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## Distribution of Competitiveness and Foreign Direct Investment using Autoregressive Distributed Lag Model

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### Abstract

**Purpose:** Research on attracting foreign direct investment (FDI) plays an important role in helping provinces attract more FDI projects. However, with local competition, FDI enterprises also have to consider their investment. This study evaluates the provincial competitiveness to attract FDI in Thai Nguyen province, a province of Vietnam. In which provincial distribution of competitiveness is measured through nine indicators. **Research design, data, and methodology:** The study collects data (FDI and the provincial competitiveness index) from 2006 to 2020. The study uses Autoregressive Distributed Lag (ARDL) to test the impact of distribution of competitiveness on foreign direct investment. With time-series, the ARDL is suitable for data analysis. **Results:** The regression results indicate that the competition index of market entry and informal costs negatively impact attracting FDI into the province; The human resource training quality index has a positive effect on FDI. The results show that FDI enterprises pay much attention to business establishment procedures, hidden costs, and quality of human resources in the province. **Conclusions:** At the same time, in terms of practice, the results of this study, the authors also offer solutions to help improve the ability to attract FDI into Thai Nguyen province. The significant provincial competitiveness indicators should be taken into account for improvement first.

**Keywords:** Distribution of Competitiveness, Foreign Direct Investment, Economic Growth, Provincial Competitiveness

**JEL Classification Code:** A14, F15, F43

### 1. Introduction

Foreign direct investment (FDI) plays an important role for developing countries (Bui & Nguyen, 2021; Ledyeva, 2009; Nguyen, Dao, & Bui, 2014). FDI helps countries solve problems of employment, technology or promote economic development (Ngoc, Tuan, Duy, Kien, & Dat, 2021; Pham & Pham, 2020). Vietnam is a developing country and highly dependent on FDI capital (up to now, FDI accounts for about 25% of total social investment capital. At the same time, FDI contributes to the whole economy of Vietnam, over 20% of

GDP). Besides, FDI enterprises are also enterprises with a high contribution to the national budget compared to other business sectors. It can be seen that in the past 35 years, the role of FDI has been really important to the Vietnamese economy. Actively attracting FDI is still an annual goal of the Vietnamese government.

Recently, FDI capital into Vietnam has focused on industrial zones in some provinces such as Binh Duong, Hung Yen, Bac Ninh, Ha Nam, Thai Nguyen province. In particular, Thai Nguyen is considered a province capable of attracting potential FDI with industrial park projects as well as a lot of land funds for industrial park development. Thai

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Nguyen is the province with the largest total private investment as well as the largest private enterprise in the country with large investment sources such as Samsung, Canon, etc. To continue to attract private investment capital, the province needs to continue to improve the determinants of investment decisions and the satisfaction of private enterprises investing in the province.

There are many studies to evaluate the factors affecting the attraction of FDI. Research shows a positive effect of economic growth, export value on FDI attraction (Sunde, 2017; Adams, 2009; Meyer & Nguyen, 2005). The trend of economic development will attract foreign enterprises more when they consider it as a potential for the long term (Keho, 2015). The investment in capital construction of the province or the country is also a factor promoting FDI attraction (Le & Nguyen, 2017). In addition, the labor force also has a positive effect on attracting FDI (Meyer & Nguyen, 2005). The above factors have been measured through a set of indicators on the competitiveness of the provinces according to the Provincial Competitiveness Index (PCI) index issued (Nguyen, 2017).

For provinces, the Vietnam Chamber of Commerce and Industry (VCCI) analyzes and evaluates the distribution of competitiveness index for each province to rank the level of competition. Investors consider the selection of direct investment FDI in the province based on the provinces' potential and current capacity. When the province has high competitiveness, it will make investors more attractive when the probability of project success is higher. At the same time, the province's level of support for foreign investors is also better than that of provinces with lower competitiveness indexes. The level of competition of enterprises is also a factor showing the province's economic growth. The higher the competitiveness index, the more advantageous the province's economic development.

In Vietnam, research on the impact of PCI on FDI attraction is still limited. Therefore, this study evaluates the effect of PCI on attracting FDI in Thai Nguyen province. To verify the role of PCI in attracting investment capital to localities in Vietnam.

## **2. Literature Review**

### **2.1. Overview of FDI and PCI**

Foreign direct investment (FDI) is a form of long-term investment by individuals or companies from one country to another by establishing production and business bases. That foreign individual or company will take over the management of this production and business establishment. The World Trade Organization defines FDI: Foreign direct investment occurs when an investor from one country (the host country) acquires an asset in another country (the host

country) along with the right to manage that asset (Nguyen, 2017). The regulatory aspect is what distinguishes FDI from other financial instruments. In most cases, both the investor and the assets they manage abroad are businesses. In such cases, the investor is often referred to as the "parent company," and the assets are referred to as the "subsidiary" or "branch. In this study, the author defines direct investment. Foreign direct investment (FDI) is the movement of capital, technology, or any other asset from a foreign country for investment to a host country to establish or control an enterprise for a profitable business.

PCI is an acronym for the English phrase "Provincial Competitiveness Index." It was first published as a pilot in 2005 and consists of eight sub-indices, each of which explains the difference in economic development between provinces and cities in Vietnam, whereby there are 47 provinces in the country. In addition, the city of Vietnam is ranked and evaluated. For the second time, in 2006, two important areas of the business environment, Legal Institutions and Labor Training were included in the PCI index development.

Investors consider the selection of direct investment FDI in the province based on the provinces' potential and current capacity. With the goal of local development, the VCCI Chamber of Commerce and Industry and the Asian Development Fund has conducted an acute competitiveness assessment (PCI) to examine the competitiveness of each province compared to other provinces. The PCI indicator is divided into nine main indicators and was assessed in all 63 provinces and cities in 2006. Up to now, the PCI index has developed into ten more indicators. The higher the evaluation percentage of the province, the more likely it is to attract investors (Nguyen, 2017).

### **2.2. The Relationship between FDI and PCI**

Neoclassical growth models determine the relationship between FDI and economic growth. The neoclassical growth model assumes that technological progress and the labor force are exogenous so that FDI increases domestic income levels when it has no long-term effect on economic growth. Long-term growth is possible through technological and population growth; If FDI has a positive impact on technology, it affects economic growth (Solow, 1956). Makki and Somwaru (2004) show that according to endogenous growth theory, FDI promotes economic growth if it increases profits in production by transferring technology. Also, Blanc-Brude, Cookson, Piesse, and Strange (2014) argued that technology transfer takes place through four models: technology transfer and new ideas; import high technology; application of foreign technology and qualification of human resources.

The provincial competitiveness factor has a positive impact on economic growth. The increase in PCI shows that

attraction policy, human resource development, or transparency of the province have changed strongly. The province's improved competitiveness indicators are the development of internal resources as a good resource to effectively implement the province's strategies and plans.

The increase in the province's competitiveness index and a more competitive position than other provinces also indicate changes and investments in infrastructure, administrative apparatus, and people. The measurement of the province's competitiveness index, the strengths or weaknesses of the province, will be calculated and given a general index. A province with good economic growth will create economic conditions for implementing infrastructure development, education, and healthcare development plans. These reciprocal relationships can last if the guidelines and policies are well implemented, there is no waste, or the plan's implementation is not on schedule, causing a loss of the budget. On the other hand, the loss of funding makes the transparency index or the problem of corruption will cause the province's competitiveness index to decrease.

### 3. Method

#### 3.1. Data

The data on FDI and GDP are collected from the monitoring database of the Thai Nguyen Provincial Statistics Office in the period from 2010 to 2020. PCI data is collected on VCCI. The collected data will be encrypted and put into STATA software for analysis.

#### 3.2. Model

The author's research model is given with the main variable being PCI and adding two variables to measure the level of FDI attraction, namely population and economic growth. The model is given as follows:

$$FDI = \alpha + \beta_0 * PCI + \beta_1 * POP + \beta_2 * GDP + u_i$$

In which:

Dependent variable:

FDI: Foreign direct investment flows into Thai Nguyen province  
Independent variables

PCI: Thai Nguyen Provincial Competitiveness Index

GDP: Economic growth in Thai Nguyen province

POP: Population

#### 3.3. Data Analysis

To estimate the influence of the variables in the research model, we process the research data through the following

process: (1) testing the stationarity of the data series; (2) testing the long-run effect relationship in the model; (3) impact analysis by ARDL model.

##### Unit root test (stationary test)

The variables when running regression need to ensure stationarity. A stationary time series is a series where the mean, variance, and covariance are constant at all percentage points in time. The author uses the unit root test (Unit Root Test) based on the extended ADF method.

##### Analysis using ARDL model

In the ARDL model, the study will evaluate the short-term and long-term impacts of PCI as well as other economic variables (GDP, POP) on attracting FDI into Thai Nguyen province.

## 4. Results

### 4.1. Descriptive

The results describing the research variables show that the average POP in the whole period is 1.2 million people. The largest of which is currently 1.3 million people. The average GDP is 47.5 trillion, the largest is 107 trillion. FDI attracts on average 11.7 billion VND per year, the largest is 50.93 trillion VND, and the smallest is 37 billion VND. The results describe the variables related to the PCI variables with nine indicators for each region. PCI1 average is 7.9; PCI2 is 6.0; PCI3 is 5.7; PCI4 is 6.22; PCI5 is 6.2; PCI6 is 5.6; PCI7 is 4.7; PCI8 is 4.99 and PCI10 is 5.2. The variables are described in Table 1.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
PCI1	15	7.903713	0.8826392	5.979152	9.159264
PCI2	15	6.056256	0.4784516	4.906598	6.684447
PCI3	15	5.769608	0.8151922	3.383695	6.686756
PCI4	15	6.229749	0.9389417	3.662925	7.701758
PCI5	15	6.199832	0.5331613	5.332295	7.235432
PCI6	11	5.643382	1.040123	4.168657	7.597541
PCI7	15	4.7833	1.452281	1.549212	7.394715
PCI8	15	4.999383	0.949248	2.671297	6.045484
PCI9	15	6.548925	1.080374	4.942933	7.881577
PCI10	15	5.217592	1.484741	2.713919	7.339705
POP	15	1205812	57830.75	1139444	1307871
GDP	14	47524.38	32892.32	11371.86	107820
FDI	14	11707.37	15925.7	37.95697	50931.6
LnPCI	15	4.051363	0.1176873	3.843347	4.242048
LnPOP	15	14.0016	0.0475465	13.94605	14.08391
LnFDI	14	7.805515	2.37991	3.636453	10.83824
LnGDP	14	10.52297	0.7524785	9.338897	11.58822

## 4.2. Unit Root Test

The results of the stationarity test show that the variables are all non-stationary series as they are stationary at the first difference. Therefore, the author will analyze the influence of variables on FDI attraction through the variables that have taken the difference. The details in Table 2.

**Table 2:** Stationary test

Variables	ADF-stats	P-value
LnCPI	-0.091	0.9504
LnGDP	-1.061	0.7302
LnFDI	-0.385	0.9125
LnPOP	-0.705	0.8454
Difference at first level		
LnCPI	-4.672	0.0001
LnGDP	-3.026	0.0325
LnFDI	-4.773	0.0001
LnPOP	-4.672	0.0001

After having the stationary variables, the study runs ARDL models with each indicator of PCI1 to PCI9. The model analysis results show that only PCI1, PCI5 have the opposite effect on FDI (negative beta coefficient and significance). Meanwhile, PCI9 has a positive impact on FDI (the beta coefficient is positive and significant). The other PCI indicators do not affect FDI. At the same time, the results also show that GDP has a positive effect on FDI (the beta coefficient is positive and statistically significant). POP has a negative impact on FDI (negative and significant beta coefficient). The details of ARDL in Table 3, Table 4, and Table 5.

**Table 3:** Regression with the independent variables -CPI1, CPI2, CPI3, CPI4

FDI	CPI1		CPI2		CPI3		CPI4	
	LR	SR	LR	SR	LR	SR	LR	SR
PCI1 <sub>t-1</sub>	-1.258 (0.693)							
LnGDP <sub>t-1</sub>	6.482*** (1.001)							
LnPOP <sub>t-1</sub>	-121.5* (46.75)							
ΔPCI1		-0.227* (0.0891)						
ΔLnGDP		4.510* (1.904)						
ΔLnPOP		-16.94*** (2.822)						
PCI2 <sub>t-1</sub>			-10.24 (15.63)					
ΔPCI2				-0.275 (0.401)				
PCI3 <sub>t-1</sub>					-1.619 (6.351)			
ΔPCI3						-0.00349 (0.331)		
PCI4 <sub>t-1</sub>							-0.180 (2.845)	
ΔPCI4								-0.142 (0.276)
Constant		403.7*** (31.81)		6.430 (3.958)		2.255 (1.975)		1.830 (2.106)
Observations	11	11	12	12	12	12	12	12
R-squared	0.990	0.990	0.414	0.414	0.307	0.307	0.309	0.309

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 4:** Regression with the independent variables -CPI5, CPI6

VARIABLES	PCI1		PCI5		PCI6	
	LR	SR	LR	SR	LR	SR
PCI1 <sub>t-1</sub>	-1.258 (0.693)					
LnGDP <sub>t-1</sub>	6.482*** (1.001)					
LnPOP <sub>t-1</sub>	-121.5* (46.75)					
ΔPCI1		-0.227* (0.0891)				
ΔLnGDP		4.510* (1.904)				
ΔLnPOP		-16.94*** (2.822)				
PCI5 <sub>t-1</sub>			5.012 (4.916)			
ΔPCI5				-1.021*** (0.290)		
PCI6 <sub>t-1</sub>					-2.214 (1.260)	
ΔPCI6						-0.294 (0.242)
Constant		403.7*** (31.81)		-1.898 (2.085)		4.916 (2.575)
Observations	11	11	12	12	7	7
R-squared	0.990	0.990	0.716	0.716	0.624	0.624

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5:** Regression with the independent variables -CPI7, CPI8, CPI9

VARIABLES	PCI1		PCI7		PCI8		PCI9	
	LR	SR	LR	SR	LR	SR	LR	SR
PCI1 <sub>t-1</sub>	-1.258 (0.693)							
LnGDP <sub>t-1</sub>	6.482*** (1.001)							
LLnPOP <sub>t-1</sub>	-121.5* (46.75)							
ΔPCI1		-0.227* (0.0891)						
ΔLnGDP		4.510* (1.904)						
ΔLnPOP		-16.94*** (2.822)						
PCI7 <sub>t-1</sub>			-10.01 (29.41)					
ΔPCI7				-0.158 (0.144)				
PCI8 <sub>t-1</sub>					-2.081 (4.574)			
ΔPCI8						-0.0331 (0.232)		
PCI9 <sub>t-1</sub>							-7.460 (14.90)	

ΔPCI9								0.438*
								(0.206)
Constant		403.7***		2.280***		2.291*		3.496***
		(31.81)		(0.660)		(1.226)		(0.945)
Observations	11	11	12	12	12	12	12	12
R-squared	0.990	0.990	0.499	0.499	0.334	0.334	0.620	0.620

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

PCI1 has a negative effect on FDI in the short term, showing that the higher the barriers to market entry, the lower the level of FDI attraction will be. With a long time establishing a business, it is difficult for companies to implement projects. This is also a factor that reduces FDI in the province. At the same time, the waiting time to have a business premise also makes it difficult to attract more FDI. The fact that FDI enterprises have to wait longer than other provinces will make businesses realize the barriers as well as disadvantages of the province compared to other provinces. The province's support for site clearance makes companies more comfortable psychologically as well as reduces the cost of space rent. In addition to reducing ground rent, but also related to the enterprise's business plan, it will also be affected if the handover time is prolonged. This will affect the performance business.

*“My corporation feels more attractive and interested in provinces with legal support policies. Especially about the quick business license that helps us quickly launch our activities when we start to invest in the province. The lengthy procedures or paperwork makes us feel that we are not supported much. So in the long term, we are also satisfied with the support from the local side.”*

PCI5 also has a negative effect on FDI in the short term, indicating that informal costs reduce FDI in Thai Nguyen province. Informal expenses can be seen as a concern of enterprises as this is an operating expense and a sign of support from the province. Provinces are considered less supportive as long as unofficial costs exist and are considered a hot issue in the province. Although informal costs exist in all provinces, the severity occurs when businesses consider the province to have a big problem in this cost. Informal costs surprise FDI enterprises when working with authorities. This makes them not proactive or takes a long time to adapt to working methods at the officers.

*“The informal costs made my company meet difficult so much. I don't know reason that I am always rejected when working with related units. Maybe the cultural issue of implicit costs makes businesses like us really uncomfortable. If these barriers are removed, we will be completely assured and proactive in our business activities in Vietnam in general and Thai Nguyen province in particular.”*

Finally, the quality of labor training has a positive impact in the short term on attracting FDI in Thai Nguyen province. The good quality of training workers in the province will help FDI enterprises consider this an advantage of the province and tend to invest more. With a well-trained workforce, it will help improve skills as well as improve working efficiency. With this result, it can be seen that FDI enterprises also question the quality of labor in the province. Therefore, expecting a well-trained workforce will help FDI enterprises be more interested in the locality.

*“In addition to the issue of preferential treatment or support from the local side, we are also very interested in the quality of local human resources as well as training facilities in the area. With Thai Nguyen province having the advantage of having many universities in the area, it will help us to have well-trained and high-quality human resources when needed. With a ready-made, locally trained workforce, we will have the best resources with the expected productivity.”*

Economic growth (GDP) has a positive impact on FDI, it can be seen that the development of the province is also an indicator that makes FDI enterprises pay attention and consider investing in the province. When the economy develops well, the development of infrastructure and human resources is also enhanced. From there, it is easier for businesses to build infrastructure and trade between provinces. At the same time, human resources are improved, making it easier to build a good quality human resource team. This helps to increase labor productivity in the enterprise.

The population has a negative effect on FDI attraction, which can see an increase in the number of laborers in the province, which reduces FDI inflows to the province. In addition, it is found that the increase in population in the province makes FDI investors less interested in investing in the province. This can be considered a disadvantage of the province when the population growth rate can disrupt the general planning and lead to affected land funds when the problem of land settlement is difficult. At the same time, human resources in other provinces can be a significant source of supply for FDI projects in Thai Nguyen province.

## 5. Conclusion

### 5.1. Conclusion

The study has reviewed the relationship between FDI and the Thai Nguyen provincial competitiveness index. Research has shown that provinces with good policies to support investment activities of businesses in the area will help attract more FDI into the province. However, in the assessment of distribution of competitiveness, there are nine indicators from PCI1 to PCI9 and the total competitiveness index of PCI for all provinces. The results of data analysis have shown that in Thai Nguyen, there are only three indicators PCI1, PCI5, and PCI9, that impact FDI attraction. PCI1 is the market entry index, and PCI5 is the unofficial cost index that has a negative impact on FDI attraction. Meanwhile, the PCI9 index of labor training positively affects FDI attraction. From the research results, the author discusses the results and makes some recommendations to help attract foreign direct investment into Thai Nguyen province.

### 5.2. Theoretical Implications

Research has verified the relationship between competitiveness and FDI attraction. It can be seen that the theory of improving competitiveness will help localities attract more FDI sources, which investment enterprises and Thai Nguyen province are interested in indicators of market entry, informal costs, and quality of human resource training. Competition theory may have been evident in the case study with Thai Nguyen province. When the province has a better competitive position, investors' level of interest and attraction is higher.

### 5.3. Practical Implications

The research results showing the impact of competitiveness on FDI attraction in Thai Nguyen province will help research and propose solutions to improve the ability to attract FDI. Firstly, the province needs to speed up the market entry process by quickly approving and issuing business registration documents for businesses. With the quick processing of business registration documents, the company can be put into operation sooner. Secondly, informal costs should be minimized to bring the initiative to FDI enterprises when doing business in the province. FDI enterprises do not have to be passive or do not understand the specific costs when investing in the province in particular and in Vietnam in general. Third, improve the quality of human resource training in the province in order to improve the quality of human resources in the province.

Improving the quality of human resources will help businesses have quality human resources and help improve employee engagement in the company.

### 5.4. Limitations and Future Research

Although research has shown the influence of the province's competitiveness on attracting FDI capital, the study still has some limitations. Firstly, with limited data sources (from 2006 to 2020), this study could not find the problem of long-term relationships. This problem may be because the data is not long enough, so a long-term relationship is not found. Secondly, the new study was conducted in Thai Nguyen province. Still, it has not been widely studied for many provinces and cities to have a more comprehensive view of attractions in the provinces. Third, the study has not assessed the impact of COVID-19 on FDI attraction. In the context of the negative effects of COVID-19, this impact needs to be considered.

From the above limitations, the authors also propose some solutions to help overcome these limitations. Firstly, follow-up research on the same topic in the coming period may have more observations to examine the long-term impacts of PCI on attracting FDI. Second, the collection of other provincial data will help a more comprehensive view of the influence of the province's competitiveness on attracting FDI in Vietnam. Third, further research can quantify the impact of COVID-19 on the province's competitiveness as well as attract FDI into Thai Nguyen province.

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