

Identify Factors Affecting Foreign Direct Investment Capital In The Southern Key Economic Region

Tran Thi Kim Dao^{1,2,*}, Nguyen Van Luan²

ABSTRACT

This paper focuses on building research model and analyzing the main factors influencing foreign direct investment (FDI) attraction in the Southern Key Economic Region during the period of 2005 - 2016. Based on theories and empirical studies, the authors identified the key factors that affect FDI attraction in that area. Through the development of hypotheses, a quantitative research model with Stata software help ed to select an estimation method with reliable and effective test results. The selected research method was the estimation method according to 3 approaches: OLS (P OOLED Regress Model) the least estimation method, Fix Effect Model (FEM), and Random Effect Model (REM). The research model used was the Panel Data model. The author performed the test hypotheses for the factors affecting FDI attraction in the Southern Key Economic Region. After regression with 3 methods (POOLED, FEM, and REM), and using F-Test and Breusch Pagan Test, the aim was to estimate the efficiency of the model and consider the simultaneous effects of independent variables on the dependent variable. These include d the following factors: market size, infrastructure, labor force, quality of human resources, market openness, trade openness, and institutional quality. Examining the relationship between market size, infrastructure development, labor force, quality of human resources, trade openness and institutional quality of FDI attraction into the Southern Key Economic Region, the authors select ed the Pooled Regression Model. The results of this paper may partly help policymakers to have an overall vision and may contribute to the development of appropriate solutions and strategies to attract and effectively use foreign direct investment capital to promote the socio-economic development of the region. Furthermore, the findings may contribute to guidelines to attract and make better use of these funds in the future, better serving the economic development of this region.

Key words: Capital, Foreign direct investment capital, Influencing factors, Region, Southern Key Economic Region

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INTRODUCTION

The Southern Key Economic Region is a special area in Vietnam which has an important role in the socio-economic development of the country. This region consists of 8 provinces and central cities: Ho Chi Minh City, Binh Phuoc, Tay Ninh, Binh Duong, Dong Nai, Ba Ria - Vung Tau, Long An, and Tien Giang. The total natural area of the region is 30,523.8 km², with a total population of 19.7 million in 2016¹. The region converges most of the prevailing conditions and advantages to developing industries and services, leading in industrialization and modernization. The region specializes in developing hi-tech industries, electronics, informatics, petroleum and petrochemical industries, high-end services, tourism services, telecommunications services, finance and banking, research, application and implementation of science and technology, and training of highly qualified human resources.

Foreign Direct Investment (FDI) plays an increasingly important role and is a key factor in the development of the economies of countries, especially developing countries. The attraction of FDI in the region continues to rapidly change and attract many projects, such as in Ho Chi Minh City, Binh Duong, and Dong Nai. However, there are also many limitations and perspectives in attracting FDI for economic development, which has always been considered as strategic issues. Given the important role of FDI, the competition in attracting investment capital for socio-economic development in the region (and localities) is unavoidable. Therefore, the identification of key factors affecting the attraction of FDI in the Southern Key Economic Region is important and urgent. Starting from these objectives and requirements, we selected the topic “Factors affecting foreign direct investment capital in the Southern Key Economic Region” to clarify research issues.

The main objective of this paper is to develop a research model to analyze the key factors affecting the

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attraction of foreign direct investment in the Southern Key Economic Region. After the introduction, the content of the article is structured into 3 parts: Theoretical basis, Hypothesis and Methods, and Research Methodology; Results; and Conclusion.

THEORETICAL BASIS, HYPOTHESIS & METHODS, AND RESEARCH METHODOLOGY

Theoretical basis and literature review

Theoretical basis

Theories of attracting foreign direct investment are mainly proposed by observing the foreign investment process of US companies, Japanese companies, and multinational companies from other developed countries since the end of World War II, as well as the emergence of multinational companies in developing countries in recent years. In essence, theories set out try to answer the following questions:

First: Why do businesses choose to move their operations to another country? *Second:* Why do they choose to do this instead of exporting or licensing? *Finally:* Why do they choose this location in an area ?

International Trade Theory

The first theoretical model to explain foreign investment based on international trade theory is the Heckscher-Ohlin model, developed by Heckscher (1919)² and Bertil Ohlin (1933)³. According to Lancaster (1957)⁴, "the first Heckscher-Ohlin model provided an appropriate analysis of market factors into international trade theory"⁴. This is an overall equilibrium model that determines the comparative advantages of the country. The model is used to predict what product a country will produce on the basis of available factors of the country's production. The model concludes that the country should export products that require intensive inputs and import products with less intensive input s; this conclusion is called the Theorem of Heckscher -Ohlin.

The Theory of Firm-Specific Ownership Advantages

This theory was initiated by Hymer (1960)⁵, which built an independent theory that explained the tendency for foreign investment⁵. Hymer's view comes from the industrial economies, which asserted that a company wants to overcome international barriers and participate in the production process when it has the exclusive advantages. Relying on these advantages will help the company reduce its operating costs and increase revenue, compared to other local companies.

The exclusive advantages can be technology or trademark. Therefore, Hymer observed that FDI is conducted when a company owns a monopoly advantage over its competitors in an industry, allowing companies to easily enter the market in other countries.

Product Life Cycle Theory

This theory was introduced by Hirsch in 1965, and explained both international investment and international trade. It considers international investment as a natural stage in the product life cycle⁶. The advantage of this theory is that is a variety of factors can account for the change in that sector or the transition of industrial activities of the pioneering countries in that technology, from the "early imitation" countries to the "late imitation" countries. According to this theory, the most original new products manufactured in the country where it was invented will be exported to other countries. The result is that most likely that product will be "imitated" (modified) and then exported back to the country from which it was invented.

Internalization Theory

Internalization Theory was proposed by Buckley and Casson⁷ in 1976, based on the theory of Coase (1937)⁸. According to this theory, Internal Transaction (IT) is better than outside Market Transaction (MT). IT is better than MT when the market is not perfect, such as from natural imperfections (*e.g.* the gap between countries can increase transportation costs), and structural imperfections (*e.g.* trade barriers like product standards, environment, requirements related to intellectual property rights, technology, *etc.*). When the market is not perfect like that, the company must create its own market by creating an Internal Market, with use of resources within the parent company (leading to subsidiaries). However, this theory does not explain the benefits of internalization. Also, it is very general, does not provide specific evidence, and is difficult to verify.

Eclectic Paradigm Theory (OLI)

This is a well-constructed model by Dunning (1977, 1979, 1981, 1988, 1996, 1998, 2000, 2001). This model has synthesized the main elements of many previous studies to explain FDI. According to Dunning, a company should conduct foreign investment with companies with OLI advantages - that is, Ownership Advantage, Location Advantage, and Internalization Incentives.

In particular, Dunning argues that companies have an ownership advantage (O) of competitive elements

in the production process compared to their foreign counterparts, in areas such as patents, new technologies, brands, or management capabilities. As such, they should maintain their own advantage rather than selling or licensing the use of that advantage to other companies. Companies with an internal advantage (I) (as discussed by Buckley and Casson) may find it dangerous when signing contracts with companies in foreign markets; it could lead to disclosure of specific ownership advantages for companies in foreign markets, and thus existing joint ventures could be potential competitors in the future.

In addition to the ownership advantage and internal advantage, Dunning adds a model of location advantage (L). In particular, the O and I advantages reflect the advantage of the multinational companies because it is outside the control of the attracting country. On the other hand, the L advantage is the basis for government interventions in the improvement of investment environments in order to increase the attractiveness of FDI^{9,10}.

In summary, the OLI model emphasizes that a companies should invest abroad when they have the advantage of ownership, need to internalize the company, and can obtain benefits from abroad. Therefore, Dunning's OLI model provides the most comprehensive framework for explaining FDI, in which it focuses on resolving satisfactorily the 3 questions (why, how, and where) for foreign investment activities of multinational companies: "Why invest abroad?"; "How can companies choose FDI instead of other forms?"; and "Where is the investment located?"

The Theory of Accumulation Effect

Accumulation refers to the concentration of economic activity that generates positive economies of scale and externalities. Krugman (1991)¹¹ argues that companies will benefit from other businesses in the same industry located in nearby locations by the combination of production scale and transport costs. This will encourage consumers and intermediary input providers to clump closer together. Accumulation will help reduce overall transportation costs, cut down on production centers, and lead to more diversified suppliers. This will encourage businesses in the same industry to concentrate in a designated location¹¹.

Theory refers to the elements of traditional economic advantage

The foundations of this theory are found in relation to the traditional economic advantages. These include factors such as market size, human resource

quality, and infrastructure, which may affect the motivation and investment efficiency of multinational corporations. In Dunning's OLI theoretical model, the factors affected the choice of location of FDI. Almost all economic factors are often found to have impact on attracting FDI at the local level; this was observed in studies in the United States by Coughlin *et al.* (1991)¹² and Head *et al.* (1995)¹³⁻¹⁵, and in studies from China by Chen, Chunlai (1997)¹⁵.

Theory regarding institutional factors

The role of institutional factors can reduce transaction costs and information costs by reducing uncertainty, establishing stability, and facilitating cooperation¹⁶. Government regulations, as well as quality of economic governance of local governments, are seen as economic foundations that affect the company's strategies¹⁷ and their business performance. On the basis of a theoretical overview, there is a set of independent variables that affect FDI, depending on the space and time to analyze and assess. This is an important theoretical basis for building models to study the factors that influence the spatial distribution of FDI among local regions.

Research Overview

Research by Nguyen Ngoc Anh and Nguyen Thang (2007)¹⁸, entitled "FDI attraction in Vietnam: An overview and analysis of the determinants of the distribution of capital by provinces", demonstrated that market factors, labor factors, and infrastructure factors all influence the attraction of FDI among localities¹⁸.

Research by Nguyen Manh Toan (2010)¹⁹ - "Factors influencing foreign direct investment (FDI) attraction in a locality of Vietnam" : Using statistical methods and descriptive research, this study concluded that technical infrastructure development is the most important factor, followed by investment incentives granted by the local government as well as by the central government, and low operating costs. The least important factor is the potential market, while the factors that do not affect the decision to choose the location of the investor are geographic location and social infrastructure²⁰.

In another study, by Gueorguiev & Malesky (2012)²⁰ - "Foreign investment and bribery: A firm-level analysis of corruption in Vietnam" : The study evaluated the impact of FDI on the level of corruption and institutional quality improvement in Vietnam. The results from Gueorguiev's & Malesky's study showed evidence of corruption in the registration procedures

and contracting in Vietnam. However, there is no link between corruption and FDI inflows²⁰.

Research by Wanda Tseng & Harm Zebregs (2002)- *Foreign investment in China: Some Lessons for other countries* : In this study, important factors influencing FDI attraction were found to be: market, labor force, quality of facilities, and government policy. The authors identified the role of FDI for economic growth, creating jobs, and boosting exports²¹. Regarding market structure, the study found that attracting capital from potential markets will have a huge impact on the GDP growth of the economy. Supply of cheap labor also plays an important role in attracting FDI. However, the quality of human resources in needs to be considered; as well, China needs to the high quality human resources to improve and produce more value. The more infrastructure present, e.g. a transport system in the country, the more attraction for FDI.

Study by Matthew A. Cole, Robert J.R. Elliott, Jing Zhang (2009)²² - *Corruption, Governance and FDI location in China: A province-level analysis* : The study examined the determinants of FDI inflows, in which corruption and governance policies have a significant impact on attracting FDI inflows to provinces in China²². The authors also mention the determinants of provincial FDI in China through differences in income, labor force and labor quality, infrastructure, concentration economies, population, and environmental regulations. The results show that foreign capital is attracted where the government has made great efforts to fight corruption and that local governments are considered more effective.

Study by Kangning Xu, Xiuyan Liu, Bin Qiu (2007)- *Spatial Determinants of Inward FDI in China: Evidence from Provinces (Preliminary)* : This study showed that foreign direct investment (FDI) is an important driving force for China's economic growth²³. Use of data areas at the provincial level in China during the period of 1998-2007, and estimation results indicated that labor costs are an important factor for decision-making in FDI selection. However, the quality of labor also plays an increasingly important role in attracting FDI from the United States and European countries to China.

Study by Li Xinzhong (2005)- *Foreign Direct Investment Inflows in China: Determinants at Location* : Based on the local data sets of China & using the quantitative model, the study came to the conclusion that accumulated FDI, market size, economic development, free trade, and labor costs are the most important factors of the investment environment which

have a positive impact on the choice of location of investors²⁴.

Study by Chen, Chunlai (1997)- *The Location Determinants of Foreign Direct Investment in the Developing Countries* : This study assessed the impact of FDI determinants in 29 regions in China during 1985-1995¹⁵. The authors identified China as one of the largest markets in the world, with good infrastructure, and observed that preferential policies have a positive impact on FDI attraction. However, high wage costs have negative impact on FDI. The effect of education is good but not statistically significant to the decision of foreign investors.

Study by Ropingi, Mohammad Basir Saud, Mustakim Melan (2012)- *Foreign direct investment in Java Island, Indonesia* : This study identified key factors affecting the attraction of FDI inflows into Java²⁵. The research showed that productivity, state minimum wage, population, and inflation are key factors attracting FDI flows to the Java Island.

In the most recent study of Hong Hiep Hoang (2012)²⁶ - *Foreign direct investment in southeast Asia: Determinants and spatial distribution* : The author analyzed the determinants of FDI inflows to Southeast Asian countries for the period of 1991-2009, in addition to factors such as market size, openness of the economy, quality of infrastructure, human capital, labor productivity, exchange rate policy, interest rates, political risks, and institutional quality (all which affect the flow of foreign capital)²⁶. Surprisingly, cheap labor does not attract foreign capital inflows into the region because foreign investors are particularly concerned about labor productivity.

In addition, there are also a number of other studies related to the measurement of the impact of factors that affect the attraction of FDI at the local, national, and regional areas (**Table 1**).

Thus, previous studies inside and outside the country have demonstrated that there are many factors that impact attracting foreign investment in developing countries. The following are the main factors: macroeconomic stability, scale and potential of the market, infrastructure, abundant labor force, quality of human resources, cheap labor costs, openness of the market, trade openness, and quality of institution. The localities showing best quality or improvement of these factors will meet the needs of foreign investors, and will be the basis for further facilitation and expansion of the attraction of FDI capital in those areas.

Assumption and Research Model

From the theoretical background of Dunning's OLI model and from summarizing results from the experimental studies, the factors affecting FDI in a country

Table 1: Synthesize studies related to the identification of factors affecting the attraction of fdi by countries and regions

STT	Author & Year	Nation	Factors affecting FDI
1	Nguyen Ngoc Anh, Nguyen Thang (2007) ¹⁸	Viet Nam	Market; labor; infrastructure
2	Nguyen Manh Toan (2010) ¹⁹	Viet Nam	Investment incentives of local and central government; operating costs; potential market; geographic location and social infrastructure
3	Gueorguiev and Malesky (2012) ²⁰	Viet Nam	Corruption - institutional quality
4	Wanda Tseng and Harm Zebregs (2002) ²¹	China	Market; labor costs; quality of facilities and government policy
	Matthew A. Cole, Robert J.R. Elliott, Jing Zhang (2009) ²²	China	Corruption, local governance policy, human resources, labor costs, infrastructure
5	Kangning Xu, Xiuyan Liu, Bin Qiu (2007) ²³	China	Labor quality, labor cost, labor force
6	Li, Xinzhong (2005) ²⁴	China	Market size; the level of economic development; free trade; and labor costs
	Chen, Chunlai (2000) ¹⁵	China	Market, infrastructure, preferential policies, labor costs, education
7	Ropingi, Mohammad Basir Saud, Mustakim Melan (2012) ²⁵	Java Island, Indonesia	Productivity; the minimum wage of the state; population; inflationary
8	Coughlin <i>et al.</i> (1991) ¹²	American	Labor market; average per capita income; State land; tax; traffic net; salary
9	Fan and Dickie (2000) ²⁷	Asian	Infrastructure; human resources; skilled labor; macroeconomic conditions
10	Mody and Srinivasan (1998) ²⁸	American/ Japan	Labor quality; abundant labor force and labor costs; infrastructure, national risks; inflationary.

(Source: Author synthesis, 2018)

ultimately include: size of the market, infrastructure, abundant labor force, quality of human resources, trade openness, market openness, and quality of institution.

First, assumptions relating to factor of market size

Market size is a key driver for investors in the search for new markets^{21,23,24,27,28}. Chen & Chunlai (2000)¹⁵ have determined that market size has a positive impact on attracting FDI, using annual GDP data at current prices to measure market size with data collected from the Statistical Yearbook from 2005-2016. From this, the author used GDP as a derivative for market size variables in assessing the factors attracting FDI inflows to key economic regions²³. The larger the market size of a particular sector, the more FDI was attracted (relative to other factors that did not change).

H1: The choice of investment in a country/ region/ locality is related to the size of the market. In particular, keeping the other variables constant, the larger the market size, the more attracti on into the region (+)

Second, the infrastructure

Infrastructure has a very important influence on the flow of FDI into a country/ province. According to Chen & Chunlai (2000)¹⁵, Fan & Dickie (2000)²⁷, Mody & Srinivasan (1998)²⁸, and Campos & Kinoshita (2003)²⁹ a good infrastructure is a necessary condition for investors to operate successfully^{15,29-32}. To measure this control variable, there are many ways including : energy use per capita, telephone line, railway density, air transport, cargo per million km, the number of paved roads, and port infrastructure. Based on the Vietnamese practice and limited data collection, the researcher can use variables related to

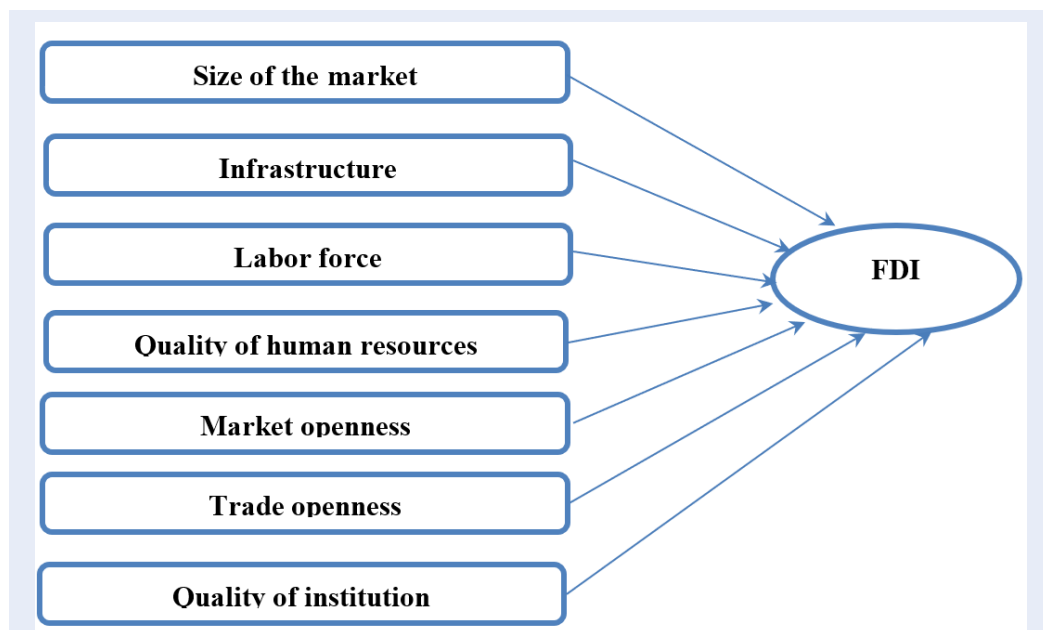


Figure 1: Research model.

the quantity of goods transported on land, river, sea, and air routes to reflect the conditions of transportation inside and outside the region. When infrastructure aims towards higher quality, development will increase the potential efficiency of the investment, thereby stimulating FDI inflows into the host country.

H2: Increasing infrastructure improvement will encourage FDI enterprises to invest in these localities.

Third, the workforce

FDI flows mainly from industrialized countries to new industrialized countries, so the demand for human resources in the host country is very important. To maximize return on capital, foreign investors often target the advantage of the investment country with the input of advantage elements (in comparison with other investment countries or host countries). With abundant human resources and low cost, skilled workers will increase productivity and reduce production costs, which should be factors to attract foreign investors^{30,31}.

H3: Abundant labor resources are dominant and have a positive impact for attracting FDI (+).

Fourth, the quality of human resources

Human resources are a concern and key element for investors when deciding to conduct investment activities. Therefore, human resources are considered

to be factors that influence local attractiveness to investors and competitiveness of localities. It also affects the quality and efficiency of production and business activities of enterprises. In addition, high quality human resources are a prerequisite for attracting investors, enabling them to quickly implement projects. This article uses data primarily from the aggregation of literacy rate of 15-year olds and above, which is the representative of education to improve the quality of the labor force. Moreover, the studies of Mody & Srinivasan (1998)³², Lu Ming Hong (2000)³³, Akinlo (2004)³⁴, Chen & Chunlai (2000)¹⁵, & Fan & Dickie (2000) have all concluded that the quality of labor force has a positive impact on FDI attraction^{15,29-31,33,34}.

H4: Improved human resource quality is a factor influencing local attractiveness for FDI investors (+).

Fifth, the degree of openness of the market

It is easy to see that for foreign investors could be impacted not only by a poor investment environment but high state ownership. Thus, market openness or the level of state ownership has a negative impact on attracting FDI. Li, Xinzhong (2005) recognized that there is a significant relationship between the degree of openness, as a percentage of state-owned enterprises (SOEs), with FDI [29; 4]. The measure of market openness by the number of SOEs were compared to all other types of enterprises.

H5: High levels of state-owned enterprises have a negative impact on attracting FDI (-).

Sixth, trade openness

Trade openness facilitates interaction with the world economy, including the flow of FDI. Numerous empirical studies confirm the important role of trade openness in attracting FDI¹⁵. The level of openness is an indicator of how easy it is to enter the market; a higher degree of openness is often associated with larger markets and it is also a complementary element to the goods and services produced by local companies. The proportion of commercial value exchange outside compared to GDP (open) is a variable used to reflect the market search engine dynamics of FDI enterprises in the Southern Key Economic Region²³.

H6: A higher the trade-to-external value and higher degree of openness are generally associated with the market, and are good conditions for attracting FDI (+).

Seventh, quality of institution

In recent years, the impact of FDI to economic growth has led to enormous changes in perceptions in many countries regarding important capital flows. Most governments have changed their policy of attracting or investing, such as improving the legal framework and preventing corruption; Vietnam has followed this same trend. Enterprises in investment and production processes always desire to cut costs to improve operational efficiency. Therefore, these changes will help businesses reduce a lot of costs incurred, especially with unofficial fees. Institutional quality factors can affect the efficiency of the investment, thereby influencing FDI inflows^{21,22,35,36}.

H7: Higher institutional quality creates a more conducive business environment that attracts more FDI (+).

Research methods and data

Data

Data related to FDI dependent variables and independent variables are collected by the author, calculated mainly from statistical data of Vietnam Statistical Yearbook and localities in the period from 2005-2016. In addition, the quality of the institutional variables are demonstrated by the 10 provincial competitiveness index (PCI) at the website of Vietnam Chamber of Commerce and Industry (VCCI). This index is ranked from 0 to 100 (with 0 as the lowest rating and 100 as the highest rating), and includes:

- 1) The cost of market entry;
- 2) easy access to land and a stable business area;

- 3) The business environment is transparent; enterprises have equal access to necessary information for business and legal documents;
- 4) Time now have to spend to implement administrative procedures and inspectors examine limitations (time costs);
- 5) Unofficial fees at a minimum;
- 6) Equal competition - New ingredient index;
- 7) Active and proactive provincial leaders;
- 8) Business support services, provided by the public and private sectors;
- 9) Good labor training policies; and
- 10) The legal and judicial system for the settlement of disputes fairly and effectively³⁷.

Variable Measurement

Dependent variable (FDI)

The dependent variable used for the model analysis is the total foreign direct investment (*fdi*) of projects enrolled in the Southern Key Economic Region, which have been attracted from 2005 to 2016.

Independent variables

Based on the results from previous empirical studies, the independent variables included in the study model reflect the factors influencing FDI flows into the Southern Key Economic Region, and include:

- *Variable of market size (masize)*: Gross domestic product (GDP) at current prices, unit - million.
- *Variable of infrastructure (infras)*: The volume of goods transport (roads - river - sea - air), unit - thousand tons.
- *Variable of labor force (labor)*: Number of employees aged 15 years and over, unit - thousand.
- *Variable of quality of human resources (huedu)*: Rate of literate workers aged 15 and above, unit - %.
- *Variable of the openness of the market (owner)*: Percentage of SOE compared to all other types of enterprises, unit - %.
- *Variable of trade openness (open)*: The proportion of commercial value exchange with outside compared to GDP, unit - %.
- *Variable of the quality of institution (pci)*: reflecting the quality of the institutional environment in the Southern Key Economic Region which is reflected in the Provincial Competitiveness Index (PCI).

Research methods

The data used are table data for 7 provinces and 1 city in the Southern Key Economic Region during the period 2005–2016, so theoretically this is a panel data model. Implementation of descriptive statistics and

Table 2: Statistical data describing the variables

Variable	Obs	Mean	Std. Dev.	Min	Max
masize	96	1.54E+08	2.02E+08	6100000	1.00E+09
infras	96	32164.51	43204.11	913	207700
labor	96	1232.224	1055.332	441.3	4335.7
huedu	96	95.3	1.83905	91.3	98.7
pci	96	60.08281	5.631318	45.1	77.2
owner	96	2.194687	2.975602	0.26	13.49
openen	96	2.019564	1.831553	0.12	7.608004
fdi	96	91.8125	145.8502	1	853

graphing equations was done using Excel software. The data was entered into STATA software, and estimation of the econometric model was performed by table data (balance). The 3 approaches to model estimation included : Pooled, FEM, and REM. Descriptive statistics analysis provided an overview of the situation of attracting FDI capital in the Southern Key Economic Region, and the fluctuation of factors affecting the attraction of FDI capital in that region.

Analyses of table data were done using STATA software. The author used three different approaches for analyzing table data (balance) ; data was collected to analyze in detail the estimation models given in the theoretical section to assess the effects of independent variables in the model. The general estimation model was as follows : $y_{it} = \alpha + x'_{it} \beta + u_{it}$ ($i=1,\dots,N$; $t=1,\dots,T$)

Of which: y_{it} is a dependent variable; x'_{it} are independent variables ; α is the slope; β are the estimated coefficients of the independent variables, u_{it} : the error; i represent the provinces ($i = 1, \dots, 8$); t : time (collected in years $t = 2005, \dots, 2016$).

The author analyzed the table data in three ways:

(i) Pooled: This is an estimation model that regresses the entire database as a normal OLS model. In particular, the data of the provinces were stacked to perform regression analysis. However, the robustness and efficiency of the coefficients in the analysis of table data based on the smallest overall squared regression may be limited because the overall OLS model does not take into account that the factors cannot be collected or influenced individually (such in peculiar individual provinces). Since problems affecting an individual province could be one of the frequent phenomena occurring in the experimental study, it is important to deal with the problem of unobserved factors. Therefore, the random-effects model and fixed-effects model are used.

(ii) FEM: The estimated model data table fixed by one or more factors in the model. Here the author estimated in three ways: fixed by factor i (i), fixed by time factor (t), and fixed by both these factors (i and t).

(iii) REM: This is a model of random effects estimation. Here, the author made random effects estimates in two ways: random effects by province factor (i), and random effects over time (t).

To choose the most suitable model, the author used the standards in econometrics. In order to determine which model is better, this study performs F test for the fixed-effects model, Breusch Pagan Lagrange Multiplier (LM) for random effects model, and Hausman testing to choose between random and fixed effects models (with P -value < 10%). In addition, to increase the efficiency of the model, testing the variance change and testing the autocorrelation in the data table are both performed. To deal with problems that arise, the researcher may use a regression model with standard error correction.

RESULTS

Descriptive statistics of variables

Table 2 summarizes the statistical results of all variables used in the model. The statistical results show that the mean values of the factors are quite high, specifically for the average number of projects, GDP, volume of goods transported on land land-river-air routes, and labor force. However, the standard deviation for the indicators of market size, infrastructure development and labor are not small (except for the literacy rate, trade openness, and provincial competitiveness index). This easily explains the development of the region, which is considered one of the three key economic regions of country. The region has also invested in building, and improving infrastructure and education, although there is no uniform development

Table 3: Pooled Regression results

Variable	Regression coefficient estimates	Standard error	t	P_value
masize	1.78E-07	8.38E-08	2.13	0.036
infrs	0.0016291	0.0004603	3.54	0.001
labor	0.0508353	0.0132421	3.84	0.000
huedu	-18.11463	6.578954	-2.75	0.007
owner	-4.815768	3.633609	-1.33	0.188
pqi	2.926917	1.62257	1.8	0.075
opnen	11.90094	6.473433	1.84	0.069
_cons	1486.286	597.186	2.49	0.015
<i>Model indicator</i>				
R ² : 83.01%; R ² adjusted: 81.66%				
F Test (7.88)= 61,41 (pvalue = 0.00)				

among localities (they are mainly concentrated in the central provinces, such as Ho Chi Minh City, Binh Duong, and Dong Nai). The provincial competitiveness index (PCI) is higher than average, indicating that the region has improved the PCI in the current stage of development.

Therefore, the relatively high average is evidence of the scale of economic development, infrastructure, education investment, abundant human resources, and development of competitiveness among localities of the region in the period of 2005-2016. However, among the localities with each other there is no uniform development and there are many differences.

Analysis of matrix coefficients show correlation between variables

This study first uses the results of the correlation matrix to explore the relationship between the factors that influence the attraction of FDI. The correlation matrix presented shows the correlation between the variables used in the regression model. In general, most of the correlation coefficients between the variables were relatively good and less than 0.8. The coefficient of oscillation around the level of 0.07 to 0.7 represents the relationship between the variables in turn. In addition, multi-collinear treatment does not depend on high or low correlation coefficients but depends on the effect of multi-collinearity, which makes the regression coefficient change or not. To determine whether multi-collinearity between variables exists, this study performed Variance Inflation Factor (VIF) tests for STATA data boards. The results show that all coefficients are less than 10, which means that the

effect of multi-collinearity is not serious, without significant consequences for the impact of variables in the model.

Regression results

The author conducted regression analysis with variables on three regression models: POOLED, FEM, and REM. First, POOLED regression was performed to analyze the relationship between factors affecting FDI.

The POOLED (OLS) regression results show that the selected factors have an important impact on the attractiveness of the FDI capital of the Southern Key Economic Region. It is important to note that the R² of the model is high at 83.01% (Table 3). This means that, in general, the dependent variables of this model account for more than 80% of FDI attraction in the region. In addition, the F test with a p-value of < 0.05 also indicates that the model used is appropriate. However, stiffness and efficiency of the coefficients in the data analysis table, based on regression least squares, overall may be suspect because the OLS model, overall, does not take into account the factors which affect individual localities or provinces.

To determine which model is better, this study performed F test for the FEM model, Breusch Pagan Lagrange Multiplier (LM) for REM; if the overall OLS model does not fit, Hausman test can be used to choose between the REM and FEM. In detail, the F test helps to choose between FEM and POOL models. This test shows whether there is an influence of the province/ city characteristics on FDI attraction. The assumption is as follows:

$H_0 : \sum u_i = 0; H_1: \text{Have at least one } \sum u_i \neq 0$

If $p\text{-value} \geq \alpha$, accept H_0 , and select the Pooled Regression Model; If $p\text{-value} < \alpha$, reject H_0 , and select the Fixed Effect Model.

Statistical significance testing (F-Test) showed that the FEM was better than the POOLED Regression model. Value accreditation $F(7,81)$ was 2.04 with $p\text{-value}$ of 0.0595; this shows that there is enough evidence to accept H_0 at 5% significance. In other words, the attraction of FDI into the provinces is not influenced by the characteristics of the province. Thus, the POOL model will be more appropriate than FEM in estimating the impact of factors on attracting FDI into the Southern Key Economic Region **Table 4**.

On the other hand, the $p\text{-value}$ of the Breusch & Pagan Tests was 1; this indicates that the overall OLS model is better than REM with applied models because there is no evidence showing a significant difference of the specific characteristics of each province/ city in attracting FDI. Thus, the overall OLS model would be a better model than the FEM and the REM in expressing the effect of the factors in the FDI attraction to the Southern Key Economic Region. Results of the estimated coefficients in POOLED Regression model showed that most of the factors are significant and impact the orientation of coefficients, as expected. The results are in expectation of the theory **Table 5**.

Testing of hypothesis

Furthermore, to increase the effectiveness of the overall Pooled Regression Model, Multi-collinear Tests, Variance Tests, and Self-Correlation Tests of the table data were performed. As discussed above, the results of the VIF test show that all coefficients were less than 10, which means that multi-collinearity does not occur in this study (**Table 6**).

White test results show no variation in variance with 99% confidence. Similarly, the Wooldridge test showed no self-correlation at 1% significance level. Therefore, the results show that, except for the openness of the market, almost all the variables have the expected effect, are statistically significant, and favor the hypothesis of 10% significance.

The above regression results show six factors - market size (masize), infrastructure (infras), labor force (labor), quality of human resources (huedu), trade openness (open), and quality of the institution (pci) - affecting the attractiveness of FDI projects in the Southern Key Economic Region. The variable representing market openness (owner) had a negative coefficient of significance and was not significant in the model with a 95% confidence level, $P\text{-value} = 0.188 > 10\%$; this indicates that there is no basis for conclusion about the

level of state-owned enterprises having implications for attracting FDI into the region.

The variable of market size (masize) had a positive regression coefficient and the $P\text{-value}$ of the variable was $0.0036 < 10\%$. Thus, market size is positively correlated with attracting FDI projects into the region.

The variable of infrastructure (infras) had a positive regression coefficient and the $P\text{-value}$ of the variable was $0.001 < 10\%$. Thus, infrastructure has a positive relationship with attracting FDI projects into the region.

The variable of labor force (labor) had a positive regression coefficient and a $P\text{-value}$ of $0.000 < 10\%$. Thus, labor force is correlated positively with attracting FDI projects into the region.

The variable of quality of human resources (huedu) had a negative coefficient and the $P\text{-value}$ was $0.007 < 10\%$. Thus, the quality of human resource is correlated with attracting FDI projects into the region. This shows that for investors, a locality with abundant and cheap labor force is still more likely to attract investors than qualified laborers. Because higher levels require higher salaries, this may be the reason for increasing the cost of attracting FDI in the Southern Key Economic Region.

The variable of trade openness (open) had a positive regression coefficient and a $P\text{-value}$ of $0.0069 < 10\%$. Thus, trade openness is correlated with attracting FDI projects into the region.

The variable of the quality of institution (pci) had a positive regression coefficient and a $P\text{-value}$ of $0.0075 < 10\%$. Thus, the quality of the institution is correlated with the likelihood of attracting FDI projects into the region.

The variable of the openness of the market (owner) had a negative coefficient and a high $P\text{-value}$ of $0.188 > 10\%$. Thus, this variable was not significant in the model. Therefore, the author has no basis to conclude the impact of the openness of the market to attract FDI in the region.

The results of this study on factors influencing the attraction of FDI into the Southern Key Economic Region show that there are 6 factors that truly impact FDI attraction. These factors include: market size (masize), infrastructure (infras), labor force (labor), quality of human resources (huedu), trade openness (open), and quality of institution (pci). In particular, the quality of human resources, trade openness, and quality of institution are the most influential variables compared to the rest (**Table 7**).

Table 4: The Fixed-Effects Models - FEM

Variable	Regression coefficient estimates	Standard error	t	P_value
masize	1.77e-07	1.14e-07	1,56	0.122
infrass	.0023247	.0006052	3.84	0.000
labor	-.1081006	.0660747	-1.64	0.106
huedu	-9.096038	9.512875	-0.96	0.342
owner	-6.26984	4.5078	-1.39	0.168
pci	1.698286	1.782892	0.95	0.344
openn	18.08433	14.13586	1.28	0.204
_cons	864.9533	874.4014	0.99	0.326
<i>Model indicator</i>				
R ² : 70.22%				
F Test (7,81)= 9,68 (pvalue = 0,00) Number of observations: 96, Groups: 8				

Table 5: The Random-Effects Model - REM

Variable	Regression coefficient estimates	Standard error	t	P_value
masize	1.78e-07	8.38e-08	2.13	0.034
infrass	.0016291	.0004603	3.54	0.000
labor	.0508353	.0132421	3.84	0.000
huedu	-18.11463	6.578954	-2.75	0.006
owner	-4.815768	3.633609	-1.33	0.185
pci	2.926917	1.62257	1.80	0.071
openn	11.90094	6.473433	1.84	0.066
_cons	1486.286	597.186	2.49	0.013
<i>Model indicator</i>				
R ² : 84.95%				
Wald chi2(7) = 429.88 (pvalue = 0,00) Number of observations: 96, Groups: 8				

DISCUSSION

The study has achieved the goal set out to determine the factors affecting the attraction of FDI in the Southern Key Economic Region. After regression with 3 methods (POOLED, FEM, and REM), and using F-Test and Breusch Pagan Test, the most suitable model was obtained. Examining the relationship between market size, infrastructure development, labor force, quality of human resources, trade openness, and institutional quality on FDI attraction into the region, the author selected the Pooled Regression model. This result has important implications in evaluating, planning, and developing policies and appropriate invest-

ment plans for this region.

Provinces in the Southern Key Economic Region should consider these 6 factors that affect the attraction of FDI : market size, infrastructure, labor force, quality of human resource, trade openness, and quality of institution. Indeed, these factors should be prioritized when considering and directing policies to attract FDI in the region. Localities need to develop an optimal strategy for developing the economy, investing in infrastructure, developing education, boosting exports and perfecting policy institutions, based on these factors affecting FDI attraction.

Table 6: The impacts of factors for attracting Fdi in Southern Key Economic Zone

	pool	fe	re
masize	0.00000 ** (0.00000)	0.00000 (0.00000)	0.00000 ** (0.00000)
infras	0.00163 *** (0.00046)	0.00232 *** (0.00061)	0.00163 *** (0.00046)
labor	0.05084 *** (0.01324)	-0.10810 (0.06607)	0.05084 *** (0.01324)
huedu	-1.8e+01 *** (6.57895)	-9.09604 (9.51287)	-1.8e+01 *** (6.57895)
owner	-4.81577 (3.63361)	-6.26984 (4.50780)	-4.81577 (3.63361)
pci	2.92692 * (1.62257)	1.69829 (1.78289)	2.92692 * (1.62257)
opnen	11.90094 * (6.47343)	18.08433 (14.13586)	11.90094 * (6.47343)
_cons	1.5e+03 ** (6.0e+02)	8.6e+02 (8.7e+02)	1.5e+03 ** (6.0e+02)
	96	96	96

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Analysis results on influence of factors that affecting FDI attraction in The Southern Key Economic Region

Factors affecting FDI attraction	Assumptions of impact trend	Results
Market size	(+)	(+)
Infrastructure	(+)	(+)
Labor force	(+)	(+)
Quality of human resource	(+)	(-)
Openness of the market	(-)	(insignificant)
Trade openness	(+)	(+)
Quality of institution	(+)	(+)

(+) Same direction; (-) Contrary direction, (0) undefined

Future research will continue to expand the scope of understanding the economic factors in the northern and central regions of Vietnam, potentially leading to a more comprehensive overview on the current situation affecting FDI in Vietnam. Moreover, the current study considers the perspective of FDI capital but has not expanded to other related investment types. Therefore, future research direction will focus on these limitations.

CONCLUSION

The Southern Key Economic Region of Vietnam plays a pivotal role, leading to the socio-economic development of other regions in Vietnam. Over the years, this region has mobilized capital from different sources, including FDI. This capital has played a very important role in the process of socio-economic development and the implementation of industrialization and modernization in the region.

In order to improve the theoretical basis, a determination of the key factors affecting FDI attraction to the region through quantitative models panel data regression was done. The findings conclude that six factors — market size (masize), infrastructure (infras), labor force (labor), quality of human resources (huedu), trade openness (open), and institutional quality (pci)-influence the attractiveness of FDI projects in the region. Therefore, these findings can shape better policy making and improvements in the environment to attract more FDI in the region. The observations from this article may potentially provide better suggestions in the area of promoting investment attraction as it relates to implementation of mechanisms and policies that promote the economic development of the region, in particular, and other regions around Vietnam, in general.

ABBREVIATIONS

FDI: Foreign Direct Investment
POOLED: Pooled Regress Model
FEM: Fix effect Model
REM: Random effect Model
SOEs : State-Owned Enterprise
PCI: Provincial Competitiveness Index
IT: Internal Transaction
MT: Market Transaction

COMPETING INTERESTS

The authors declare that they have no conflicts of interest.

AUTHORS' CONTRIBUTIONS

This research is conducted by Dao and Luan, in which Dao is mainly responsible for this research. Dao is responsible for conceiving and designing the analysis, contributing data and analysis tools, performing the analysis and writing the paper as well as collecting data; interpreting data. Luan are responsible for guidance, advice on research theory.

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