarizes and discusses public policy implications.

1. Framework

1.1. Data

The data is a quarterly sample of the Vietnamese economy, with 65 observations from Q1 of 2007 to Q1 of 2023. The time series structure is convenient to investigate the dynamic connection between foreign capital and macroeconomic fundamentals over time in an economy. Each variable is collected from various sources.

First, the FDI with its registered and disbursed values in billion USD is measured by both the registered value, denoted by *(FDIreg),* and the disbursed value, denoted by *(FDIdis)*. Then, each variable is scaled by the nominal GDP in billion USD to form the ratio over GDP on percentage, denoted by *(FDIreg2y)* and *(FDIdis2y)*. The data on the FDI in billion USD is explored by the Vietnam General Statistics Office (GSO, 2022), while the data on the nominal GDP in billion USD is from the global macroeconomic monitor database by the World Bank (2023).

Second, the economic growth rate on percentage, denoted by *(VNgdp)*, is measured by the annual growth rate of real gross domestic product in the constant 2010 national price in domestic currency (VND - Vietnam Dong). The economic growth rate is from the Vietnam General Statistics Office (GSO, 2022).

Third, the inflation rate on percentage, denoted by *(Cpi)*, is measured by the annual change in the overall price level. The price level, in turn, is measured by the headline consumer price index (HCPI). The data is explored from the global inflation database constructed by the World Bank (2023).

Fourth, the depreciation rate of domestic currency on percentage, denoted by *(gNER)*, is measured by the annual change of the nominal exchange rate of VND compared with the USD. The nominal exchange rate is relevant for the conduction of monetary policy in Vietnam, while the real exchange rate concerns the purchasing power of a currency. In our analysis, the results with the nominal exchange rate are similar to that of the real exchange rate. The VND/USD exchange rate is explored from the global inflation database constructed by the World Bank (2023).

Fifth, the credit supply growth rate on percentage, denoted by *(gCredit)*, is measured by the annual change of domestic credit supply. This data is from the State Bank of Vietnam (SBV, 2022).

Table 1. Descriptive statistics

Variable	Observations	Mean	Standard Deviation	Min	Max
Registered FDI per GDP *(FDIreg2y,%)*	65	13.55	18.18	3.14	105.60
Disbursed FDI per GDP *(FDIdis2y,%)*	65	7.19	4.77	4.26	40.87
Economic Growth Rate *(VNgdp,%)*	65	19.60	11.89	4.95	63.21
Inflation Rate *(Cpi,%)*	65	6.68	6.36	0.29	27.75
VND Depreciation Rate *(gNER,%)*	65	2.41	3.04	-1.62	9.76
Credit Growth Rate *(gCredit,%)*	65	19.60	11.89	4.95	63.21

Table 1 shows the descriptive statistics of the time-series sample. The registered FDI per GDP ratio has a mean of 13.55% with a standard deviation of 18.18%. Compared with this variable, the disbursed FDI per GDP ratio has both a lower mean (7.19%) and standard deviation (4.77%), while the economic growth rate has a higher mean (19.60%) but a lower standard deviation (11.89%). Among three other variables, the credit supply growth rate has the highest mean at 19.60%, with the highest standard deviation at 11.89%, while the VND depreciation rate has the lowest mean (2.41%) and standard deviation (3.04%). The corresponding statistics of the inflation rate fall in the middle range, i.e., its mean and the standard deviation are higher than the VND depreciation rate but lower than the credit growth. In brief, the data sample offers a large variation to

explore the macroeconomic information content of FDI in the Vietnamese economy.

1.2. Model

The reduced form equation in the following Bayesian Structural Vector Autoregression (BSVAR) model with Time-Varying Coefficients (TVC) is as follows:

$$y_t = C + A_{1,t}y_{t-1} + A_{2,t}y_{t-2} + A_{3,t}y_{t-3} + A_{4,t}y_{t-4} + \varepsilon_t \quad (1)$$

where a lag order of 4 is selected by the Akaike information criterion (AIC).

$y_t = (FDI_t, dgCredit_t, dgNER_t, VNgdp_t, dCpi_t)$ is a 5x1 vector of endogenous variables, namely, the foreign direct investment (FDI_t), the first difference of the depreciation rate of domestic currency *($dgNER_t$),* the first difference of credit supply growth rate *($dgCredit_t$),* economic growth rate *($VNgdp_t$)*, and the first difference of inflation rate *($dCpi_t$)*. In our sample, only the FDI and economic growth are stationary, while the others have unit roots. Per statistics, there is also no co-integration between them, since the Johansen test value (Trace statistic) is always higher than the Critical value (at 5%). A maximum rank is (0,1,2), where the trace statistic is (40.35, 20.97, 9.5), while the critical value of 5% is (29.68, 15.41, 3.76). Thus, the vector autoregressive (VAR) model is chosen rather than the vector error correction (VECM) model. To do that, we take the first difference of these three variables to plug into the model. Thus, the first difference is taken for the credit growth, VND depreciation, and inflation rate so that these variables turn out to be stationary.

The choice of variables and associated lag order depend on both statistics and recent evidence in the literature on FDI. The macroeconomic fundamental is captured by the economic growth, inflation, and the foreign exchange rate, which is crucial for a small open economy (Kubo & Hirao, 2020). The monetary policy

is accounted for by the credit supply, which is even more effective than the money supply in the case of Vietnam. These four variables are also employed by Thanh et al. (1999) to analyze the information content of the foreign exchange rate in Vietnam.

Our model extends their block of variables to include FDI to study its information content in the context of Vietnam. Recently, with a reduced list of variables, including trade openness, economic growth, and FDI, Nguyen et al. (2022) investigated the interaction of FDI with economic growth in Vietnam. Moreover, for the lag order, the lags of 4 quarters, as suggested by the AIC criterion, cover just one year. In practice, this is just enough time for one foreign firm to finish the registration procedure and start to disburse the foreign funds into Vietnam. With the robustness analysis with different lag choices, such as lags of 3 quarters, the evidence is similar to the result with a lag of 4 quarters.

To examine the difference between the disbursed and registered FDI, the same model, captured by equation (1), is employed with two alternative variables: one with the disbursed FDI and the other with the registered FDI.

Each of $(A_{1,t}, A_{2,t}, A_{3,t}, A_{4,t})$ is a matrix of dimension 5x5. C is a 5x1 vector of 5 constant terms. So, for each endogenous variable, there are 21=5x4+1 coefficients to be estimated. So, for 5 endogenous variables, there are 105=21x5 estimated coefficients.

$\varepsilon_t = (\varepsilon_{1,t}, \varepsilon_{2,t}, \varepsilon_{3,t}, \varepsilon_{4,t}, \varepsilon_{5,t})$ is a vector of residuals following a multivariate normal distribution:

$$\varepsilon_t \sim \mathcal{N}(0, \Sigma) \tag{2}$$

The VAR coefficients are assumed to follow the autoregressive process:

$$\beta_t = \beta_{t-1} + \upsilon_t, \upsilon_t \sim \mathcal{N}(0, \Omega) \tag{3}$$

The covariance matrix (Ω) is assumed to be a random variable endogenously determined by the model.

The parameters of interest to be estimated include the VAR coefficients $\beta = \{\beta_1, \ldots, \beta_T\}$, the covariance matrix (Ω) for the shocks on the dynamic process, and the residual covariance matrix (Σ). For the identification, we employed the orthogonalized impulse responses with the Cholesky decomposition of the residual covariance matrix. By this type of decomposition, the variables are ordered by the decrease of exogeneity so that one variable has an impact on the other preceding variables.

The TVC-BSVAR model, as a type of structural vector autoregressive model (Blanchard & Quah, 1989; Sims, 1980), is appropriated to study changing regimes of economic fundamentals. In the Vietnamese economy, the State Bank of Vietnam has changed from a fixed exchange rate regime to a controlled floating regime as of January 2016. After the implementation of the new regime, both the mean and variance of the inflation rate reduced substantially. The mean of inflation reduced from 9.64% over Q1/2007–Q4/2015 to 3.01% over Q1/2016–Q1/2023, and its standard deviation also went down from 7.26% to 1.24%, respectively. Within the new exchange rate regime, the inflation rate is always below 4% per year since 2016, even during the COVID-19 pandemic period.

Another advantage of the TVC-BSVAR model is the ability to capture the potential structural breaks within an economy. Our data sample covers the recent COVID-19 pandemic in the 2020–2021 period, which caused unprecedented changes in macroeconomic fundamentals. During the pandemic, the economic growth rate experienced an abnormal pattern. In Q3 of 2021, the growth rate is negative at (-6.17%), then climbs to its peak at 13.67% in Q3 of 2022. The

abnormal change in economic growth can reflect that the pattern of macroeconomic variables changed dramatically during the pandemic.

Recently, the VAR model has been employed to explore the information content of international capital flows (Tille & Wincoop, 2014). In particular, the authors compare the ability of gross and net capital inflows to predict the future value of economic growth, inflation rate, and public deficit. Thanh et al. (2000) used an extension of the VAR model to study the information content of the exchange rate in the Vietnamese economy from 1990–2000. Their evidence shows that the exchange rate is connected with macroeconomic fundamentals and is also useful for predicting the fundamentals. Another extension of VAR to the TVC-SVAR model is employed by Cogley and Sargent (2001) for analyzing the switching regime of economic fundamentals after World War II and by Primiceri (2005) for examining monetary policy in the United States.

2. Evidence

We first characterize the connection between FDI and the macroeconomic fundamentals by exploring the impulse response function (IRF). Then, our analysis examines the role of FDI in predicting the macroeconomic variables with a window of 20 quarters ahead. This evidence is based on the forecast error variance decomposition (FEVD).

2.1. Fundamental Connection

The connection to fundamentals is captured by the impulse response function, as shown in Figure 2. The disbursed FDI interacts more intensely with the macroeconomic fundamental variables than the registered FDI. In particular, the shock in the disbursed FDI per GDP ratio exerts an impact on other macroeconomic variables right in Q1 with a large and long-lived magnitude.

Meanwhile, the effect of shock in the registered FDI per GDP ratio only appears with lags after several quarters with quite small and short-lived magnitude.

As shown in Panel A, an increase of 1% in the ratio of disbursed FDI over GDP raises economic growth by 0.8% in the first quarter. Then, the impact of shock reduces and then dies out after 20 quarters. This shock also reduces the inflation rate by 0.25%. Then, the impact of shock fluctuates and also dies out after 15 quarters. The shock reduces the credit growth and raises the depreciation rate of VND right in the first quarter, and the impact tends to die out after 20 quarters for the credit growth and 15 quarters for the VND depreciation rate.

As shown in Panel B, an increase of 1% in the ratio of registered FDI per GDP raises the economic growth by 0.5% in the fifth quarter; then, the impact of shock dies out after 10 quarters. The lags of shock can be understood as the time for the conversion of registered value to the disbursed value of FDI in the Vietnamese economy. This shock also reduces the inflation rate by 0.2% in the third quarter, then the impact of the shock fluctuates and dies out after 10 quarters. For other variables, the shock reduces the credit growth in the first quarter and raises the VND depreciation rate in the fifth quarter; the impact of the shock then fluctuates and dies out after 15 quarters.

In general, the impact of a positive shock, i.e., an increase of 1%, in the disbursed FDI per GDP is quicker than that of the registered FDI per GDP ratio. The main reason is that the disbursed FDI brings the supply of foreign currency into the economy, while the registered FDI only goes along with the expectation of future disbursement of foreign currency. Thus, the lags on the impact of registered FDI can capture the time length required to transform the registered value into the disbursed value of FDI in an economy.

Moreover, the shocks in other macroeconomic variables exert both quicker and larger effects on the disbursed FDI than on the registered FDI. In particular, the impact of shocks in the macroeconomic fundamentals usually has an impact on the disbursed FDI right in the first quarter, and the impact only dies out after 20 quarters.

As shown in Panel A, the impact of economic growth shock on the disbursed FDI is positive immediately in the first quarter and with the highest impact (0.3%) in the fifth quarter before dying out after 20 quarters. However, as shown in Panel B, the impact of economic growth shock on the registered FDI is weaker and has unclear direction. Similarly, the impact of inflation rate shock on the disbursed FDI is negative immediately in the first quarter and with the highest magnitude (-0.2%) in the fifth quarter; it then fluctuates and dies out after more than 20 quarters. However, the impact of inflation rate shock on the registered FDI is positive even in the first quarter, then fluctuates and dies out after 10 quarters.

These results uncover that the impact of shocks in the macroeconomic variables on the disbursed FDI follows more strictly the theory than that on the registered FDI. In particular, a higher economic growth rate is recorded to attract more foreign capital inflows by raising the marginal product of capital and, subsequently, the rate of return on capital investment. A greater inflation rate also means lower macroeconomic stability, thus leading to a lower attractiveness to foreign capital.

For other variables, the shock of the VND depreciation rate raised the disbursed FDI per GDP ratio in the third quarter while reducing the registered FDI per GDP ratio in the fifth quarter; both impacts die out after 15 quarters. The impact of the VND depreciation rate on the disbursed FDI is more consistent with the theory. A weaker domestic currency can raise the inflows of capital since

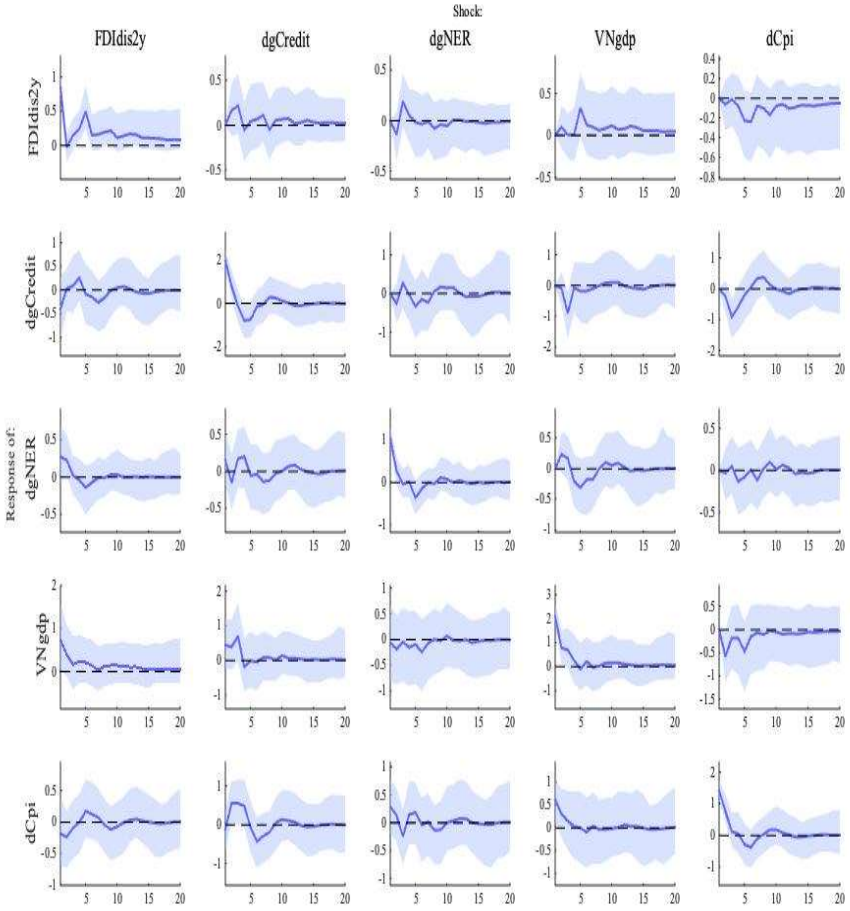
one unit of foreign currency can be converted into more units of the domestic currency. Moreover, the magnitude of the impact that the VND depreciation rate has on the disbursed FDI per GDP ratio is larger than that on the registered FDI per GDP ratio.

These results are consistent with the fact that the disbursed FDI per GDP ratio goes along with the supply of foreign currency. Then, the disbursed FDI directly affects the demand-supply difference and the equilibrium exchange rate in the foreign exchange market.

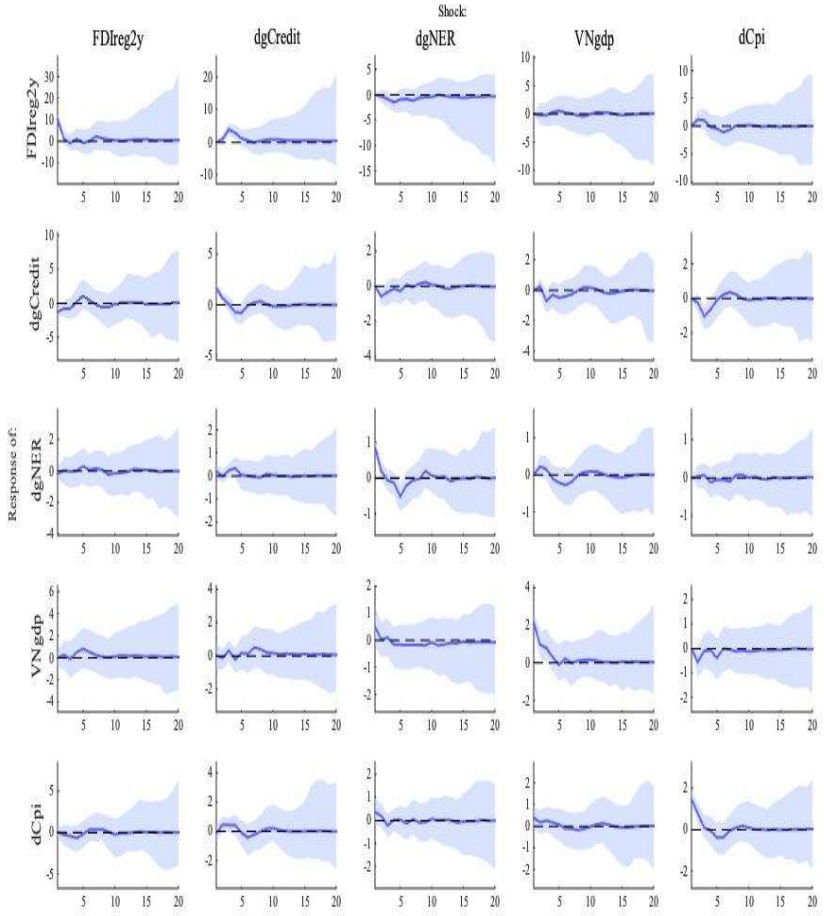
In brief, the disbursed FDI has a closer connection with the macroeconomic fundamentals than the registered FDI. As an implication, the macroeconomic analysis with the registered FDI would be less accurate than that with the disbursed FDI. Most papers on Vietnam's foreign investment employ the registered FDI, mainly due to the lack of data on the disbursed value of the FDI. Thus, our evidence provides a refresher on the method to analyze FDI in the Vietnamese economy.

Figure 2. Impulse response function

Panel A: Disbursed FDI



Panel B: Registered FDI



Source: Estimated results from TVC-BSVAR model.

2.2. Predictive Contribution

The predictive contribution is captured by the forecast error variance decomposition, as shown in Figure 3. The contribution of registered FDI on macroeconomic forecasted value is much greater than that of disbursed FDI. And the registered FDI is also more persistent over time than the disbursed FDI.

In particular, the registered FDI per GDP ratio contributes 3% in the fifth quarter, and this contribution increases gradually up to 30% in the forecast value of economic growth in the 20th quarter, as shown in Panel A. The disbursed FDI per GDP ratio contributes 10% right in the first quarter, but its contribution is stable in the forecast value of economic growth after 20 quarters.

The difference in the predictive contribution of two variables on the variation of economic growth relies on the economic insight of each variable. The registered FDI reflects the attractiveness of an economy toward foreign investors. Thus, an increase in registered FDI proves that foreign investors are optimistic about the prospect of an economy. However, the disbursed FDI reflects the absorption capacity of an economy. An increase in disbursed FDI shows that the economy can absorb more inflows of foreign capital. Usually, the absorption capacity is stable since it is dependent on stable structural variables such as institutional quality.

Therefore, the registered FDI is much more relevant to future economic growth than the disbursed FDI. And since the registered FDI accounts for a large share of forecast error variance of economic growth, an increase in registered FDI is also a signal of high economic growth in the future.

A similar pattern applies to the inflation rate when there exists a closed connection between the registered FDI per GDP ratio and has a low contribution of 3% in the first quarter, but its contribution rises to 35% in the 20th quarter on

the forecast value of the inflation rate. Meanwhile, the contribution of disbursed FDI per GDP ratio is higher in the first quarter (4%) but is stable at about 8% over the next 20 quarters.

The relevance of foreign capital to the inflation rate works through the reaction of monetary policy and exchange rate adjustment. As the State Bank of Vietnam chooses the combination of independent monetary policy with exchange rate management, it needs to carry out capital control. This measurement is implemented right after information on the value of registered FDI is provided. The value of registered FDI will be adjusted according to the relative difference between the demand and supply of foreign currency so that the depreciation of the domestic currency is not too large.

One way to adjust the registered FDI is to divide it into sub-components fitting the absorption capacity of the foreign exchange market. For example, the FDI of 1 billion USD that the Republic of Korea Hana Bank placed into the Vietnam Bank of Investment and Development (BIDV), equivalent to 15% of total registered BIDV capital, was divided into various packages, each of which is several million USD.

For other macroeconomic variables, the contribution of registered FDI is also more significant than that of disbursed FDI. Up to 40% of credit growth and VND depreciation rate are explained by the registered FDI, while less than 10% of these variables are captured by the disbursed FDI. The result uncovers that the reaction of monetary policy, through the credit growth rate, and the reaction of domestic currency, through the VND depreciation rate, are more sensitive to the registered FDI than to the disbursed FDI.

The sensitivity of monetary policy and exchange rate to the registered FDI can be explained by how the registered FDI can exert a more effective impact on

the expectation of credit growth and depreciation rate of the domestic currency than the disbursed FDI.

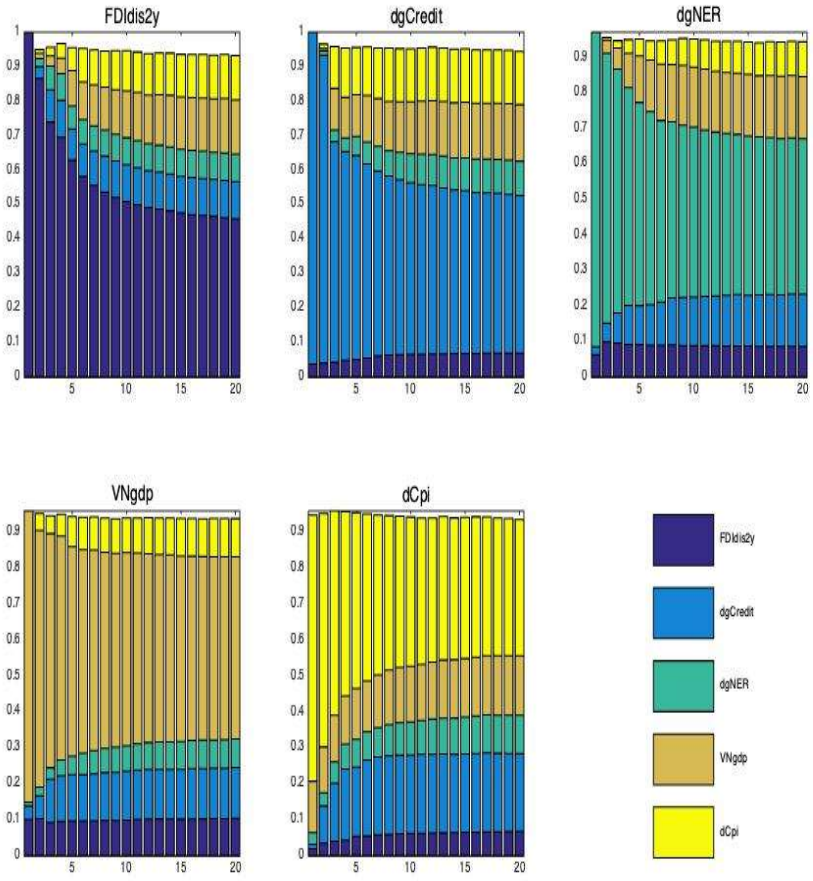
Moreover, the registered FDI is more persistent over time than the disbursed FDI. The share of each variable on its forecast error variance is 100% in the first quarter. This share tends to reduce gradually for a longer period. In the 20^{th} quarter, 60% of registered FDI is accounted for by its lagged values, while only 45% of disbursed FDI is explained by its lagged values. This evidence suggests that when they are in the range of high value, the registered and disbursed FDI tend to be high, but if they are reduced substantially, they would be low for a long time.

The high persistence of both registered and disbursed FDI can be relevant to their statistics. Both of the two variables are stationary, as depicted in Figure 3. This feature is quite rare in the quarterly sample since the value of FDI is mostly driven by the world capital market in combination with the conditions of the domestic economy.

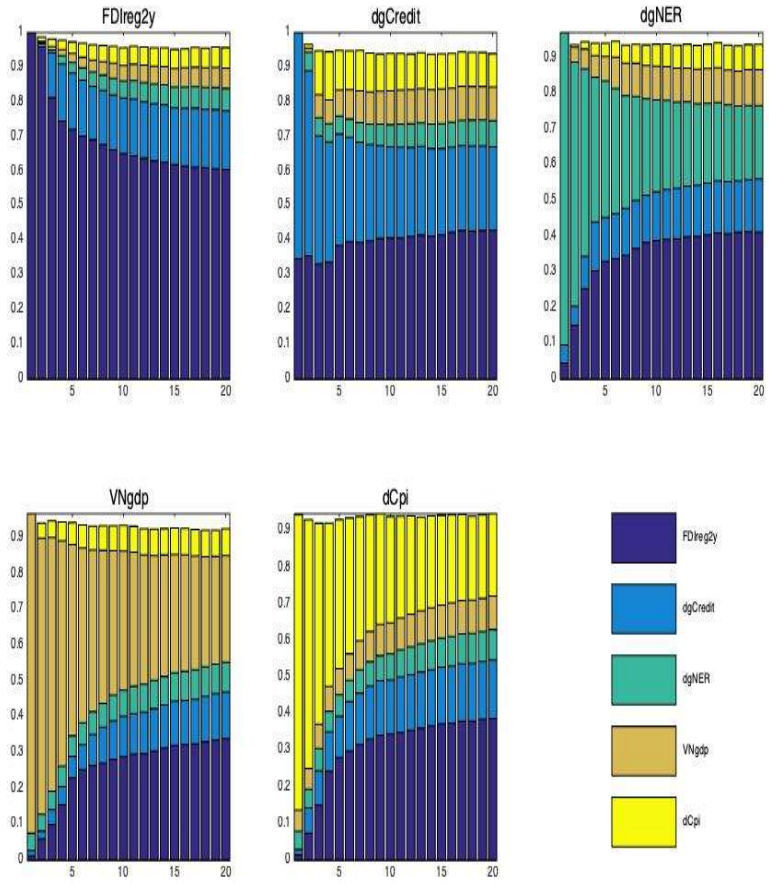
Especially among the macroeconomic fundamental variables, only economic growth is stationary; other variables, including the inflation rate, VND depreciation rate, and credit growth rate, are only stationary with their first difference. The stationary, in turn, implies that the registered and disbursed FDI tend to come back to their mean when they deviate from their mean. This mean-reverting tendency also stresses the persistency of these variables in the sense that the current-quarter value is determined mostly by its lagged values.

Figure 3. Forecast error variance decomposition

Panel A: Disbursed FDI



Panel B: Registered FDI



Source: Estimated results from TVC-BSVAR model.

2.3 Robustness Analysis

One concern for the model is the potential endogeneity, which can arise if there are feedback loops or simultaneous causation among the endogenous variables. To check this issue, we carry out the sensitive analysis with (i) alternative specifications and (ii) different periods. The evidence is shown in Figure 4.

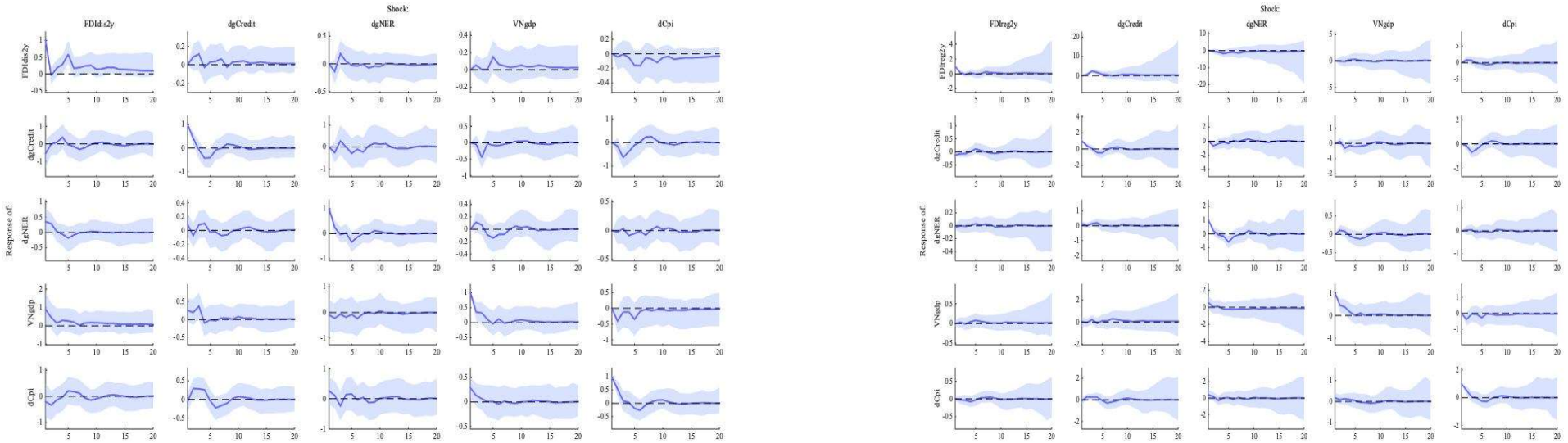
For the alternative specification, we use the triangular factorization to compare with the Cholesky factorization of the covariance matrix as in the main analysis. In particular, the Cholesky factorization considers that all structural shocks have a similar unit variance, even though the variance may actually differ from unity. The triangular factorization, however, considers the case that different shocks may have different sizes.

With robustness analysis, the covariance matrix is decomposed by the triangular factorization and leads to similar results. In detail, the disbursed value of FDI is more connected to the macroeconomic fundamentals, while the registered FDI is more useful for forecasting the fundamentals.

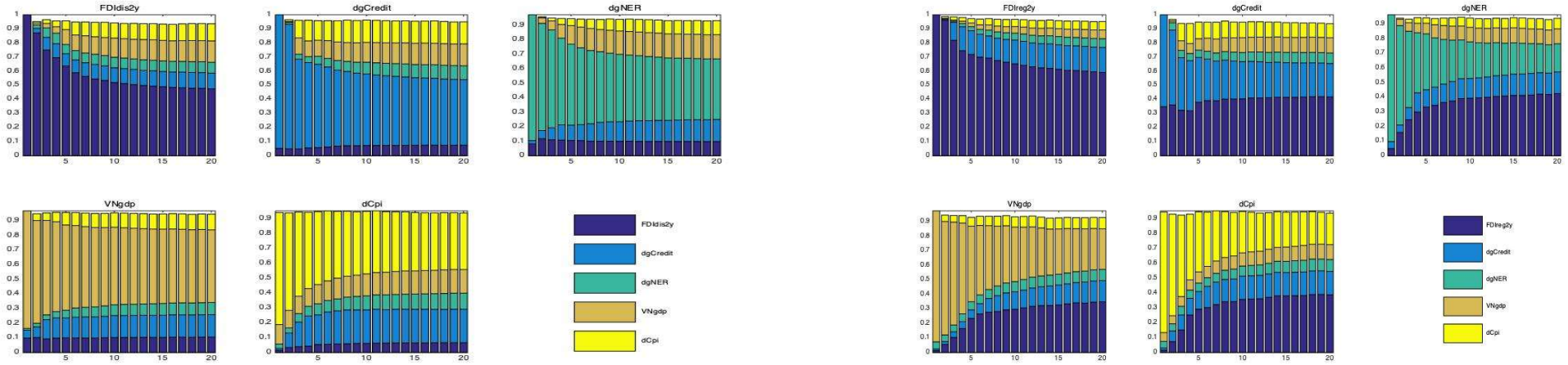
For the different periods, we carried out a sensitive analysis that covered a sample from 2008 to 2019. This period is just before the COVID-19 pandemic, which can cause structural breaks, even switching regimes, in the fundamentals of the economy. The result, not shown in the text, records a similar pattern of FDI.

Figure 4. Triangular factorization

Impulse Response Function: Disbursed FDI (left graph) and Registered FDI (right graph)



Forecast Error Variance Decomposition: Disbursed FDI (left graph) and Registered FDI (right graph)



3. Conclusion

This paper analyzes the macroeconomic information content of FDI with evidence in the Vietnamese economy by separating the registered FDI with the disbursed FDI on a quarterly sample over the Q1/2007–Q1/2023 period. The impulse response function demonstrates that the disbursed FDI has a closer interaction with macroeconomic fundamentals, including economic growth, inflation, and exchange rate, than the registered FDI. The forecast error variance decomposition shows that the registered FDI contributes more information on forecasting the macroeconomic fundamentals than the disbursed FDI.

For public policy, the evidence implies that the disbursed FDI needs to be monitored for the stability of the macroeconomic environment, but the registered FDI would be much more useful for analyzing the prospect of macroeconomy. For instance, the registered FDI into Vietnam has reduced since mid-2022. By the empirical model, this reduction is a signal for a lower economic growth rate in 2023. As recent data reveals, the GDP growth rate of Q1/2023 is 3.32%, which is lower than the growth rate of Q1/2022 at 5.05%. Thus, the reduction of economic growth is consistent with the prediction by the empirical model.

The paper can be extended to account for the information content of various components of foreign investment in Vietnam's economy. One way is to differentiate the gross FDI inflows from the net FDI inflows or to compare the FDI with the FDI. These results can shed new light on the foreign investment dynamics over time and then provide a more useful background for public policy.

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References

Badinger, H. (2009). Globalization, the output–inflation tradeoff, and inflation. *European Economic Review*, *53*(8), 888-907.

Ball, L., Mankiw, N. G., Romer, D., Akerlof, G. A., Rose, A., Yellen, J., & Sims, C. A. (1988). The new Keynesian economics and the output-inflation trade-off. *Brookings Papers on Economic Activity*, *1988*(1), 1-82.

Behera, J., & Mishra, A. K. (2017). The recent inflation crisis and long-run economic growth in India: An empirical survey of a threshold level of inflation. *South Asian Journal of Macroeconomics and Public Finance*, *6*(1), 105-132.

Blanchard, O. J., & Quah, D. (1989). The dynamic effects of aggregate demand and supply disturbances. *The American Economic Review*, *79*(4), 655-673.

Caballero, R. J., Farhi, E., & Gourinchas, P. O. (2008). An equilibrium model of global imbalances and low-interest rates. *The American Economic Review, 98*(1), 358-393.

Caselli, F., & Feyrer, J. (2007). The marginal product of capital. *The Quarterly Journal of Economics*, *122*(2), 535-568.

Cogley, T., & Sargent, T. J. (2001). Evolving post-World War II US inflation dynamics. *NBER Macroeconomics Annual, 16*, 331–373.

Dvorak, T. (2005). Do domestic investors have an information advantage? Evidence from Indonesia. *The Journal of Finance*, *60*(2), 817-839.

Gerlach, S., & Wensheng, P. E. N. G. (2006) Output gaps and inflation in Mainland China. *China Economic Review, 17*(2), 210-225.

Gourinchas, P. O., & Rey, H. (2007). International financial adjustment. *Journal of Political Economy*, *115*(4), 665-703.

Griffin, J. M., Nardari, F., & Stulz, R. M. (2004). Are daily cross-border equity flows pushed or pulled?. *Review of Economics and Statistics*, *86*(3), 641-657.

Hung, L. D. (2021). Output-inflation trade-off in the presence of foreign capital: Evidence for Vietnam. *South Asian Journal of Macroeconomics and Public Finance*, *10*(2), 179-192.

Hung, L. D. (2022). Steady state growth of Vietnam economy. *Southeast Asian Journal of Economics*, *10*(2), 35-58.

Imai, H. (1997). Outpu-inflation tradeoff in China. *The Developing Economies, 35*(2), 111-141.

Farhi, E., & Maggiori, M. (2018). A model of the international monetary system. *The Quarterly Journal of Economics*, *133*(1), 295-355.

Froot, K. A., & Ramadorai, T. (2008). Institutional portfolio flows and international investments. *The Review of Financial Studies*, *21*(2), 937-971.

Justiniano, A., Primiceri, G. E., & Tambalotti, A. (2013). Is there a trade-off between inflation and output stabilization?. *American Economic Journal: Macroeconomics*, 5(2), 1-31.

Kubo, A., & Hirao, K. (2020). Do inflation targeters in Southeast and East Asia respond to exchange rate movements?. *Southeast Asian Journal of Economics*, *8*(2), 25-42.

Lucas, R. E. (1973). Some international evidence on output-inflation tradeoffs. *The American Economic Review, 63*(3), 326-334.

Lucas, R. E. (1990). Why doesn't capital flow from rich to poor countries?. *The American Economic Review*, *80*(2), pp. 92–96.

Nguyen, A. T., Anwar, S., Alexander, W. R. J., & Lu, S. H. (2022). Openness to trade, foreign direct investment, and economic growth in Vietnam. *Applied Economics*, *54*(29), 3373-3391.

Pavlova, A., & Rigobon, R. (2010). An asset-pricing view of external adjustment. *Journal of International Economics*, *80*(1), 144-156.

Prasad, E. S., Rajan, R. G., Subramanian, A., Collins, S. M., & Henry, P. B. (2007). Foreign capital and economic growth/comments and discussion. *Brookings Papers on Economic Activity*, 1, 153.

Primiceri, G. E. (2005). Time-varying structural vector autoregressions and monetary policy. *The Review of Economic Studies*, *72*(3), 821-852.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica*, *48*(1), 1-48.

Su, D. T., Nguyen, P. C., & Christophe, S. (2019). Impact of foreign direct investment, trade openness, and economic institutions on growth in emerging countries: The case of Vietnam. *Journal of International Studies*, *12*(3).

Thanh, V. T., Minh, D. H., Truong, D. X., Van Thanh, H., & Quang, P. C. (2000). Exchange rate arrangement in Vietnam: Information content and policy options. *Exchange*, 2(2).

Teeramungcalanon, M., & Chiu, E. M. (2020). The effects of foreign direct investment on income inequality of Thailand. *Southeast Asian Journal of Economics, 8*(1), 107-138.

Tille, C., & van Wincoop, E. (2014). International capital flows under dispersed private information. *Journal of International Economics*, *93*(1), 31-49.

Vietnam General Statistics Office (2023). Monthly social-economic reports. Available online at: www.gso.gov.vn.