

Regional Determinants of FDI Location in Vietnam

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Abstract

This paper examines empirically determinants of foreign direct investment (FDI) location in Vietnam. Based on a panel dataset of 63 provinces and cities in Vietnam from 2008 to 2012, linear regression models for panel data (fixed-effects and random-effects) and negative binomial models are applied in analysis. The empirical evidence confirms the significant impact of market potential, labour cost, labour quality, infrastructure, provincial policy effectiveness, and the previous year's FDI concentration on FDI allocation between provinces and cities in Vietnam. Also, market potential and wage rate are statistically shown to affect the size of FDI projects. Moreover, estimation results suggest that provinces with higher FDI accumulation seem to create a dispersion force to new foreign investors and FDI between regions in Vietnam in the form of efficiency-seeking FDI.

Keywords: Foreign direct investment (FDI); market potential; regional determinants.

1. Introduction

After the reform policy called *Doi Moi* in 1986, Vietnam has shifted from a highly centralized planned economy to a socialist-oriented market economy. During the transformation process, foreign direct investment (FDI) by multinational corporations has played a very important role since it has brought a variety of benefits to the host nation such as capital, finished products, components, new technology, organizational and managerial skills, distribution channels and markets.

In recent years, Vietnam has emerged as one of the most attractive locations for FDI in Southeast Asia. Nevertheless, recognizing that FDI can contribute actively to the economic development of a country, the world market for FDI is indeed highly competitive, especially among developing countries. Vietnam used to be in the top 15 most attractive FDI destinations in the world from 2010 to 2012, according to the FDI Confidence Index of A.T.Kearney¹. However, in 2014, Vietnam is no longer in the top 25, which implies that Vietnam's competitiveness in the FDI market has been eroded noticeably. The facts have shown that liberal policy frameworks are becoming commonplace and are losing their traditional power to attract FDI. Therefore, the Vietnamese government needs to pay more attention to locational advantages and created assets of the country in order to improve its attractiveness among FDI destinations. Moreover, FDI distribution in Vietnam is highly uneven, accruing to developed regions such as Hanoi in the North and Ho Chi Minh City in the South. This leads to very wide development gaps between regions in Vietnam. Needless to say, investigating lo-

cational factors that have impact on FDI inflow is essential to amend this situation.

The main purpose of this paper is to study determinants of FDI location in Vietnam at the provincial level after the country joined the World Trade Organization (WTO) in 2007. The next section presents a literature review and describes main contributions of the paper. The third section explains the analytical framework and proposes research hypotheses. Data description is presented in the fourth section. The fifth section describes the methodology, followed by the sixth section with empirical results and discussion. The conclusion and policy implications are finally presented in the seventh section.

2. Literature review

Determinants of FDI location have been extensively investigated in the literature, both in developed and in developing countries. For instance, Head et al. (1995), Friedman et al. (1992, 1996), O'Huallachain and Reid (1997) analyzed geographical distribution of FDI in the US. Artige and Nicolini (2006) studied locational determinants of FDI in three European regions. Chidlow and Young (2008), Cieslik (2005, 2013) examined FDI location in Poland. Head and Ries (1996), Cheng and Kwan (2000), and Ali and Guo (2005) researched the case of China. Those studies focused on factors affecting FDI distribution at country, sectorial, or regional levels. In Vietnam, the increasing influx of foreign capital, which followed Vietnam's policy reforms, has generated empirical studies on the allocation of FDI. The problem of location decisions of foreign firms in Vietnam has been analyzed mostly at the regional level by a number of empirical methodologies.

Pham (2002) studied the location determinants of foreign firms in Vietnam during the 1988-1998 period, using linear regression on cross-sectional data for 53 provinces. She found that the provincial FDI inflows were positively related to the telecommunication network, the number of middle secondary school pupils, and to personal income.

The roles of geographical characteristics of the regions were further researched in the study of Meyer and Nguyen (2005). They estimated a binomial regression model to show the important role of population, infrastructure, industrial zones, education, FDI stock and economic growth in attracting FDI to provinces in Vietnam. Particularly, the main finding was that foreign investors chose to locate in provinces where market transactions were supported. Employing the same method but with more up-to-date cross-sectional data, Nguyen and Nguyen (2007) concluded that improved human capital, higher wages, a better infrastructure system, and a larger market size had a positive impact on FDI allocation. Nguyen and Nguyen (2007) also ran a number of regression models to distinguish determinants of FDI inflows by different countries of FDI origin.

Nguyen (2006) applied a simultaneous equation model under GMM estimation to test the mutual relationship between FDI and economic growth. Cross-sectional data in 2000 was used to demonstrate that economic growth, domestic investment, market size, infrastructure, exports, real exchange rate, and labour quality were all positively related to the concentration of FDI. Meanwhile, labour cost had a negative impact on FDI flows. The roles of those factors in FDI distribution were confirmed again in her

follow-up study (Anwar and Nguyen, 2010). The main difference between these two studies was the fact that instead of cross-sectional data, Anwar and Nguyen (2010) used a panel data of 61 provinces in Vietnam for 1996-2005 to conduct their research. Their findings were in line with the former study.

Hoang and Goujon (2014) estimated spatial econometric models to find the determinants of FDI location among Vietnamese provinces after the Asian crisis in 1997. Their empirical study was based on cross-sectional data from 2001 to 2010. The paper revealed that FDI was attracted by market size and infrastructure in the host and neighboring provinces. Provincial industrial development policy and labour productivity were also drivers of FDI inflows into provinces. This paper was the first study taking into consideration characteristics of neighboring provinces.

Briefly, the four main groups of factors analyzed in the previous studies were market size, labour, infrastructure, and government policy. Nevertheless, most empirical studies on FDI location in Vietnam did not explicitly analyze the impact of agglomeration force so-called market potential, which is the economic size of the region and closeness to other markets. This paper aims to fill this gap. Additionally, I will attempt to show the significant effect of previous years' FDI concentration on current year's FDI. Furthermore, this study not only evaluates the important role of these agglomeration forces in FDI distribution in Vietnam but also attempts to examine their influence on the size of FDI projects. Besides, there are very few studies on FDI location in Vietnam employing panel data. This is mainly due to

the previous unavailability of data. Based on a panel dataset obtained from Statistical Yearbooks of Vietnam, this paper takes into account the dynamics of FDI inflows and the economic development of the country in recent years. Panel data analysis offers numerous advantages in empirical research. It controls for individual heterogeneity, gives more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency (Baltagi, 2005). This study provides more recent evidence on the locational determinants of FDI in Vietnam and contributes to the literature on the subject after the country's accession to the WTO in 2007.

3. Analytical framework and research hypotheses

As mentioned before, the FDI distribution in Vietnam is significantly uneven. To investigate the uneven spatial location of FDI, we may refer to the theoretical model of agglomeration economies proposed by Head and Ries (1996), Cieslik (2013). This analytical framework combines the firm heterogeneity and the new economic geography literatures. The model confirms the significant effects of agglomeration forces including infrastructure, government incentive policies and labour market (labour cost and labour quality) on foreign firms' location choice.

First, the theoretical model predicts that high factor costs make the region unattractive to foreign investors. Obviously, capital and labour are the most important factors of production. It is often the case that FDI firms bring the capital from their home country and do not have to rely on the local capital markets (Cieslik, 2013). Thus, labour cost becomes a major con-

cern in the host country in terms of production cost. In this paper, I also expect that provinces with a lower wage rate will attract FDI more than the others.

Beside labour cost, labour quality and labour availability are very important factors impacting location choice of foreign investors. Foreign firms invest in Vietnam mainly in labour-intensive activities such as clothes and footwear (Jenkins, 2006). Thus, the quality and availability of a labour force might be positively related to provincial FDI inflows.

Another important determinant of FDI location that the theoretical model considers is government policy. The theoretical model predicts that local incentive policies such as tax incentives are positively related to the number of foreign firms. Local authorities can maintain the economic and political stability, create a friendly business environment for investors, and impose effective policies to develop infrastructure and human capital, etc. Thus, provincial policy effectiveness may have a positive impact on FDI inflows.

In the theoretical model, Head and Ries (1996) revealed that infrastructure is one of the factors determining the location of foreign-funded investments. This paper also expects to see a similar outcome of infrastructure.

The major concern in Head and Ries' model is the importance of agglomeration economies, which simply means foreign firms will prefer cities where other foreign firms are located. Similarly, I expect to see the positive relationship between new FDI and cumulative FDI until the end of the previous year in this study.

As summarized before, four main groups of factors analyzed in the previous studies on FDI

location in Vietnam are market, labour, infrastructure and government policy. The factor which was neglected in the model of Head and Ries is market. However, when econometrically proving the important role of infrastructure in their theoretical model, Head and Ries (1996) stated that a city is more attractive if it is easier to transport goods produced there to other markets. This, in fact, not only depends on the infrastructure system but also on the geographical position of that location. The regions' centrality or periphery is expected to influence firms' location decisions – all else being equal, firms are likely to locate where they find least costly access to markets for their inputs and outputs (Midelfart-Knarvik et al., 2000). An ideal candidate to demonstrate the ease of a region to access other markets is market poten-

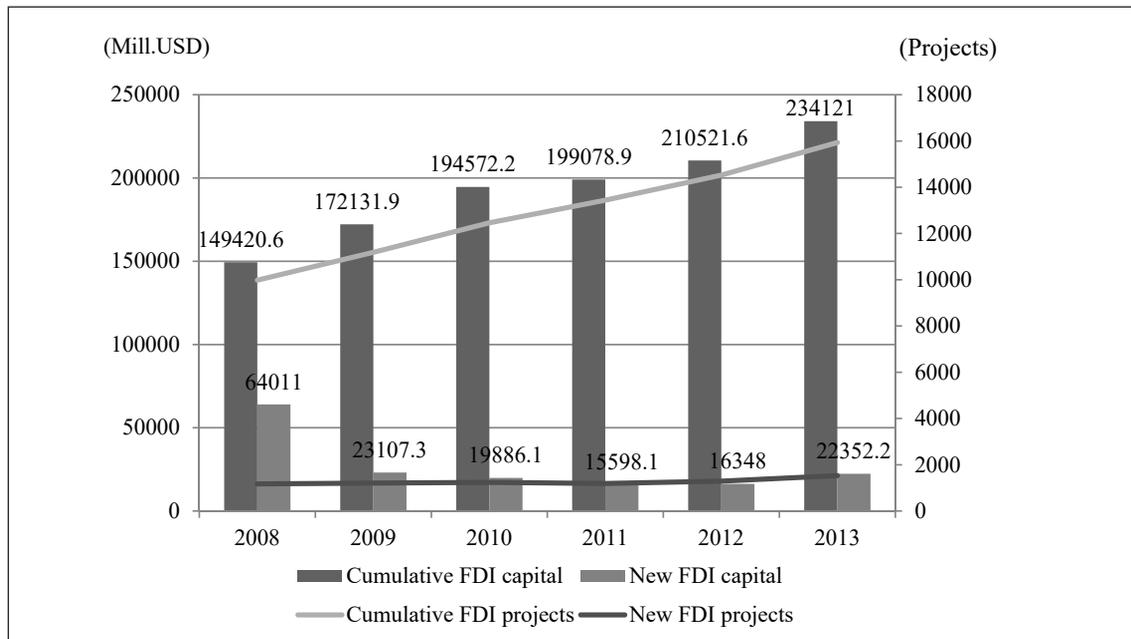
tial introduced by Harris (1954). According to Harris (1954), market potential is the demand for products in a location. It is the sum of purchasing power in other locations, weighted by transport costs (distances). In this study, I expect to reveal that provinces with easier access to other provinces attract more foreign investors. Furthermore, as FDI plays a critical role in export (Ekholm et al., 2004), provinces that have an infrastructure system and geographical location supporting export may be more attractive than others.

4. Data description

4.1. FDI in Vietnam between 2008 and 2013

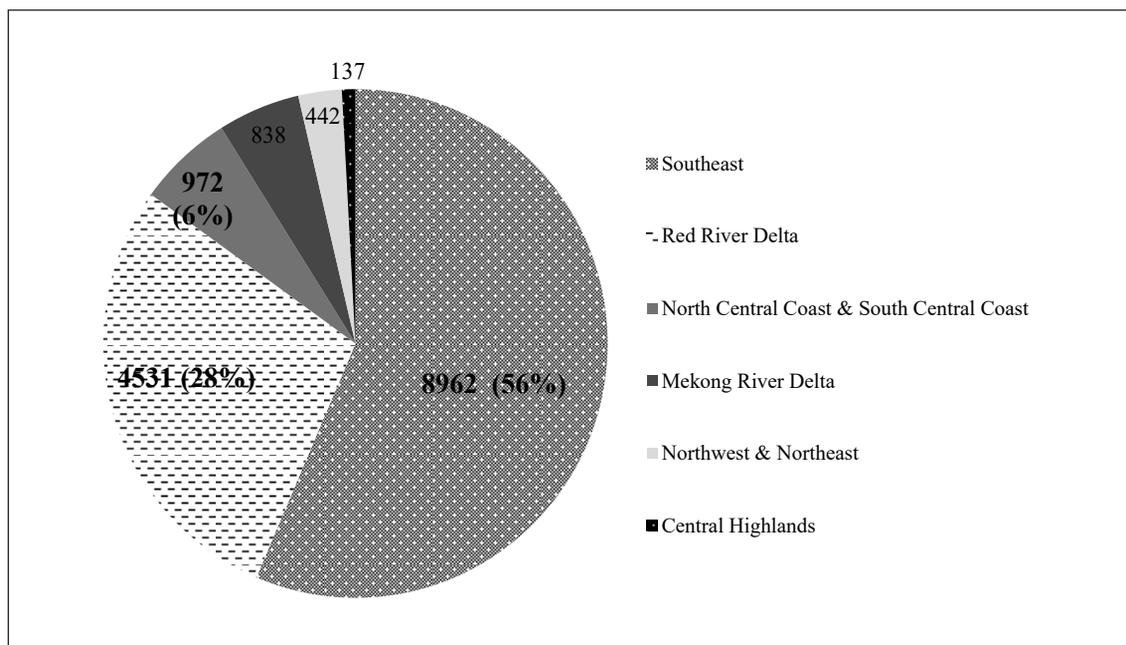
FDI has been contributing actively to the development of Vietnam since it was first allowed into Vietnam in 1988. The Vietnamese econo-

Figure 1: FDI inflows to Vietnam, 2008-2013



Source: Statistical Yearbooks of Vietnam, 2008-2013 and author's calculations.

Figure 2: Number of FDI projects having effect as of 31st Dec 2013



Source: GSO (2013) and author's calculation

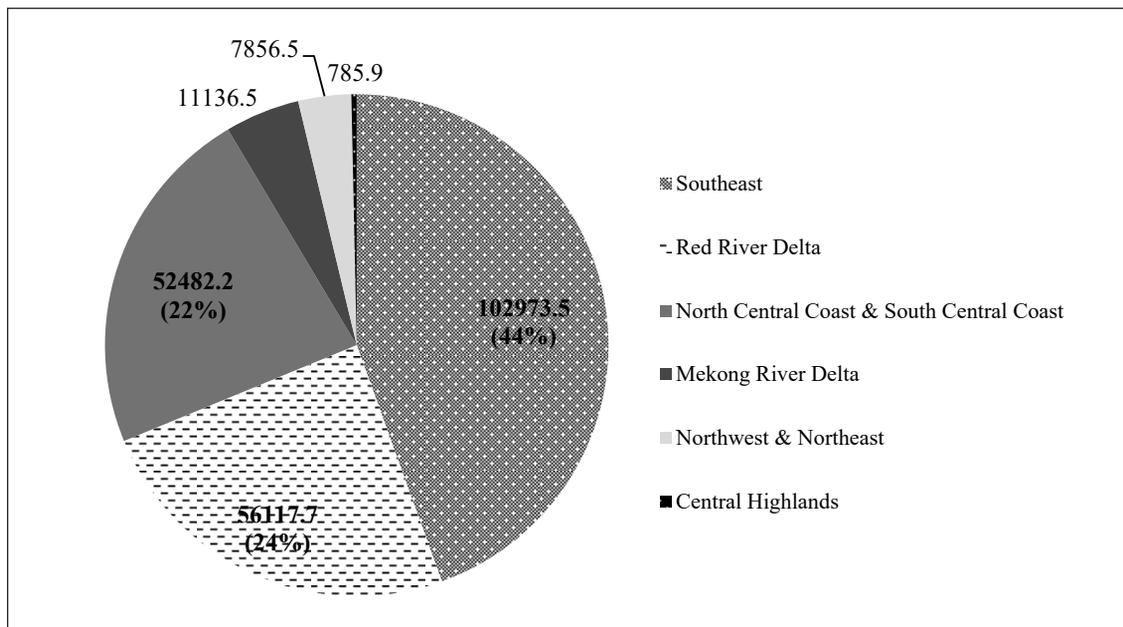
my has experienced a rapid growth with gross domestic product (GDP) growth of more than 7% at the beginning of the 21st century and of more than 5% after the global financial crisis, 2008. According to the Government Statistical Office of Vietnam (GSO, 2013), in 1991, there were only 152 FDI projects with 1284.4 million USD of total registered capital and 428.5 million USD of implementation capital. These numbers increased to 1530 projects, 22352.2 million USD, and 11500 million USD, respectively in 2013. However, after the financial crisis in 2008, FDI inflows to Vietnam decreased dramatically in both the number of new projects and the total amount of new capital. This is indicated in Figure 1 even though cumulative numbers were still on an upward trend.

Statistics have shown that the distribution

of FDI across provinces and cities in Vietnam is significantly uneven (See Figure 2 and 3). Specifically, the Southeast region accounted for 56% of FDI projects and 44% of the total FDI capital having effect as of 31st December 2013. Meanwhile, 28% of projects and 24% of FDI capital were located in the Red River Delta. Moreover, Hanoi in the North and Ho Chi Minh in the South accounted for 10% and 15%, respectively of FDI capital in 2013 (GSO, 2013). The Central Highlands is the least attractive region for FDI within the country.

The top three sources of FDI flowing into Vietnam are Japan, Singapore, and South Korea in 2013. In addition, manufacturing and processing captured nearly 60% of the total FDI, followed by real-estate business with around 20% (Bui et al., 2014).

Figure 3: Total FDI capital as of 31st December 2013 (Mill.USD)



Source: GSO (2013) and author's calculation

4.2. Data description

This study focuses on the situation after Vietnam's accession to the WTO, from 2008 to 2012. I desired to collect data on a longer period; however, the problem was that in 2008 Ha Tay province was merged into Hanoi. Thus, statistics before 2008 reported data for Ha Tay and Hanoi separately. Data are collected on a two-year basis, 2008, 2010, and 2012 because some key variables like wage rates by provinces are reported only every two years. The dataset contains 63 groups which represent 63 provinces and cities in Vietnam.

There are six dependent variables in which four variables demonstrate provincial FDI inflows and two variables reflect the size of FDI projects. The first four variables are cumulative FDI capital, new FDI capital, the cumulative number of FDI projects, and the number of new

FDI projects. Cumulative projects are all projects having effect as of 31st December each year. Two variables measuring the size of FDI projects are the average size of cumulative FDI projects and the average size of new FDI projects. In addition, all data on FDI flows is registered or committed FDI, not implemented FDI since the GSO only publishes provincial registered FDI in their annual Statistical Yearbook. Most earlier studies also relied on registered FDI even though implemented FDI can reflect real FDI inflows to Vietnam more accurately.

Regarding the currency unit of variables, data on FDI inflows is denominated in US dollars (USD) while other variables such as monthly wage and GDP are in Vietnam Dong (VND). In order to eliminate the effect of changes in the exchange rate between USD and VND over time, in the regression process,

I convert all data on FDI inflows from USD to VND currency. I use the yearly average exchange rate from World Bank statistics². The exchange rates, USD/VND, in 2008, 2010, and 2012 were 16302.25, 18612.92, and 20828, respectively.

In order to test my aforementioned predictions based on the theoretical framework of Head and Ries (1996), there are nine explanatory variables in the empirical analysis: external market potential, internal market potential, wage rates, the number of high school students, the PCI index, road density, the number of harbours, cumulative FDI capital till the end of the previous year, and cumulative FDI projects till the end of the previous year.

Market potential

The most popular proxies for market potential used in previous studies in Vietnam are GDP and GDP per capita. Unfortunately, GDP and GDP per capita themselves cannot fully measure the region's economic centrality or periphery in comparison to other adjacent regions. Therefore, I am going to employ market potential as proposed by Harris (1954), which is the sum of purchasing power in other locations, weighted by transport costs (distances). Market potential in this research is divided into two categories, namely external market potential and internal market potential.

The external market potential of each province is the distance-weighted sum of purchasing power of all the other provinces with purchasing power measured by GDP of each province.

$$MP_{ie} = \sum \frac{GDP_j}{D_{ij}} \quad (1)$$

MP_{ie} : external market potential of province i

GDP_j : GDP of province j ($j \neq i$)

D_{ij} : distance from province j to province i. Distances between provinces are collected from Google Maps. I choose the fastest way by car between two provinces suggested by Google Maps, excluding ways that cross Vietnam's neighboring countries such as Laos or Cambodia. The number of pairwise distances between 63 provinces and cities are 1953 distances.

Additionally, a province also possesses its own market potential from the purchasing power of the province itself. Here, I call it internal market potential, which is the purchasing power of that province divided by its internal distance.

$$MP_{ii} = \frac{GDP_i}{D_{ii}} \quad (2)$$

MP_{ii} : internal market potential of province i

GDP_i : GDP of province i

D_{ii} : internal distance of province i. The measurement of internal distances is based on Mayer and Head (2000).

$$D_{ii} = 2/3 \sqrt{A/\pi} \quad (3)$$

A : Area of province i

Labour

There are two variables representing labour factors. Monthly wage rate demonstrates labour cost while the number of high school students indicates both labour supply and labour quality in each province.

Policy

In order to capture the attractiveness to FDI in terms of policy, I employ the Provincial Competitiveness Index (PCI). PCI was first introduced in 2005 by the Vietnam Chamber of Commerce (VCCI) and the U.S Agency for International Development (USAID). This index

Table 1: Variables used in regression

No	Variable	Abbreviation	Number of observations	Mean	Standard deviation	Min	Max
1	Cumulative FDI capital (Trill.Vnd)	cfdi	188	55.58	113.58	0.0016	674.89
2	New FDI capital (Trill. Vnd)	nfdi	153	11.44	27.31	0	159.77
3	Cumulative FDI projects (count)	cpj	188	196.13	582.92	1	4337
4	New FDI projects (count)	npj	147	25.09	66.84	0	436
5	Average size of cumulative FDI projects (Bill.Vnd)	csz	188	727.07	1941.68	1.63	21500.22
6	Average size of new FDI projects (Bill.Vnd)	nsz	146	3304.68	14533.26	1.63	128.45
7	External market potential (Trill.Vnd)	emp	189	4.84	2.73	1.19	14.66
8	Internal market potential (Trill.Vnd)	imp	189	3.75	6.69	0.15	61.69
9	Wage rate (Thous.Vnd/month)	wage	189	499.49	334.64	105	2205
10	High school students (10000 persons)	hs	189	4.45	3.68	0.58	22.43
11	PCI index (1-100)	pci	189	56.16	6.15	36.39	72.18
12	Road density (ton/km2)	road	189	3.33	5.21	0.04	24.79
13	Number of harbours	harbour	189	3.62	8.63	0	42.00
14	Cumulative FDI capital till last year(Trill.Vnd)	cfdi1	189	48.59	109.31	0.001	666.90
15	Cumulative FDI projects till last year (count)	cpj1	189	188.14	548.24	1	3967

Source: Author's calculations

is constructed by assessing the ease of doing business, economic governance, and administrative reform efforts by the local governments of the 63 provinces and cities in Vietnam. The index ranges from 0 to 100 with higher scores implying a better business environment offered by the local authority. Thus, the PCI can be a good tool to evaluate regional governments' policies in attracting FDI.

Infrastructure

In previous research papers, several different proxies for infrastructure like electricity system, number of telephone per inhabitants and so on were used. However, my dataset is in panel form and thus I could not gather data for those proxies in every single year in my period of analysis. As a result, I use a different proxy for infrastructure. Specifically, I calculate the volume of freight by road in each province divided by the province's area to get the density of traffic per square kilometer as a proxy for infrastructure. Road density can be regarded as a measure of the quality of infrastructure because it demonstrates the transport capacity of the infrastructure system in each province. Moreover, travelling by road is the most important means of transportation in Vietnam.

As I mentioned earlier, provinces that have an infrastructure system and geographical location supporting export may attract more FDI. Thus, I use the number of maritime harbours in each province as an additional explanatory variable. This variable does not only reflect the infrastructure system of provinces but also implies their advantage in geographical location supporting export, i.e. adjacent to the sea.

Agglomeration force

In order to test if foreign investors are in fa-

Table 2: Correlation matrix

	cfdi	nfdi	cproject	nproject	csize	nsize	emp	imp	wage	hs	pci	road	harbour	cfdi1	cproject1
cfdi	1														
nfdi	0.48	1													
cproject	0.81	0.32	1												
nproject	0.76	0.33	0.95	1											
csize	0.21	0.49	-0.12	-0.12	1										
nsize	0.10	0.70	-0.07	-0.07	0.68	1									
emp	0.18	-0.12	0.19	0.14	-0.24	-0.22	1								
imp	0.73	0.23	0.90	0.91	-0.13	-0.09	0.28	1							
wage	0.67	0.09	0.66	0.59	-0.14	-0.18	0.50	0.72	1						
hs	0.61	0.32	0.65	0.73	0.04	0.01	0.03	0.70	0.39	1					
pci	0.13	-0.09	0.17	0.14	-0.19	-0.25	0.23	0.14	0.29	-0.05	1				
road	0.52	0.14	0.64	0.65	-0.17	-0.11	0.35	0.72	0.66	0.54	0.14	1			
harbour	0.59	0.35	0.44	0.43	0.02	0.03	0.03	0.50	0.51	0.34	0.08	0.42	1		
cfdi1	0.97	0.29	0.81	0.76	0.10	-0.06	0.21	0.76	0.69	0.60	0.17	0.54	0.56	1	
cproject1	0.81	0.31	1.00	0.94	-0.12	-0.07	0.19	0.89	0.67	0.64	0.17	0.63	0.46	0.82	1

Source: Author's calculations

vor of provinces where other foreign firms are located, I use two regressors: cumulative FDI capital till the end of the previous year, and the cumulative number of FDI projects till the end of the previous year. The cumulative FDI capital of the previous year will be used in equations for new FDI capital of the current year while cumulative FDI projects of the previous year will be employed in equations for new FDI projects of the current year.

In terms of data source, the PCI index is obtained from its official website³. The number of maritime harbours in each province is from a report of the Ministry of Transport of Vietnam⁴. Other variables are captured from Vietnam's Statistical Yearbooks published annually by the General Statistics Office of Vietnam (GSO).

Descriptive statistics of variables and their correlation matrix are presented in Table 1 and Table 2, respectively. According to Singh (2003), a high correlation is within [-1; -0.7] or [0.7; 1]. Thus, from the correlation matrix in Table 2, high correlations are seen between imp and several variables (wage, hs, pci, cfdi1, and cproject1). In the methodology section, I will explain why these high correlations do not affect my final results and conclusions.

5. Methodology

The model of analysis is as follows:

$$FDI_{it} = \beta_0 + \beta_1 X_{it} + \varepsilon_{it}$$

FDI_{it} are provincial FDI of province i at time t . The six dependent variables are: cumulative FDI capital, new FDI capital, cumulative FDI projects, new FDI projects, average size of cumulative FDI projects, and average size of new FDI projects.

X_{it} is the vector of nine regressors of province i at time t .

ε_{it} is the error term.

For the dependent variables related to capital, including cumulative FDI capital, new FDI capital, average size of cumulative FDI projects, and average size of new FDI projects, I simply run linear regression models for panel data.

For numbers of FDI projects (cumulative and new projects), which are count variables, there are two models usually employed, namely the Poisson model and the negative binomial model. These models have been widely applied to study the regional determinants of foreign firms in developed as well as in developing and transition economies. The following are main aspects of the Poisson model and the negative binomial model, derived from the summary of Cieslik (2013).

In the Poisson model, the number of projects y_i in i region is drawn from a Poisson distribution with the parameter λ_i related to the vector of regressors x_i . Thus, the probability of observing a count of projects y_i is:

$$\Pr(y_i | x_i) = \frac{e^{-\lambda_i} \lambda_i^{y_i}}{y_i!}, y_i = 0, 1, 2, \dots, N \quad (5)$$

The first assumption is that λ_i is log-linearly dependent on the vector of explanatory variables x_i which represents regional characteristics:

$$\ln \lambda_i = \beta' x_i \quad (6)$$

and β is a vector of coefficients on independent variables that needs to be estimated.

The key assumption of the Poisson model

is that:

$$E[y_i | x_i] = \text{var}[y_i | x_i] = \lambda_i \quad (7)$$

This assumption is regarded as a major limitation of the Poisson model as count data often exhibit overdispersion with the conditional variance larger than the mean. To solve this problem, the most popular alternative is the negative binomial model of Cameron and Trivedi (1986). This is a generalized version of the Poisson model. The negative binomial model introduces an individual unobserved effect ε_i into the conditional mean:

$$\ln \lambda_i = \beta' x_i + \varepsilon_i \quad (8)$$

where ε_i can be interpreted as either a specification error or some cross-sectional heterogeneity with $\exp(\varepsilon_i)$ having a gamma distribution with unit mean and variant α .

The expected value of y_i in the negative binomial model is exactly the same as in the Poisson model, however the variance exceeds the mean:

$$\text{var}[y_i | x_i] = E[y_i | x_i] \{1 + \alpha E[y_i | x_i]\} \quad (9)$$

The negative binomial model reduces to the simple Poisson model when the estimated parameter α is not statistically different from zero.

In this study, the negative binomial model is employed. Although the Poisson model can be applied, it may suffer from the aforementioned overdispersion problem. Meyer and Nguyen (2005) tested and detected this problem in their research on FDI location in Vietnam, and thus they also turned to negative binomial regression.

The Hausman test is conducted to choose between random-effects (RE) and fixed-effects (FE) in all regression equations. However, it is

important to note that among nine regressors, there is a one time-invariant variable during the period of analysis, i.e. the number of maritime harbours in each province. If I include this variable at the beginning, a fixed-effects models cannot be employed in any equation as fixed-effects estimation does not allow time-invariant variables. Therefore, the steps of regression in my research are as follows. At the beginning, the number of harbours is not included in all equations. Then, if the Hausman test shows that RE estimators are consistent and effective in comparison to FE estimators, I will include this variable in RE estimation. In contrast, if Hausman test results prefer FE estimators, this variable will not be taken into account in that equation.

Furthermore, in order to check whether high correlations between several variables (see Table 2) significantly affect the final results, I have run equations without *imp* variable. Fortunately, the signs and significance level of other variables almost did not change.

6. Estimation results and discussion

Table 3 presents estimation results for the determinants of FDI distribution across provinces in Vietnam. With 63 provinces in 3 years, the highest number of observations for each equation would be 189. However, data on FDI were missed in some years in several remote provinces such as Cao Bang, Bac Can, Dien Bien, Kon Tum, and Lai Chau. Consequently, the numbers of observations of FDI-related variables are all lower than 189, which is shown both in Table 1 and Table 3. Also, regression results of new FDI projects and of new FDI capital end up with a lower number of observations and a lower number of groups as

there are more missing data on new FDI than on cumulative FDI.

At first glance, it is noticeable that equation V on the average size of cumulative FDI projects is not statistically significant because P-value for regression as a whole ($P > \chi^2$) in this model is 0.6232 (>10%). This means we cannot reject the null hypothesis stating that all coefficients of regressors are together equal to zero. In other words, seven independent variables in this equation are jointly statistically insignificant. Consequently, I skip the results of equation V in the discussion. Other models are statistically significant because their P-values for regression as a whole are all equal to zero. A number of factors are identified as important determinants of FDI location and the size of new FDI projects.

Market potential

As we can see from Table 3, external market potential statistically has a positive impact on both new FDI capital and number of FDI projects at a high significance level. Provinces and cities with higher external market potential attract more FDI projects and FDI capital. Moreover, those provinces also attract bigger FDI projects as we can see from equation VI: external market potential is positively related to the size of new FDI projects at a 5% significance level. Therefore, new and big foreign investors are in favour of provinces with higher external market potential or in other words with easier access to other large markets. This may help to save transportation costs for firms.

Interestingly, internal market potential has a positive effect on accumulation of FDI capital (1% significance level) but the opposite is seen on the number of new projects (also at a 1%

significance level). Thus, provinces with higher internal market potential have a larger total amount of cumulative FDI capital but they do not attract new foreign investors.

Several previous empirical studies have used GDP and GDP capital to measure market potential or market size and just simply found those variables had statistically significant positive effects on regional FDI allocation in Vietnam (Pham, 2002; Nguyen, 2006; Nguyen and Nguyen, 2007; Anwar and Nguyen, 2010; Hoang and Goujon, 2014). By using market potential variables first introduced by Harris (1954), my empirical results reveal that new FDI inflows to Vietnam have a tendency towards provinces with higher external market potential but lower internal market potential.

Labour factors

First, production cost measured by wage rate has a negative impact on new FDI capital at a 5% significance level while it has a positive impact on cumulative FDI capital at a 1% significance level. Therefore, provinces with a higher wage rate have a higher accumulation of FDI but do not attract new foreign investors. By contrast, the lower the wage rate a province has, the more new FDI accrues to that province. The result corresponds to the fact that areas with higher FDI accumulation such as Hanoi, Hai Phong, and Ho Chi Minh usually have higher wage rates than the others. Interestingly, equation VI shows that wage rate is negatively related to the size of new FDI projects at a 1% significance level. Thus, the tendency is that large new foreign investors are in favor of provinces with lower wage rates. Generally speaking, my regression results show that wage rate regarded as production cost has a negative

impact on new FDI in terms of both total capital and the size of projects.

The negative relationship between labour cost and regional FDI inflows in Vietnam was also found in the studies of Nguyen (2006) and Anwar and Nguyen (2010), but the opposite was seen in the findings of Nguyen and Nguyen (2007) and Hoang and Goujon (2014). Nguyen and Nguyen (2007) used the same variable, monthly wage rate, and focused on only one year before the global financial crisis (2006). Another important difference is the fact that their data was cross-sectional with only 63 observations while my study employs a panel data which takes into account the dynamics of variables over time. Besides, Hoang and Goujon (2014) analysed two separate periods with cross-sectional data, 2001-2006 and 2007-2010. They found that labour cost was positively related to FDI flows. However, labour cost in their study was represented by a different proxy which was the annual income per employee in the firm sector in each province. This proxy could be an indicator for labour productivity, and thus its coefficient was positive in all of their equations. Thus, the different results on wage rates in my study compared to these studies can be attributed to different periods of analysis, methodology, sample size, and variable choices.

Another striking result is the number of high school students. Coefficients of this variable are positive and highly significant in equations on cumulative FDI capital and number of FDI projects. This reveals that the availability of educated labourers has a positive impact on provincial FDI inflows. This result is consistent with previous studies on the role of human

capital in FDI distribution, although a number of different proxies were used such as the number of secondary school pupils per capita (Pham, 2002), the average number of university and college enrolments (Anwar and Nguyen, 2010), and etc.

Policy

Regarding provincial competitiveness, a significant positive relationship is seen between the PCI and the number of new FDI projects. However, the PCI negatively affects new FDI capital and the size of new FDI projects. Thus, it seems to be that provinces with higher PCI receive a higher number of FDI projects but a smaller amount of capital as well as smaller size FDI projects. It would be more reasonable if high PCI encouraged more foreign capital and big projects because it reflects the ease of doing business, economic governance, and administrative reform efforts by local governments. I also attempted to run regression with the PCI rank instead of the PCI index as provinces compete for foreign investment. The results, however, still show some negative influence of the PCI on provincial FDI. Thus, I only present results with the PCI index here.

Nguyen and Nguyen (2007) also used this index for the policy factor, and the index was statistically insignificant in all models in their analysis. They concluded that either this index was not an ideal measure of local governance or it did not influence provincial FDI. From my empirical results, the concern of PCI measurement still exists because higher PCI provinces receive less new FDI capital and smaller new projects.

Infrastructure

When it comes to infrastructure, the estimat-

ed coefficients of road density are positive and statistically significant in equation IV on the number of new FDI projects with a 1% significance level. Provinces with higher road density receive more new FDI projects than the others. Additionally, coefficients of the number of harbours are statistically significant at a 1% level in equations of cumulative FDI in terms of both capital and projects (equations I and III). These results confirm the important role of infrastructure in attracting new FDI. They also reveal that provinces that are adjacent to the sea attract more FDI as their geographical locations are convenient for maritime exports.

My results on infrastructure reinforce the findings of previous studies even though different factors were used for infrastructure, such as the average number of telephones (Pham, 2002; Nguyen, 2006), the number of industrial zones (Mayer and Nguyen, 2005, Nguyen and Nguyen, 2007), the percentage of paved roads in each province (Hoang and Goujon, 2014).

Agglomeration force

As is clearly seen from Table 3, cumulative FDI capital till the end of the previous year has a strongly negative impact on total new FDI in the current year. In contrast, the number of new FDI projects is positively related to the cumulative number of FDI projects of the previous year at a 1% significance level.

According to the self-reinforcing FDI model of Head and Ries (1996), foreign firms prefer cities where other foreign firms are already located. This may not be the case in Vietnam. Specifically, the results on market potential reveal that new foreign investors are in favor of provinces with higher external market potential and lower internal market potential. Mean-

Table 3: Estimation results

No	Explanatory variables	Expected signs	Amount of FDI capital		Number of FDI projects		Average size of FDI projects	
			Cumulative		Cumulative		Cumulative	
			RE (I)	FE (II)	Negative Binomial RE (III)	Negative Binomial RE (IV)	RE (V)	FE (VI)
1	External market potential	+	-1.700 (2.209)	3.442* (1.960)	0.057*** (0.015)	0.070** (0.032)	0.009 (0.053)	2.961** (1.520)
2	Internal market potential	+	4.923*** (1.364)	1.640 (1.238)	0.002 (0.005)	-0.059*** (0.018)	-0.009 (0.033)	1.269 (0.932)
3	Wage	-	0.069*** (0.022)	-0.036** (0.010)	-0.0001 (0.0001)	-0.0002 (0.0003)	0.0001 (0.0005)	-0.040*** (0.015)
4	High school students	+	6.996*** (2.457)	0.632 (5.741)	0.039* (0.021)	0.112*** (0.027)	0.039 (0.053)	4.131 (4.523)
5	PCI	+	-0.680 (0.519)	-1.394*** (0.491)	-0.003 (0.005)	0.040*** (0.012)	-0.025 (0.013)	-1.161*** (0.403)
6	Road density	+	-0.634 (1.781)	3.040 (2.000)	0.010 (0.011)	0.090*** (0.019)	-0.035 (0.021)	0.439 (1.583)
7	Harbour	+	3.920*** (1.029)		0.067*** (0.018)	0.002 (0.011)	0.014 (0.021)	
8	Previous cumulative FDI capital	+		-0.354*** (0.046)				
9	Previous cumulative FDI projects	+				0.0008*** (0.0002)		
	Constant		6.304 (31.189)	91.251* (46.682)	3.484*** (0.412)	-1.778** (0.758)	1.902 (0.791)	48.469 (38.201)
	R-square		0.67	0.04	N/A	N/A	0.04	0.003
	No.of observations		188	153	188	147	188	147
	No.of groups		63	59	63	57	63	57
	Prob>ch2		0.000	0.000	0.000	0.000	0.6232	0.000

Notes: (*), (**), (***) indicate significance level at 10%, 5%, and 1%, respectively;
 FE: Fixed Effects; RE: Random Effects; N/A: Not Applicable
 Source: Author's calculations

while, provinces with lower internal market potential also have a lower level of FDI accumulation. Moreover, there are more new projects in the provinces with a higher cumulative number of FDI projects in previous year, but the total amount of capita is in the opposite direction. In other words, the influx of new foreign capital has a strong tendency towards provinces with a lower level of capital accumulation. All these results show a good signal for the pattern of uneven FDI distribution in Vietnam because the trend of more FDI towards provinces with less FDI concentration will contribute actively to reduce the development gap between regions in Vietnam. The empirical results also suggest that FDI in Vietnam is efficiency-seeking because foreign investors seek low transportation cost within the country, high quality labour, low wage rate, infrastructure quality, and policy attractiveness.⁵

7. Conclusion and policy implications

By analyzing a panel dataset of 63 provinces and cities in Vietnam from 2008 to 2012, this paper empirically analyzes the significant effect of market potential, labour, infrastructure, FDI concentration, and provincial policy attractiveness in FDI allocation between provinces and cities in Vietnam. The main findings are as follows.

First, FDI is attracted by high external market potential, a low wage rate, high quality and availability of human capital, and a better infrastructure system. These are important agglomeration forces affecting FDI location in Vietnam.

Second, wage rate and external market potential influence the size of FDI projects. To be clearer, provinces with either lower wage rate

or higher external market potential are likely to receive bigger FDI projects.

Third, FDI in Vietnam seems to create a dispersion force to new FDI because new FDI capital accrues more to provinces with higher external market potential and lower capital accumulation than to provinces with high internal market potential and high cumulative FDI.

Fourth, empirical results suggest that FDI in Vietnam is in the form of efficiency-seeking FDI.

Fifth, in line with the conclusion of Nguyen and Nguyen (2007), this study also reveals that PCI measurement needs more attention because some empirical results on the PCI are not consistent with expectations on the index value.

From a policy perspective, in order to increase FDI inflows into Vietnam in general and decrease the unequal allocation of FDI flows between provinces in particular, it is necessary to invest in locational determinants of FDI. Even though Vietnam has the advantage of a low wage rate compared to other countries in the region, facts have shown that the wage rate in Vietnam has risen continuously in recent years. Thus, low wages are not a long-term condition to attract FDI. Instead, each province needs to impose effective policies to improve employees' education and skills. Investing in human capital is crucial to attract FDI in the long-term. Plus, the location decisions of foreign firms are effected by locational authorities' policies. Developing and maintaining a friendly business environment, a sound administrative procedure, and a modern infrastructure system will contribute significantly to FDI inflows to each province. Furthermore, poor

areas such as Northern midlands and mountain areas and Central Highlands are disadvantageous in attracting FDI because of their low purchasing power (GDP) and remote geographical position, which leads to their low external and internal market potential. Therefore, in order to attract FDI to those provinces, it is essential to invest in their infrastructure system

and impose more specific incentive policies to support poor provinces in those regions. This, in turn, will contribute to improve their income, living standard and thus market potential. The investment in human capital and the spending on infrastructure would be optimal strategies to attract FDI to all regions of the country.

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Notes:

1. <http://www.atkearney.com/research-studies/foreign-direct-investment-confidence-index>, accessed on 15th, October, 2014.
2. <http://data.worldbank.org/indicator/PA.NUS.FCRF> , accessed on 20th November, 2014.
3. <http://eng.pcvietnam.org/>, accessed on 10th, November, 2014.
4. Report No.1433/QĐ-BGTVT, “Danh mục bến cảng thuộc các cảng biển Việt Nam” (List of harbours belonging to Vietnamese sea ports), published on 21st April, 2014.
5. According to UNCTAD (1998), FDI is in the form of efficiency-seeking FDI when foreign firms seek low cost of resources and assets in the host country such as raw materials, low-cost unskilled labour, skilled labour, technological and other created assets and physical infrastructure. Additionally, firms also take into account other factors including other input costs (transport and communication costs to-and within the host economy and costs of other intermediate products), membership of a regional integration agreement beneficial to the establishment of regional corporate networks.

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