

Does FDI inflow crowd in private investment? Empirical evidence for the Southeast region of Vietnam from the panel quantile regression approach

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ABSTRACT

Well-known to be the most dynamic economic region in Vietnam with the establishment of more export processing zones, high technology parks, and industrial zones, the Southeast region is increasingly attracting more capital flows from all over the world. Does FDI inflow crowd in private investment in this region? To answer this research question, the study examines the effect of FDI inflow on private investment for a sample of 6 provinces/cities of the Southeast region between 2005 and 2019 using the panel quantile regression approach, the difference GMM Arellano-Bond, and the FE-IV estimator. The results show that FDI inflow crowds in private investment in this region. In addition, public expenditure, inflation, and population also promote private investment. These findings suggest some crucial policy implications for local governments in this region to receive more FDI inflows as well as promote private investment.

1. Introduction

The effect of Foreign Direct Investment (FDI) inflow on private investment is hotly debated among economists. From the cited work by Agosin and Machado (2005), a strand of studies tries to examine complementarity or substitutability between them. FDI inflow plays a crucial role in the process of economic development and growth in many countries, especially developing countries. This kind of capital is the fixed form of across-border economic activities conducted by the multinational corporations in which FDI companies receive benefits from internationalizing their brand name, selling and marketing their products and services in other countries (Agosin & Machado, 2005) while the private sector's investment capital significantly contributes to promoting economic growth, creating more jobs, and thus stabilizing the social security (Khan & Reinhart, 1990).

Despite its significant contribution to economic development in host countries, FDI inflows have certain influences on private investment. On the one hand, if FDI investors use domestic credit in host countries to finance their business operations, they will stress high pressure on interest rates in host countries, which makes domestic investors give up business opportunities. It is a crowding-out effect of FDI inflows on domestic investment (Delgado & McCloud, 2017). On the other hand, domestic investors can link to FDI investors through cooperation opportunities such as an investment joint-venture between private companies and foreign firms. In some cases, domestic investors can supply raw materials for FDI investors and get the transfer of appropriate technologies to decrease costs. It is a crowding-in effect of FDI inflows on domestic investment (Agosin & Machado, 2005).

The Southeast region is well-known as the most dynamic and developed economic area in Vietnam, with the most development of Ho Chi Minh City. HIDS (2020) notes this region contributes more than 2/3 of the annual government revenue with an urbanization level of 50%. Attracting FDI flows from several countries is a good solution to compensate investment capital in this region through local governments' appropriate regulations and policies. As a result, more export processing zones, industrial zones, and high technology parks are established in this region. However, under incentive policies (cheap land lease, tax reduction, and appropriate administrative procedures), whether FDI inflow crowds out or crowds in private investment in this region will be the core purpose of this study.

So far, no related studies have been conducted for the Southeast region in Vietnam. So, the main objective of this study is to empirically investigate the effect of FDI inflow on private investment for a group of 6 provinces/cities of the Southeast region in Vietnam from 2005 to 2019 using the panel quantile regression approach. The FE-IV estimator is employed to check the robustness of estimates.

The structure of the study is presented in the following way. Section 2 presents the literature review that notes the effect of FDI inflow on private investment. The methodology and research data are given in Section 3 that suggests the empirical equation and describes the applied estimators. The empirical results and discussion in Section 4 show the main results and robustness check. Finally, section 5 concludes and suggests some crucial policy implications based on the findings in Section 4.

2. Literature review

The most contribution to the literature is the research works by Morrissey and Udomkerdmongkol (2012) and Farla, De Crombrugghe, and Verspagen (2016). They apply the one-step system GMM Arellano-Bond estimator to examine the effects of FDI, governance, and interaction term on domestic investment for a group of 46 developing countries. They come to the same conclusion that FDI inflow stimulates domestic investment.

Similar to Morrissey and Udomkerdmongkol (2012) and Farla et al. (2016), some studies such as Kim and Seo (2003), Titarenko (2006), Mutenyo and Asmah (2010), Eregha (2012), and Szkorupová (2015) indicate that FDI inflow reduces domestic private investment. Wang (2010) confirms that the FDI inflow crowds out domestic private investment while the cumulative FDI stimulates it using the estimators of random effects, fixed effects, and GMM Arellano-Bond. In the same vein, Pilbeam and Oboleveciute (2012) apply the one-step difference GMM estimator for a group of 26 EU member states over the period 1990 - 2008 and find a crowding-out effect of FDI on domestic private investment for the older EU14 countries.

In contrast, some studies such as Desai, Foley, and Hines (2005), Tang, Selvanathan, and Selvanathan (2008), Ndikumana and Verick (2008), Ang (2009, 2010), and Prasanna (2010) present the "crowd-in hypothesis." Al-Sadig (2013) notes that FDI inflow promotes private investment via the system GMM estimator for panel data of 91 developing countries over the period from 1970 to 2000. The findings in Al-Sadig (2013) show that the positive effects of FDI in the sample of low-income countries are conditional on the availability of human capital in the receipt countries. Similarly, Munemo (2014) indicates that the complementarity between FDI inflow and domestic investment is strongly dependent on business start-up regulations in receipt countries for a group of 139 countries from 2000 to 2010 with the two-step difference GMM estimator. Meanwhile, Munemo (2014) states that reforms in these regulations can enhance the complementarity between FDI inflow and domestic private investment. In the same vein, Boateng, Amponsah, and Annor (2017) support the crowding-in effect of FDI inflow on domestic investment for a sample of 16 sub-Sahara African countries from 1980 to 2014 using

fixed effect, FMOLS, and pooled OLS techniques. Recently, Jude (2019) shows that FDI inflow crowds in domestic investment for a sample of 10 Central and Eastern European economies over the period 1995 - 2015 through the one-step system GMM estimator.

Unlike the above-mentioned studies, some such as Mišun and Tomšk (2002), Agosin and Machado (2005), Apergis, Katrakilidis, and Tabakis (2006), Onaran, Stockhammer, and Zwickl (2013), Ahmed, Ghani, Mohamad, and Derus (2015), Nguyen (2021a, 2021b) show mixed evidence for the relationship between FDI inflow and domestic investment. Lin and Chuang (2007) note that FDI inflow promotes the domestic private investment of the larger firms, but FDI inflow reduces it in the smaller firms in Taiwan for the periods of 1993 - 1995 and 1997 - 1999 using the Heckman 2SLS estimator. In the long run, Tan, Goh, and Wong (2016) find that FDI inflow has a crowding-in impact on gross domestic investment for a group of 08 Asean countries over the period 1986 - 2011 via the PMG estimator. Similarly, Chen, Yao, and Malizard (2017) find a neutral relationship between FDI inflow and domestic private investment in China over the period from 1994Q1 to 2014Q4 through the ARDL test. Regarding the entry mode set up by FDI enterprises, they report that equity joint venture promotes domestic private investment but wholly foreign-funded enterprises decrease it. More recently, Nguyen (2021a, 2021b) emphasize that the FDI inflow - private investment relationship strongly varies based on the institutional quality in the host countries. Nguyen (2021a) finds that FDI inflow crowds out private investment in 25 developed countries (good governance environment) but crowds in it in 72 developing countries (bad governance environment) using the two-step GMM Arellano-Bond estimators for 97 countries over the period 2000 - 2013. In contrast, by using the two-step GMM Arellano-Bond estimator for a group of 52 provinces in Vietnam over the period 2004 - 2015, Nguyen (2021b) indicates FDI inflow crowds in private investment under good institutional quality but crowds out under poor institutional quality.

In short, from the literature review perspective, in addition to the difference between GMM Arellano-Bond estimator and the FE-IV estimator, this study is the first to use the panel quantile regression approach to examine the effect of FDI inflow on private investment for the Southeast region in Vietnam. It is the research gap that this study focuses on.

3. Methodology and research data

3.1. Methodology

In this study, the fixed effects panel quantile regression approach is used to examine the effect of FDI inflow on private investment. This approach makes the study focus on the entire conditional distribution of private investment and determine the effect of FDI inflow on private investment. In particular, most related literature uses panel data models based on conditional mean regression. The heterogeneity in such models is often ignored. Ignoring this heterogeneity in panel data models can lead to bias in estimates. The seminal work by Koenker and Bassett (1978) developed the quantile regression approach. Compared with the conditional mean regression, this approach can bring more robust estimation results (Koenker & Bassett, 1978). Therefore, based on the work by Agosin and Machado (2005), the empirical equation is extended as follows:

$$PIN_{it} = \beta_0 + \beta_1 FDI_{it} + X_{it}\beta' + \varepsilon_{it} \quad (1)$$

where subscript i and t are the province and time index, respectively. PIN_{it} is private investment, FDI_{it} is net FDI inflow. X_{it} is a set of control variables such as public expenditure, inflation, and population; ε_{it} is an error term; β_0 , β_1 , and β' are estimated coefficients. Public expenditure can stimulate or reduce domestic private investment through mechanisms of complementarity or substitutability. So, Ahmed and Qayyum (2007) indicate a positive impact of public expenditure

on private investment in Pakistan. Meanwhile, inflation can raise the transaction cost and reduce enterprises' profit, resulting in a decrease in private investment (Jin & Zou, 2005). Similarly, the effect of population on domestic private investment can stem from labor supply to enterprises.

Regarding the fixed effects panel quantile regression approach, the econometric model is presented as:

$$Q_{y_{it}}(\tau|X_{it}) = X'_{it}\beta(\tau), i = \overline{1, n}, t = \overline{1, T} \quad (2)$$

where $Q_{y_{it}}(\tau|X_{it})$ is the conditional τ -quantile of y_{it} given X_{it} ; $\alpha_i(\tau)$ and $\beta(\tau)$ are conditional on τ . The key challenge in this approach is the random parameters problem stemming from the substantial amount of fixed effects (Galvao, 2011; Koenker, 2004; Lamarche, 2010). One reason for literature on the panel quantile regression approach is impossible to remove unobserved fixed effects in the quantile regression model. Koenker (2004) suggested an appropriate method to deal with these problems. Accordingly, the fixed effects estimator is applied to reduce a weighted sum of K ordinary quantile regression objective functions corresponding to K values of τ . The slope coefficients of objective function and coefficients of fixed effects are assigned to be dependent and independent with τ , respectively. A penalty term penalizes the coefficients of fixed effects to reduce them to zero. The parameters are estimated as follows:

$$\min_{(\alpha, \beta)} \sum_{k=1}^K \sum_{i=1}^N \sum_{t=1}^T \psi_k \chi_{\tau_k} (y_{it} - \alpha_{it} - X'_{it}\beta(\tau_k)) + \phi \sum_{i=1}^N |\alpha_i| \quad (3)$$

where k , i , and t are the quantile, country, and time index, respectively; X is the matrix of independent variables, χ_{τ_k} is the quantile loss function, and ψ_k is the weight corresponding to k th quantile. The study uses equally weighted quantiles, as suggested by Lamarche (2010). The penalty parameter ϕ improves the estimates of β by reducing individual effects to zero.

To deal with the endogeneity phenomena and the autocorrelation of errors, the study uses the difference GMM Arellano-Bond estimator for the following empirical equation:

$$PIN_{it} = \alpha_0 + \alpha_1 PIN_{it-1} + \alpha_2 FDI_{it} + X_{it}\alpha' + \mu_i + \zeta_{it} \quad (4)$$

where PIN_{it-1} is a proxy for the initial level of private investment, ζ_{it} is an observation-specific error term while μ_i is an unobserved time-invariant, country-specific effect; α_0 , α_1 , α_2 , and α' are estimated coefficients.

The GMM (General Method of Moments) Arellano and Bond (1991) estimator first proposed by Holtz-Eakin, Newey, and Rosen (1988) is employed for estimation. To remove country-specific effects, the first difference is taken in Equation (4). Then, for the assumption that time-varying white noises in original models are not serially correlated, regressors in the first difference are used as instrumented by their lags (Judson & Owen, 1999). This strategy is known as the difference GMM Arellano-Bond estimator (D-GMM), which can handle simultaneity biases in regressions.

The validity of instruments in S-GMM will be assessed by the Sargan test as well as the Arellano-Bond test. The Sargan and Hansen tests are used to check the endogeneity phenomena, while the Arellano-Bond test is applied to search the autocorrelation of errors in the first difference. So, the test result of the first autocorrelation of errors, AR(1) can be ignored while the second autocorrelation of errors, AR(2), is checked on the first difference series of errors to eliminate the phenomenon of AR(1).

For further check, the study uses the FE-IV estimator. FE-IV is the instrumental variable estimation with fixed effects for panel data in which some variables can be endogenous (Baum, Schaffer, & Stillman, 2003). The Sargan statistic is used to assess the validity of instruments.

3.2. Research data

The main data are private investment, FDI, public expenditure, consumer price index, and population, which all are taken from the General Statistics Office of Vietnam (GSO, 2020). The research sample consists of 06 provinces/cities in the Southeast region (Binh Duong, Binh Phuoc, Ba Ria - Vung Tau, Dong Nai, Tay Ninh, and Ho Chi Minh City) from 2005 to 2019. The variables are defined as follows:

- Private investment (PIN): The share of domestic private investment in GDP (%);
- FDI inflow (FDI): The ratio of net FDI inflow to GDP (%);
- Public expenditure (EXP): The share of public expenditure in GDP (%);
- Inflation (INF): Consumer price index, average annual (logarithm);
- Population (POP): The population of a province (logarithm).

The descriptive statistics of the data are given in Table 1. The results indicate the average private investment in the Southeast region from 2005 to 2019 is 15.196%, with the lowest of 0.731% in 2007 (Ba Ria - Vung Tau) and the highest of 36.971% in 2005 (Binh Duong). Meanwhile, in the same period, the average FDI inflow into this region is 10.643%, with the lowest of 0.49% in 2016 (Ho Chi Minh City) and the highest of 48.46% in 2006 (Binh Duong). Meanwhile, the matrix of correlation coefficients is described in Table 2. Public expenditure and population are positively connected with private investment, while FDI and inflation insignificantly. Correlation coefficients among independent variables are relatively low, which helps to remove the co-linearity among these variables.

Table 1

Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Private investment (%)	90	15.196	8.878	0.731	36.971
FDI inflow (%)	90	10.643	9.661	0.49	48.46
Public expenditure (%)	90	5.380	3.021	1.02	12.09
Consumer Price Index (value)	90	107.750	5.970	99.7	125.4
Population (value)	90	2,510.727	2,411.406	799.6	8,673.87

Source: Processed by Software

Table 2

The matrix of correlation coefficients

	PIN	FDI	EXP	INF	POP
PIN	1				
FDI	0.160	1			
EXP	0.651***	-0.099	1		
INF	0.163	0.164	0.060	1	
POP	0.184*	-0.142	-0.346***	-0.102***	1

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent respectively

Source: Processed by Software

4. Empirical results and discussion

The results by panel quantile regression are given in Table 3. In the table, 10th, 20th, 30th, 40th, 50th, 60th, 70th, 80th, and 90th percentiles are applied for analysis. OLS estimate is also included in the table for comparison. The results across all quantiles and OLS estimator note that FDI inflow crowds in private investment. In addition, public expenditure, inflation, and population promote private investment. It is easy to see that the estimated coefficients do not vary much across the quantiles.

Unlike Morrissey and Udomkerdmongkol (2012) and Farla et al. (2016), we find out that FDI increases private investment, validating the “crowd-in hypothesis” in the prior findings (Al-Sadig, 2013; Ang, 2009, 2010; Desai et al., 2005; Ndikumana & Verick, 2008; Tang et al., 2008). So, FDI flows to the Southeast region are complementary to domestic private investment. It can be originated from the fact that domestic companies can cooperate with foreign enterprises as subcontractors to foreign businesses, partners in investment joint ventures, or suppliers of supply raw materials. It also implies that regulations and policies related to attracting FDI inflows in the Southeast region are effective and appropriate in improving the economic activities of the private sector.

The positive impact of public expenditure on private investment can stem from the fact that public spending in healthcare and education will develop human capital. High-quality human resources contribute to the development of the private sector by providing a skilled workforce to the private sector. Meanwhile, the potential benefit of inflation is to promote savings - investments (Jin & Zou, 2005). Inflation is also a factor that stimulates the price level, increasing private sector projects’ investment capital. It can be found in Adams (2009) for the case of Sub-Saharan African countries. However, high inflation can lead to social instability. Similarly, population growth contributes to both providing human resources for the development of the private sector and setting up a market large enough to consume the private sector’s products and services, thus boosting private investment.

The results by D-GMM and FE-IV are given in Table 4. In the estimation procedure by D-GMM, FDI is detected to be endogenous; thus FDI is used as instrument in the GMM-style while the remaining variables such as private investment, public expenditure, inflation, and population as instruments in the IV-style. In line with those by the panel quantile regression approach, the results by D-GMM and FE-IV show that FDI crowds in private investment, re-validating the “crowd-in hypothesis.” In addition, public expenditure, inflation, and population also promote private investment. In addition, inflation and population also promote private investment.

Table 3

FDI and private investment: Panel quantile regression and OLS

Dependent variable: Private investment (%)

Variables	OLS	Quantiles								
		10th	20th	30th	40th	50th	60th	70th	80th	90th
FDI	0.278***	0.413***	0.431***	0.461***	0.491***	0.501***	0.518***	0.530***	0.552***	0.574***
	(0.053)	(0.145)	(0.124)	(0.091)	(0.071)	(0.067)	(0.068)	(0.074)	(0.092)	(0.114)
EXP	2.530***	1.676	1.743*	1.852**	1.957***	1.996***	2.055***	2.098***	2.180***	2.256**
	(0.179)	(1.231)	(1.044)	(0.767)	(0.588)	(0.560)	(0.572)	(0.619)	(0.775)	(0.963)

Variables	OLS	Quantiles								
		10th	20th	30th	40th	50th	60th	70th	80th	90th
INF	0.190** (0.094)	0.188 (0.132)	0.182* (0.112)	0.171** (0.082)	0.161*** (0.063)	0.158*** (0.060)	0.152** (0.061)	0.148** (0.066)	0.140* (0.083)	0.133 (0.103)
POP	0.001*** (0.000)	0.002* (0.001)	0.003** (0.001)	0.003*** (0.001)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.001)

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent respectively

Source: Processed by Software

Table 4

FDI and private investment: D-GMM and FE-IV

Dependent variable: Private investment (% GDP)

Variables	D-GMM	FE-IV
PIN (-)	-0.194 (0.126)	-----
FDI	0.853*** (0.205)	0.427*** (0.063)
EXP	-0.629 (1.552)	2.074*** (0.574)
INF	0.056 (0.086)	0.188*** (0.066)
POP	0.005*** (0.001)	0.003*** (0.001)
Observation	78	84
AR(2)	0.116	-----
Sargan test	0.736	0.3195

Note: ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent respectively

Source: Processed by Software

5. Conclusion and policy implications

Driven from the fact that the Southeast region is well-known to be the most dynamic economic area in Vietnam that increasingly attracts more FDI inflows from all over the world, the study uses the panel quantile regression approach, D-GMM, and FE-IV to empirically examine the relationship between FDI inflow and private investment for balanced panel data of 06 provinces in this region from 2005 to 2019. The estimated results show that FDI crowds in private investment. Also, public expenditure, inflation, and population are positively significant determinants of private investment in this region.

The findings in this study suggest some crucial policy implications for this region in attracting more FDI inflows to stimulate domestic private investment. However, some problems such as tax evasion, transfer pricing, and pollution by FDI enterprises also cause concerns.

Therefore, local governments in the Southeast region, as well as the central government in Vietnam, should reform the regulations and policies to attract more green-FDI inflows to keep sustainable development in the future. Future research can address the effect of FDI inflows on private investment by industry/sector. In particular, these studies should examine the role of institutional quality in the FDI inflow – private investment relationship by industry/sector.

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