

# **Economic Effects of Inward Foreign Direct Investment: The Case of Vietnamese Provinces**

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## **Abstract**

This article examines the effect of FDI on economic growth and domestic investment with a focus on Vietnamese provinces by conducting the Granger causality and impulse response tests under a vector auto-regression (VAR) estimation using panel data. The major research questions in this study are twofold: whether the inward FDI causes economic growth or economic growth induces the FDI, and whether the inward FDI crowds in or crowds out domestic investment. Since this study targets Vietnamese provinces, it explores regional differences in the FDI effect by dividing Vietnamese provinces according to FDI-value intensity. The VAR estimation results showed two clear contrasts on FDI effects between the FDI-intensive region and the FDI-less-intensive one. One contrast was that FDI causes economic growth in the FDI-intensive region, whereas economic growth induces FDI in the FDI-less-intensive region. Another contrast was that FDI crowds in domestic investment in the FDI-intensive region, whereas FDI crowds out domestic investment in the FDI-less-intensive region. These contrasts suggest the existence of FDI's agglomeration effects.

Keyword: Inward foreign direct investment (FDI), Economic growth, Domestic investment, Crowd-in or -out effects, Vietnamese provinces, Vector auto-regression estimation, Granger causality and Impulse responses

JEL Classification Codes: F21; O47; O53

## 1. Introduction

Inward foreign direct investment (FDI) is a major source of capital inflows and has boosted its presence in the world economy during the recent decades. The stock value of FDI in the world increased from 2.2 trillion US dollars in 1990 to 31.5 trillion US dollars in 2017 by about 14 times, whereas the world GDP grew by only three times during the same period. As a result, the FDI ratio relative to GDP rose from 9.6 percent in 1990 to 39.2 percent in 2017 in the world.<sup>1</sup>

Vietnamese economy, one of the emerging market economies in Asia, has also accepted inward FDI in a remarkable degree in accordance with its involvement in global value chains for the recent decades. As a matter of fact, its FDI (stock value) ratio to GDP rose up from 3.7 percent in 1990 to 57.9 percent in 2017. For the latecomer's economy like Vietnam, in particular, the acceptance FDI has been often considered to be one of the driving forces to boost economic growth and to accelerate its catch-up process toward such forerunner economies as Thailand and Malaysia.

Although the argument that FDI has a positive effect on economic growth in the host country is generally accepted, there have still been critical discussions on the FDI impacts in the theoretical and empirical aspects. From the theoretical perspective, if we follow the traditional neoclassical growth model in Solow (1956), FDI merely increases the investment rate, resulting in a transitional growth in per capita income under the assumption that technological progress is exogenous. Under the new "endogenous" growth theory in which technological progress is endogenous (e.g., Romer, 1990), however, FDI is considered to have a permanent growth effect through technology transfer and spillover.

From the empirical perspective, while most of studies supported positive effects of FDI on growth, some studies found that FDI had no significant effect on growth and even crowded out domestic capital accumulation and innovation (e.g. Chen et al., 2017; Pilbeam and Oboleveciuteb, 2012). Another angle of dispute lies in the causality between FDI and growth (e.g. Hsiao and Hsiao, 2006). Whereas some evidence showed the positive causality from FDI to growth, the other pointed out that FDI could be attracted to growing economies and markets since foreign investors tended to choose these favorable locations for their investment. Thus it raises endogeneity problems in a single-equation regression analysis. As for the targeted samples in empirical analyses, there have been limited studies to address the regional nexus between FDI and growth, while its national-level relationship has been examined intensively.

This article examines the effect of FDI on economic growth and domestic investment with a focus on Vietnamese provinces by conducting the Granger causality and impulse response tests under a vector autoregression (VAR) estimation. The major research questions in this study are twofold: whether the inward FDI causes economic growth or economic growth induces the FDI, and whether the inward FDI crowds in or crowds out domestic investment. Since this study targets Vietnamese provinces, it explores regional differences in the FDI-growth effect and the FDI-domestic investment effect in Vietnam. This study first classifies Vietnamese provinces according to FDI-value intensity: FDI-intensive region and FDI-less-intensive region. The reason for this classification is that FDI intensity is considered to create agglomeration effects such as technological spillovers and forward- and backward- industrial linkage. Another classification is geographical one comprising three areas of Northern, Central and Southern Vietnam. As for an analytical methodology, this study adopts not a single-equation regression but a VAR model to avoid the endogeneity problem among economic variables of FDI, economic growth and domestic investment. The VAR estimation lets the data determine the causality between targeted variables, and makes it possible to trace out the dynamic responses of variables to exogenous shocks overtime.

The rest of the paper is structured as follows. Section 2 describes the literature review with a focus on the FDI-growth effects in Vietnam, and clarifies the contributions of this study. Section 3 conducts a VAR estimation for examining the FDI effects with the descriptions of methodologies, data and estimation outcomes with its interpretations. The last section summarizes and concludes.

## 2. Literature Review and Contribution [Omitted]

## 3. Empirics

This section conducts an empirical analysis, namely, a VAR model estimation for examining the FDI effects with the descriptions of methodologies, data and estimation outcomes with its interpretations.

### 3.1 Methodology: VAR Estimation

This subsection describes the methodology for the VAR model estimation. The basic assumption is based

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<sup>1</sup> The data is based on UNCTAD STAT: <http://unctadstat.unctad.org/EN/Index.html>

on an equilibrium in monetary and external sectors at the national level so that interest rate and exchange rate can be given. This assumption would be justified since this study's analysis targets regional economies in Vietnam. The study thus focuses only on the real aspect of the economy, ignoring the financial variables.

Under this assumption, the following three variables are selected for the estimation: inward foreign direct investment (FDI) in terms of stock value (*fdi*), gross regional products (GRP) in each province (*grp*), and domestic investment in each province (*div*). The first two variables are used for examining the causality between FDI and economic growth. The variable of domestic investment is needed for identifying the crowding-in or crowding-out effects of FDI on domestic investment.

For the estimation, a single-equation regression would cause a estimation bias since all the variables above are endogenous ones. The study thus adopts a VAR model for letting the data determine the causality between targeted variables and for tracing out the dynamic responses of variables to exogenous shocks overtime. To be specific, the study conducts the tests of Granger causality and impulse response to the one-unit shock under the VAR model estimation on the bilateral combinations between FDI and GRP, and between FDI and domestic investment. Regarding the lag interval, the study takes one-year lag in the VAR model estimation.<sup>2</sup> Then the VAR estimation, by using Vietnamese provincial data, is conducted in terms of the nation-wide model, the regional model divided into two groups of FDI-intensive provinces and FDI-less-intensive provinces, and the geographical model comprising three areas of Northern, Central and Southern Vietnam.

### 3.2 Data Description

This subsection describes the data source and the sample data for the estimation use. All the data of the three variables for the estimation are retrieved from Statistical Yearbook of each province. For instance, the data for Ho Chi Minh City are taken by its statistical yearbook of each year as follows.<sup>3</sup> The FDI data are obtained by the item of "Accumulation of foreign direct investment projects licensed having effect (thousand US dollars)" as of the end of each year in the category of "IV. investment"; the GRP data are from the item of "Gross regional domestic product at current prices (billion dong)" in the category of "III. National accounts and state budget"; and the data of domestic investment are calculated by subtracting the item of "Foreign invested sector" from the item of "Total investment at current prices (billion dong)" in the category of "IV. investment". The "domestic investment" thus does not contain the FDI in this study. The GRP and domestic investment are converted into the values of US dollars by using the dong-per-US dollar exchange rate, which are retrieved by the State Bank of Vietnam.<sup>4</sup>

The sample data is confined to the data availability of the provincial FDI data. Table 1 indicates that the FDI data are available in 34 provinces out of 63 provinces in 2016. The sum of GRPs of the 34 sample provinces accounts for 93.3 percent of nation-wide GDP in 2016.<sup>5</sup> The time-series sample of each province is available for the period between 2005 to 2016. For the VAR estimation of nation-wide model, the study constructs a panel data with 34 provinces for the period of 2000-2016. In the estimation of regional model, the 34 sample provinces are divided into two groups according to the FDI intensity in 2016. To be specific, the sample provinces are arranged in the sequence of the FDI US dollar value in 2016 from the top to the bottom. Then the first half group from the top (Ho Chi Minh City) to the 17th (Vinh Phuc) is called "FDI-intensive region" and the latter half group from the 18th (Da Nang) to the bottom (Dong Thap) is called "FDI-less-intensive region". For each region, the study constructs a panel data with 17 provinces for 2000-2016, respectively. Regarding the estimation of geographical model, as shown Table 1, the 34 sample provinces are simply divided into three areas: Northern, Central and Southern areas, which create panel data with 13, 10 and 11 provinces for 2000-2016, respectively.

Figure 1 displays the overview of the relationship between FDI and GRP on year-on-year rate base in the top 6 of FDI-intensive and FDI-less-intensive provinces. By rough observation, the FDI and GRP appears to synchronize in the FDI-intensive provinces rather than the FDI-less-intensive provinces. Their correlation should, however, be statistically tested by a more precise manner through the VAR estimation later on.

### 3.3 Data Property [Omitted]

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<sup>2</sup> This study estimates the bilateral combinations of variables and adopts one-year lag, due to the data constraint with the limited numbers of time-series observations, 2005-2016, as described later on.

<sup>3</sup> See the website: <http://www.pso.hochiminhcity.gov.vn/web/guest/nam-20161>

<sup>4</sup> See the website: <http://www.sbv.gov.vn>

<sup>5</sup> The nation-wide GDP in 2016 is retrieved from the website of General Statistics Office of Vietnam: [https://www.gso.gov.vn/default\\_en.aspx?tabid=775](https://www.gso.gov.vn/default_en.aspx?tabid=775)

### 3.4 Estimation Outcomes

Table 3, Table 4 and Figure 2 respectively report the estimation outcomes of VAR models, Granger causalities and impulse responses on the FDI effects on GRP and domestic investment based on Vietnamese provincial database. The outcomes are reported for the nation-wide model, the regional model divided into two groups of FDI-intensive provinces and FDI-less-intensive provinces, and the geographical model comprising three areas of Northern, Central and Southern Vietnam.

#### 3.3.1 Nation-wide Model

Table 3-1 and Table 4-1 report the estimation outcomes of the nation-wide VAR model. Regarding the Granger causalities, the causality is identified from FDI to GRP but not from GRP to FDI in the combination between FDI and GRP. In the combination between FDI and domestic investment, the causality is confirmed from FDI to domestic investment. Both causalities from FDI to GRP and to domestic investment are significant at the conventional level (99 percent), and are supposed to be “positive” ones judging from the estimated VAR model in Table 3-1.

As for the impulse responses in Figure 2-1, GRP responds positively to the one-unit shock of FDI continuously from the beginning with 95 percent error band, whereas FDI does not significantly respond to the shock of GRP. In the combination between FDI and domestic investment, domestic investment responds positively to the shock of FDI continuously from the beginning with 95 percent error band.

#### 3.3.2 Regional Model with FDI Intensity

Table 3-2, Table 4-2 and Figure 2-2 report the estimation results of the regional model estimation classified by the FDI intensity. Regarding the combination between FDI and GRP, the positive causality from FDI to GRP is verified in the FDI-intensive region at the significant level (95 percent) and in the FDI-less-intensive region at weakly significant level (90 percent). The positive causality from GRP to FDI is, on the other hand, identified in the FDI-less-intensive region at the significant level (95 percent) but not in the FDI-intensive region. Looking at the impulse responses between FDI and GRP in Figure 2-2, GRP responds positively to the shock of FDI with 95 percent error band in the FDI-intensive region, whereas FDI responds positively to the shock of GRP in the FDI-less-intensive region. The response of FDI to the shock of GRP in the FDI-intensive region and the response of GRP to the shock of FDI in the FDI-less-intensive region are ambiguous, respectively.

In the combination domestic between FDI and domestic investment, the causality from FDI to domestic investment shows a clear contrast between the regions: the “positive” causality is identified in the FDI-intensive region at 95 percent level, whereas the “negative” causality is found in the FDI-less-intensive region at 99 percent level. The causality from domestic investment to FDI is, on the other hand, is confirmed as a positive one only in the FDI-less-intensive region at 99 percent level. As for the impulse responses between FDI and domestic investment in Figure 2-2, domestic investment responds to the shock of FDI with 95 percent error band, positively in the FDI-intensive region, but negatively in the FDI-less-intensive region. The positive response of FDI to the shock of domestic investment is found in the FDI-less-intensive region.

#### 3.3.3 Geographical Model

Table 3-3, Table 4-3 and Figure 2-3 report the estimation results of the geographical model estimation. In the combination between FDI and GRP, it is only in the Northern area that the positive causality and impulse response from FDI to GRP are identified clearly at the conventional level of significance: at 99 percent in the causality and with 95 percent error band in the impulse response. Those effects are, on the other hand, insignificant or weak in the Central and Southern areas. As for the causalities and impulse responses from GRP to FDI, there are no significant effects in all the areas.

As for the relationship between FDI and domestic investment, it is also in the Northern area that the positive causality and impulse response from FDI to domestic investment are identified clearly at the conventional level of significance: at 99 percent in the causality and with 95 percent error band in the impulse response. Those effects are, however, insignificant in the Central and Southern areas. The causality and impulse response from domestic investment to FDI differ according to the areas: negative effects in the Northern area, positive effects in the Central area and insignificant effects in the Southern area.

### 3.5 Interpretations of Estimation Outcomes

This subsection interprets the estimation outcomes above by each model, from the viewpoints of the causalities between FDI and GRP and of FDI crowd-in or crowd-out effects on domestic investment.

In the nation-wide model covering all sample provinces, the estimation result simply suggests that FDI causes economic growth whereas economic growth does not induce FDI, and that FDI just crowds in domestic investment. Since the positive impulse response of GDR to the FDI shock is found to be not temporary but sustainable, the FDI effect seems to follow not the traditional neoclassical growth model but the new “endogenous” growth theory in which FDI is considered to have a permanent growth effect through technology transfer and spillover.

The regional model with FDI intensity, on the other hand, produces contrasting estimation results between the FDI-intensive region and the FDI-less-intensive one. One contrast is that FDI causes economic growth in the FDI-intensive region, whereas economic growth induces FDI in the FDI-less-intensive region. Another contrast is that FDI crowds in domestic investment in the FDI-intensive region, whereas FDI crowds out domestic investment in the FDI-less-intensive region. These contrasts imply the existence of FDI’s agglomeration effects with technological spillovers and forward- and backward- industrial linkage. The FDI-intensive region with agglomeration effects makes FDI crowd in domestic investment, which also facilitates the region’s economic growth. The FDI-less intensive region lacking in agglomeration effects, however, makes FDI crowd out domestic investment due to resource-scarcity, which does not necessarily lead to the region’s economic growth. For this region, which is usually in premature development stage, it is the side of economic growth that could be a key factor to attract FDI.

The geographical model reflects mixed estimation results of different FDI effects from the FDI-intensive province and the FDI-less-intensive one, since each area contains both types of provinces. The Northern area shows the positive effects of FDI on economic growth and domestic investment, similar to those of the FDI-intensive region, since the area includes 9 FDI-intensive provinces out of 13 sample provinces. The Central and Southern areas, on the other hand, represent the insignificant or weak impact of FDI, since both areas includes the FDI-intensive province and the FDI-less-intensive one to a certain extent in each.

In sum, the VAR estimation outcomes identifies regional differences in the effects of FDI on GRP and domestic investment in Vietnam, and the differences come from the variance in the FDI intensity in each province. One contrast is that FDI causes economic growth in the FDI-intensive region, whereas economic growth induces FDI in the FDI-less-intensive region. Another contrast is that FDI crowds in domestic investment in the FDI-intensive region, whereas FDI crowds out domestic investment in the FDI-less-intensive region. These contrasts suggest the existence of FDI’s agglomeration effects.

#### **4. Concluding Remarks**

This article examined the effect of FDI on economic growth and domestic investment with a focus on Vietnamese provinces by conducting the Granger causality and impulse response tests under a vector auto-regression (VAR) estimation using panel data. The major research questions in this study were twofold: whether the inward FDI causes economic growth or economic growth induces the FDI, and whether the inward FDI crowds in or crowds out domestic investment. Since this study targeted Vietnamese provinces, it explored regional differences in the FDI-growth effect and the FDI-domestic investment effect by dividing Vietnamese provinces according to FDI-value intensity: the FDI-intensive region and FDI-less-intensive region.

The VAR estimation results showed two clear contrasts on FDI effects between the FDI-intensive region and the FDI-less-intensive one. One contrast was that FDI causes economic growth in the FDI-intensive region, whereas economic growth induces FDI in the FDI-less-intensive region. Another contrast was that FDI crowds in domestic investment in the FDI-intensive region, whereas FDI crowds out domestic investment in the FDI-less-intensive region. These contrasts imply the existence of FDI’s agglomeration effects with technological spillovers and forward- and backward- industrial linkage. The FDI-intensive region with agglomeration effects makes FDI crowd in domestic investment, which also facilitates the region’s economic growth. The FDI-less intensive region lacking in agglomeration effects, however, makes FDI crowd out domestic investment due to resource-scarcity, which does not necessarily lead to the region’s economic growth. For this region, which is usually in premature development stage, it is the side of economic growth that could be a key factor to attract FDI.

**References** [Omitted]

**Table 1 Availability of FDI Data** [Omitted]

**Figure 1 Relationship between FDI and GRP (Year-on-Year rate, %)** [Omitted]

**Table 2 Unit Root and Co-integration Test** [Omitted]

**Table 3 Estimated VAR Model** [Omitted]

**Table 4 Granger Causalities** [Omitted]

**Figure 2 Impulse Responses**

Figure 2-1 Nation-wide Model

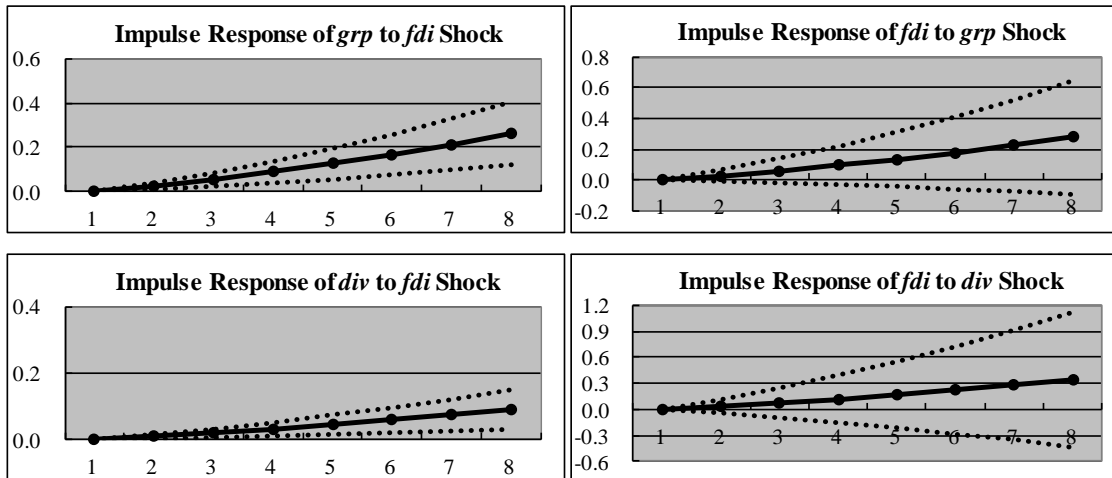
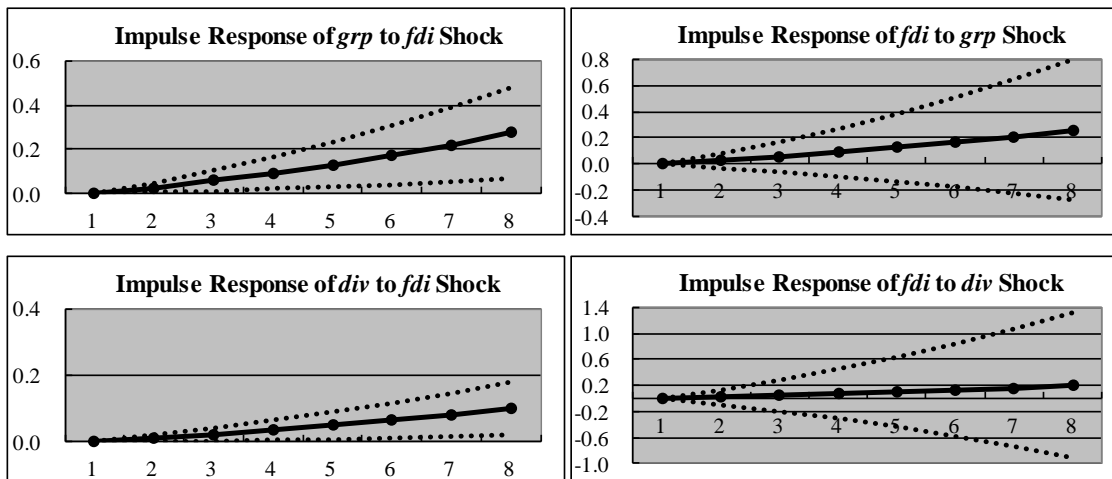


Figure 2-2 Regional Model with FDI Intensity  
[FDI-intensive Region]



[FDI-less-intensive Region]

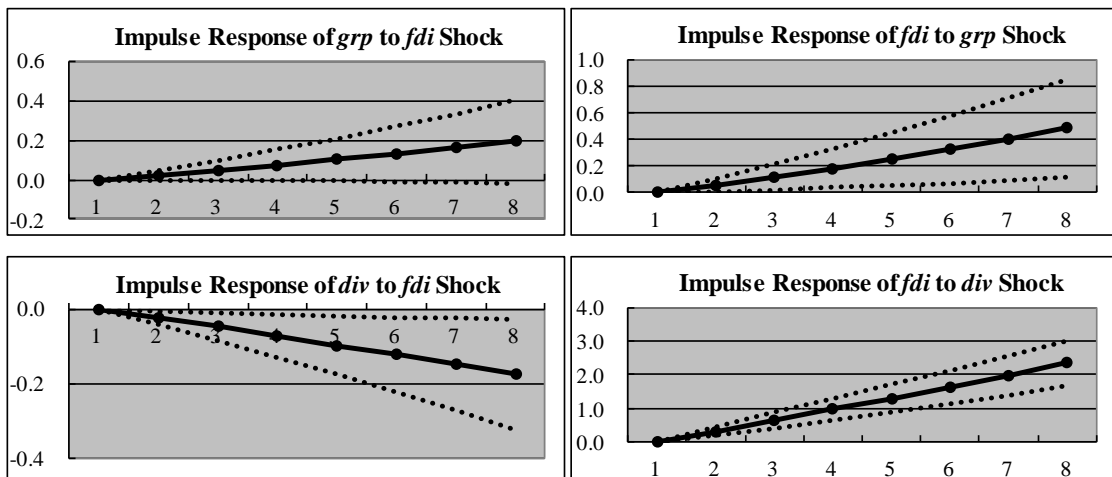
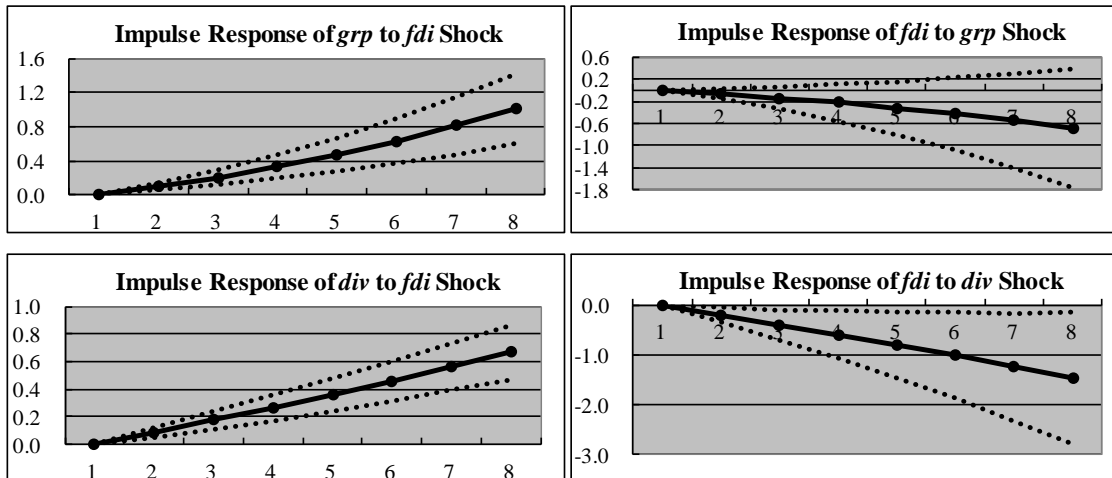
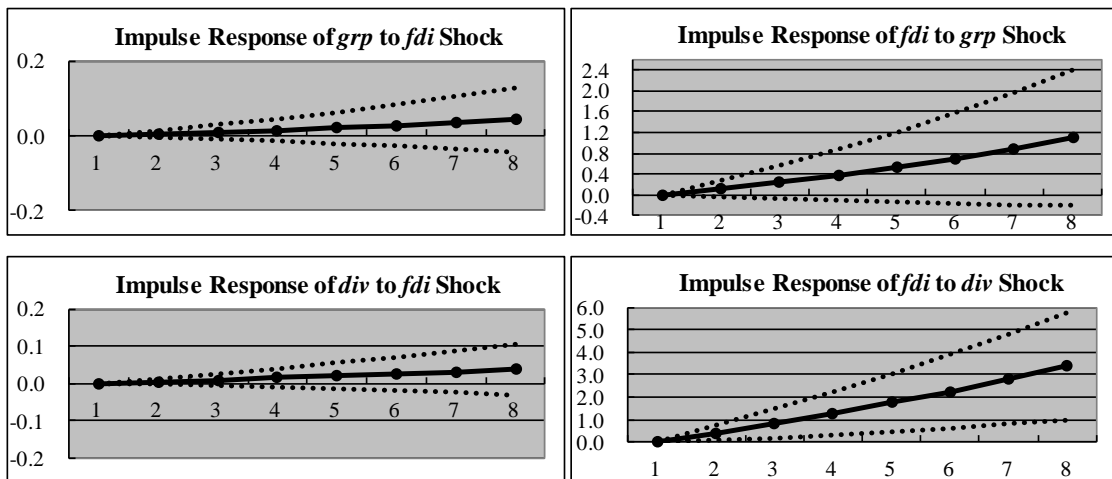


Figure 2-3 Geographical Model

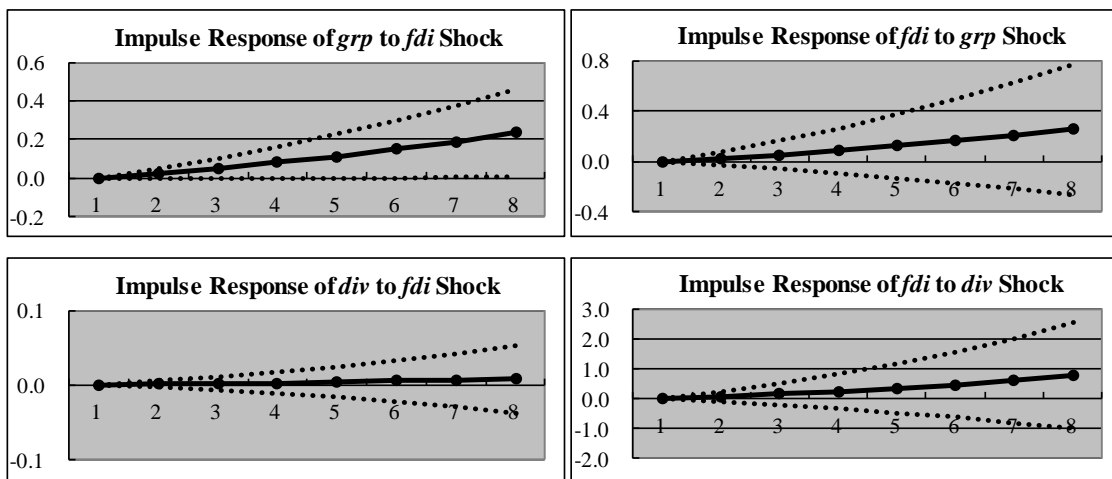
[Northern Area]



[Central Area]



[Southern Area]



Note: 1) The shock is defined as one unit innovation.

2) The dotted lines denote a 95 percent error band over 8-year horizons.

Sources: Author's estimation based on Statistical Yearbook of each province