

## **MSc Programme in Urban Management and Development** Rotterdam, The Netherlands September 2018

## Thesis

Title: Foreign direct investment and housing price in The Netherlands

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## MASTER'S PROGRAMME IN URBAN MANAGEMENT AND DEVELOPMENT

## (October 2017 – September 2018)

# Foreign Direct Investment and Housing price in the Netherlands

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UMD 14 Report number: 1227 Rotterdam, September 2018

## **Summary**

Foreign direct investment is a major indicator of global trade and economic growth for the country. These investments stand for a global capital and resource flow that could have a major impact on the host cities economy growth while earning a prosperous finical return. However, FDI also brings other unexpected effects, which the recipient countries may not foresee. After investment happened, this impact would gradually become part of the spatial characteristic of the investment location. Based on the previous studies, we understand that the influences of housing price have been well researched before. However, the full mechanism of how these factors work to affect housing price over spatial dimension and compositions still leaves a lot to be studied. In the Netherlands, there have been a limited number of studies conducted on the FDI roles in influencing the local housing prices. The Netherlands is currently undergoing a major rising of housing prices, contributed by the optimistic foresee of economic development with the contribution of FDI, but the relationship in-between has not yet fully understand. This research studies the effect of FDI on housing prices in the Netherlands from 2007 to 2015. Based on the inferential analysis, it is concluded that there is a relationship between FDI and housing price. With the panel regression calculated with spatial weights matrix and fixed effect model, we further investigate the relationship of close by neighbors' influences. The results show that with an influence of FDI, different districts' housing prices are positively correlated with each other. The investment counts from foreign countries positively relate to the investment location's housing price.

## Keywords

FDI, housing price, spatial econometrics, spatial Durbin model, the Netherlands

## Acknowledgements

First of all, I would like to thank my supervisor Dr. Nicola Cortinovis for his patient guidance and insightful advice, without him this thesis could not exist at all. I am deeply grateful for all his support especially when I was lost in the vast knowledge of economics. I would also like to think my second reader Dr. Sergio Parra-Cely for all the advice and meaningful comments, which further make this research more solid and precise. I would also like to thank the UCR team: Paula, Indriany, and Rupinder for all their support on lectures as well as administration, without them UCR would definitely have a very hard time.

I am very pleased to have my UMD 14 classmates, the Chinese girls, classroom 4 The Habitus, Arlene, Aileen, Lea, Endo, thank you guys with all the help and chats about life and work, these things will be my precious memories. Special thanks to Jimmy, my fellow Taiwanese classmate, without you constantly arguing with me, how boring our lives would be right?

To study in the Netherlands was my dream; I am so grateful my parents and family support me to fulfill this dream. And thank you Evert-Jan, you are my most solid support in this country, I can't wait to build the future with you.

## Abbreviations

IHS	Institute for Housing and Urban Development	
FDI	Foreign Direct Investment	
MNEs	Multinational Enterprises	
CBD	Central Business District	
ETDZ	Economic and Technological Development Zone	
TNCs	Transnational Corporations	
FREI	Foreign Real Estate Investment	
CBS	Centraal Bureau voor de Statistiek (Statistics Netherlands)	
VMBO	Secondary vocational education	
HAVO	Higher general secondary education	

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## **Chapter 1: Introduction**

### 1.1Background

Cities and countries around the world have long been competing to attract foreign direct investment (FDI) since it is often considered to be a major source of stimulation to the countries' economy. These investments stand for a global capital and resource flow that could have a major impact on the host cities economy growth while earning a prosperous finical return. Cities that have a higher portion of FDI are often considered to be more competitive, policies and regulations are often tend to in favor of this process to attract more foreign investments into the country. However, along with the ability to build up more investmentoriented strategies, FDI bring other unexpected effects, which the recipient countries may not foresee. Such effect could be both spatial as well as social aspects, from clusters of the industry to the migration of knowledge workers. As global trade goes on, influence from FDI would likely to increase; government and city planners would need to address this issue. Previous researchers have concluded that FDI could lead to inequality distribution of income and affecting employment status, as well as crowd out effect on local firms ability to trade and invest (Basu and Guariglia, 2007, Agosin and Machado, 2005). However, to what extent does FDI effect on cities' spatial composition, and whether or not does FDI has other influences on the economy is yet to be clearly discovered. As previous researches have concluded (Hermes and Lensink, 2003, Sahoo, Nataraj, et al., 2014, Driffield, 2006), FDI could cause multiple effects on the host country, both positively and negatively. These effects could potentially help the host countries to grow the economy strong and prosperous, or causing redistribution of knowledge, workers, and wealth. The effects are not universal around countries but different depend on each countries' local context. Therefore, the government should take these effects into consideration when using policies to attract FDI, and regulate the unforeseen outcomes while building city's competitiveness.

For the past several years, countries around the world have been successfully building each own unique position in the global economic chain. Urban competitiveness became more than just a concept, but a real empirical strategy that helped fulfill the purpose and bring in FDI into different countries causing global economy trade to happen. One of the very successful countries is the Netherlands. The Netherlands is currently undergoing a large amount of foreign investment input. As shown in Figure 1, In the global economic context, the Netherlands is the third-largest country, and the largest in Europe to receive an influx of FDI, around USD 68 billion worth of investment in 2017 flows into the country (UNCTAD, 2018). As a result, these FDIs have been well developed and establish their business at the neighborhood and district level. However, the factors that influence the location of investment in the Netherlands and their interactions remain much to discuss. In the research of Grosveld, (2002), he mentioned "city-makers", as the decision-makers and their perceptions of the factors, which has been established to determine a city's ability to attract FDI. Around 35 factors have been identified as criteria for building a cities' competitiveness. These factors in other way are the location determines an investment; foreign firms take these factors into account when making their investment decisions. Therefore, by using these factors, we could have a more clear idea on how the FDI would likely to locate.

#### Figure 1. The top 10 host economies of the world in 2017



Estimated FDI inflows: top 10 host economies, 2017 (Billions of US dollars)

Source: (UNCTAD, 2018, p.3)

Another dramatic change in the Netherlands regarding economic impact is the housing price rise. The housing market in the Netherlands has been steadily rising since 1995, with only a slight drop between 2008 till 2013, which was during the Subprime mortgage crisis. In 2017, a study conducted by Calcasa pointed out that in the Netherlands the housing prices have raised by 8.2%, making it the third highest growth ranking in Western Europe. The Netherlands is only preceded by Portugal and Ireland, where house prices in 2017 rose by 12.5% and 11.8% respectively (Calcasa, 2018). The average purchase price of the dwellings in the Netherlands rose from  $\bigoplus$ 3,750 to 263,295, almost 2.8 times of market price (see Chart 1). In 2018, it is estimated will continue to rise 1.8% in 2018 Q1. High housing price could mean the average cost of people buying a house increased, further cut down the amount of capital to allocate, as well as saving rate. High housing price could also cause several negative impacts on cities' development process, such as speculation on land and housing only to make a profit, a major obstacle for industries to invest or operate.

However, the housing price change isn't universal among the nation, as we know there are multiple factors that influence the price, but the location of the asset is one of the most determining factors. Besides geographical distribution, other attributes such as "locational, accessible and structural attributes as well as neighborhood characteristics result in differentials between house price and influence demand-supply elasticity within particular submarkets" (McCord, Davis, et al., 2012, Bitter, Mulligan, et al., 2007). As studied some research's conclusions, we wonder as years go by, with FDI which gradually changes the host country's urban context, could it serve as one of the location factors that could affect the housing price of its location?





Source: (Statistic Netherlands, 2018)

## **1.2 Problem Statement**

Based on the previous studies, we understand that the influences of housing price have been well researched before. However, the full mechanism of how these factors work to affect housing price still leaves a lot to be studied. In the Netherlands, previous researchers have conducted studies regarding housing improvements or environment compositions of the location as influence factors on housing prices(Luttik, 2000, Smets and van Weesep, 1995). Nevertheless, in the economic context, there have been a limited number of studies conducted on the FDI roles in influencing the local housing prices. The Netherlands is currently undergoing a major rising of housing prices. Contributed by the optimistic foresee of economic development with the contribution of FDI(Hermes and Lensink, 2003), this trend is likely to continue for the coming years. Higher housing prices indicate less affordable for the first-time buyers and heavier mortgage burden. Also, high housing price could also lead to other negative effects. Therefore, to understand this dramatic change of the housing market, other economic influences should be considered an influencing factor as well. As we know FDI plays an important role in supporting the economy to grow, and the housing market is deeply correlated with the economy. Therefore we argue that the relationship between FDI and housing price need to be clarified.

## **1.3 Research Objectives**

This research focuses on the relationship between FDI site and the surrounding location's housing price in the Netherlands. Different types of FDI would have different strategies and specific spatial characteristics when it comes to choosing location of investments, the decision impact on the surrounding neighbourhoods remain unknown. Different types of FDI may have different criteria when choosing firm location. After establishes the business, these investment sites should affect surrounding neighborhoods differently, as they themselves also become part of local spatial characteristic. Whether or not different types of FDI would have different levels of impact on housing price in the Netherlands is unknown, therefore this research is aimed to understand the relationship.

We seek to understand if FDI serves as a spatial characteristic in determining local housing price of the Netherlands. After understanding the relationship between FDI and housing price, urban policy makers could take into consideration. The objective of this research is first to identify the locational characteristics of FDI investment in the Netherlands, using these characteristics to identify similar districts with and without the FDI, and further compare the difference in average housing price change of the districts. In this research, we study FDIs investment distribution (location) as the independent variable, and for dependent variables, which are invested districts' housing price. Therefore, we need to know the effects of independent variables (FDI investment) on the dependent variable (neighbourhoods housing price).

### **1.4 Research Questions**

"Do FDI location choices have an impact on local housing prices?"

### 1.5 Significance of the Study

There are numbers of literatures that have focused on the pros and cons of FDI on both developing and developed countries before. Research have been conducted and identified that FDI has a positive effect on housing price in Australia, China, and Malaysia (Guest and Rohde, 2017, Zull and Masron, 2017, Hui and Chan, 2014). However, FDI on housing price in the Netherlands has not been fully studied yet. This research will look into the relationship between FDI and local housing price in the Netherlands for the period from 2007 to 2015. We also look into if FDI has a continuous effect over time, and exam how strong is the relation over spatial distribution. The results could be an important factor witch policy makes would need to take into consideration in the future.

## **1.6 Scope and Limitations**

This research is based on the secondary datasets of FDI and housing price in the Netherlands between 2007-2015. This research explains the relationship between FDI and housing price.

On major challenge for this research's reliability is the integrity of the data set. With some indicators having missing values, will further limit the time scale we could have examined. However, since the secondary data is obtained from respectful and authentic sources such as FDi Markets and CBS *Wijken en Buurten* datasets, the internal validity of this research should

still be considered strong. However, due to the lack of FDI functions in the dataset, the difference of impacts from different sectors of FDI activities could not be further analysed. Also, with only the housing price data being only the average of first and second hand housing price combined in each district, we can only analyse the relationship in a more general housing market sense than a less detailed description.

However, as previous research has suggested, the effects of FDI tend to have mixed results mostly because it strongly depends on the local context, therefore the results of this research could be more explanatory to the Netherlands situation, and might be different in other countries, hence lower external validity.

## **Chapter 2: Literature Review / Theory**

In this chapter, we will discuss the relations between FDI and housing price. We first look into how FDI is formed and the reason behind the global investment network, we then look into how competitiveness is built and what are the criteria that attract FDI, particularly what is the firm location decision determines. After understanding where FDI is likely to locate, we further dig into the pros and cons of receiving FDI, as well as the potential effects that FDI cause in cities. Secondly, We further discuss why these different decisions will have a different effect on its surrounding. Later by using these criteria, we could establish our research model to identify compare variables. Lastly, we look into how the housing market is composed, and what is the relationship between high housing price and other factors effects by FDI such as income, employment and demand conditions.

### 2.1 Building urban competitiveness

The global economic process has been a major force shaping the modern world. A key component, FDI, in the process of globalization is the manifesto of this shaping force. By definition, FDI means investment from one country to another, Multinational Enterprises (MNEs) do so mainly either pursuit profit or to cut down production cost. FDI helps transfer technology, human resource, capital and ideologies around the world. "Globalization can be characterized by an increase of trade values and FDI flows" (Mah, 2002, p. 1007), however, this process is not entirely beneficial to the recipient countries, since the distribution and impact is unequal, and especially on income distribution of the developing countries as well as other spillover effects (Nunnenkamp, 2002, Mah, 2002).

It has become quite common around the world that FDI has been well linked to competitiveness and often used as a measurement of how well is the economy performing (Dicken, 2007). The notion of urban competitiveness starts with classical resource-based theories such as (Ricardo, 1817), who pointed out the competitive advantages of location choose buy the production firms, whether it is labor, capital, natural resources, each country has it's own advantages compare to others, therefore they could be more competitive when producing certain goods. Factor endowments are the predetermines of selecting the location of investment, however, there is more than just location when it comes to building competitiveness. Nowadays the marketplace is global, any local firm could have competition around the world instead of neighboring competitors, "the capability of firms to survive and to have a competitive advantage in global markets depends on, among other things, the efficiency of their nation's public institutions, excellence of the educational, health and communication infrastructures, as well as on the nation's political and economic stability"(Önsel, Ülengin, et al., 2008, p.222). Therefore, we can say that cities' competitiveness cannot solely rely on location, but should take other factors into account. A city's institutional influence plays an important role in steering the direction of grows. The spatial policy has been shifted from "mobile investment and the transfer of jobs between regions, to more on creating environments where high-quality businesses can start and succeed" (Turok, 2004, p.1071). Also, this direction should be targeting improve life quality of the citizen, to keep the positive effect while avoiding the negative effect.

Porter's demand model is another further explanation of how firms work in clusters to form competitiveness at a national level. He suggested, "A nation's competitiveness depends on the capacity of its industry to innovate and upgrade." Coping with challenges and pressure, these

industries have their advantages built by "having strong domestic rivals, aggressive home-Figure 2: The Diamond of national advantage



Source: (Porter, 1990, p.78)

based suppliers, and demanding local customers", therefore the nation's competitiveness is created (Porter, 1990, p.73). FDI plays an important role in this process, not only in the host country but also its home country. FDI majorly helps stimulate the competition and introduce spillover of advanced technology as well as management strategies. This process encourages local industries to innovate and upgrade, in order to keep up competing with foreign companies. By innovation and production process improvement, raise the level of "productivity", which a nation has the ability to raise the living standards for its citizens (Porter, 1990, p.76). In figure 2 we can see the structure of Porter's Diamond, it mainly contains four attributes: Factor conditions, Demand conditions, Related and supporting industries, and Firm strategy.

- Factor condition refers to the resources of the nation, such as natural resources, human resources, capital, land, and infrastructure. These conditions are not just preconditions but sometimes created by well-established industries, such as skilled labor or knowledge. These advantages help the business to lower production cost and shape the baseline of trade, however, the resources that a nation lack which often been considered disadvantage could also help to build competitiveness, but with the change of innovation and upgrade.
- Demand condition means the demand of the home market. In a global trade context, trading trends are often formed and spread by the major industries' home country. "It is the local demand that helps build competitiveness advantage when a particular industry segment is larger or more visible in the domestic market than the foreign market" (Porter,

1990, p.82). The domestic market help shape the value and taste of the products, while global trade spread them across the world.

- Related and supporting industries are referring to the industries that included in the production process. These industries help lower production cost while delivering highquality services with efficiency and precision. They are also the stimulation of innovation as well as the derived development of the industries.
- Firm strategies, structure, ad rivalry, this mainly included the management philosophy, company's decision-making and competitors within the industry. According to(Wall, Burger, et al., 2011), FDI can be characterized as horizontal or vertical. "Horizontal FDI duplicate the home country's activities abroad and mainly target accessing foreign markets. Vertical FDI concerns investments in which firms decide to break up their activities geographically, essentially motivated by savings in production costs" (Wall, Burger, et al., 2011, p.908) Local rivalry is an important factor contributing dynamic improvement of production. They cause the motivation to constantly improve the quality and service, and innovate the production procedures as well as the product itself.

At the city level, researchers argued that it is different from the national level when it comes to building competitiveness. (Grosveld, 2002) refined Porter's diamond into " the city diamond," trying to further demonstrate the factors that fit more into a city model. In this model, Grosveld adds cluster into the main factor while the larger scale of factors (i.e. national competitiveness) as another. City governance become part of the factor, unlike Porter's view of seeing it as a catalyst, to help and encourage the industries to be more competitiveness instead of creating it (Porter, 1990).



#### Figure 3: The City Diamond

Source: (Grosveld, 2002, p.77)

As we have seen in the City Diamond model, clusters are the core factor of urban competitiveness. Nowadays, the concept of clustering has become the most important concept for building and analyzing the competitiveness of nations and cities(Roelandt, Den Hertog, et al., 1999, Jacobs and De Jong, 1992, Langen, 2002). The clustering of business can be explained by the startup of "the value chain" (Jacobs and De Jong, 1992, p. 235), that is the collection of the production activities from design, production to shipping to customers. In the production process, firms would need to pay for the material shipping costs, hiring workers and ship the products. Firms need to be competitive among their rivals in this process in order to gain profits. By geographically aggregated together with similar industries, these firms could share mutual resources such as transportation and labor pool, therefore, reduces costs. Also, the presence of suppliers and customers within the cluster location would also affect as well, the close proximity between the firms and suppliers as well as customers would give an advantage to the business. Lastly, the knowledge spillovers inside the cluster would also be beneficial. This would further enhance their efficiency in the production process, thus creating a collective industry competitiveness of the region(Porter, 1990, Langen, 2002). The forming of clusters would further attract investments both foreign and domestic. This agglomeration of economies could further change the spatial compositions and landscape of the location, further influence FDI decision in the firm's location.

### 2.2 FDI firm location decision factors

When it comes to the firm's location decision, besides the cluster of industries and agglomeration economy, FDI itself has severed as determine factors that influence in this process. As we understand the important role of FDI in globalization and world trade, it is time to further understand the decision-making behind and Multinational Enterprises' (MNEs) action in this process. Firms would decide to establish their business if the reword is higher enough to cover the cost and risk when establishing the process. According to Dunning's OLI paradigm (Dunning, 1977, Dunning and Lundan, 2008), MNEs would decide to invest internationally if the situation satisfies three advantages: ownership (O), location (L), internalizing (I). (O) refers to ownership advantages of the institutions at the level of firms, including the asset and transaction. (L) refers to the location-based advantages that the firms choose to place over abroad. (I) refers to the business advantage if internalizing, meaning if the business has fully or partially owned subsidiaries.

There are four types of FDI, involving the different motivations behind the strategies, they choose to invest internationally, namely: *Market-seeking* FDI, *Efficiency-seeking* FDI, *Resource-seeking* FDI, and *Strategic-asset-seeking* FDI. (Wall, Burger, et al., 2011, p.910)

- Market-seeking FDI: This type of FDI is the most common reason why firms decided to invest aboard, with capital export seeking a new market to operate (Brakman and van Marrewijk, 2008) This kind of FDI usually forms from horizontal FDI (Wall, Burger, et al., 2011) meaning they are in search for nearby mew markets to operate as well as globally.
- Efficiency-seeking FDI: This is the type of the FDI that search for more efficiency in managing firms, usually with a lower cost of labor or taxation, to further lower the cost in producing goods for the global market. It is often vertical FDI.

- Resource-seeking FDI: This type of FDI search for natural resources to extract with a lower cost of production. Therefore, the knowledge and exploit these resources are important motivations to invest in a particular market(Wall, Burger, et al., 2011)this type of FDI is usually vertical FDI as well.
- Strategic-seeking FDI: This is the type of FDI that is motivated by the long-term strategy of global investment objectives. Which the establishment will further gain an advantage in favor of the firm's international competitiveness. It could be the firm's aim in acquiring knowledge, human resource, technology or management strategies, which help the firm to grow in the long-term. This type of FDI could horizontal or vertical FDI.

With the motivation background in mind, researchers also suggested recipient countries' local factors to be influential as well. For example, In China, previous researchers pointed out that the size and location of the market, location of the competitors, information circulation (both publicly-available and private-held), cost of labor conditions (such as wage rate, unionization, unemployment rate), government policies and transportation infrastructures are some of the factors that affect FDI firms' location choice (He, Wang, et al., 2011, Belderbos and Carree, 2002, He, 2002, S. Cheng, 2006, L. K. Cheng and Kwan, 2000, Sun, Tong, et al., 2002). Moreover, recipient countries that have the higher efficiency in the protection of civil and property rights, economic and political freedom and low levels of government corruption, and

high reliability of the credit market would contribute the willingness to invest (Bénassy-Quéré, Coupet, et al., 2007). Furthermore, since "decentralization in economic decision-making, inter-city competition, bargaining nature of localized state apparatus, and low mobilization of community interests," nowadays FDI has more control in location choice regardless of government regulations(Wu, 1999, p.540).

The motivation of seeking profit drives the FDI to act, but the location is determined after careful thought of the actual situation of the local context. Therefore, the location firm chooses to invest in the combination of self-character and local factors interaction. For example, in Wu, (1999) he studied intra-metropolitan FDI firm location in Guangzhou, China. He discovered that although government regulation and policy have an effect on location advantage, it is not drastically different from the access to comprehensive services or amenities that help serve the business. Therefore, local factors such as the distance to Central Business District (CBD), access to major high-ranking hotels and the convention center plays a more important role in determining the location. Wu also pointed out policies that encourage FDIs to aggregate are universal rather than idiosyncratic since every firm in the Economic and Technological Development Zone (ETDZ) can enjoy the same benefits. Overall, service FDI firm's location has some unique features compared to the general industrial manufacturing firms that usually follow the general behavior of location choice, which can be explained by the Classical Neoclassical model(Wu, 2000). Service FDI firm location choice could be linked to the specific context of the policies that recipient city has to offer, and also to fit more into the local customs as well as between social relations. For service providers, the merchandise of its production is usually non-storable and required to be consumed immediately, besides the embodied with goods(Kolstad and Villanger, 2008) As a result, the closeness to the market and the labor conditions, as well as distribution of similar services, become more important(He and Fu, 2008, Hong, 2007).

### 2.3 Foreign Direct Investment and the spillover effects

There is numerous research discuss what FDI can cause other impacts on the host country when investing. FDI is strongly linked to economic growth, which measured by Gross Domestic Product (GDP), therefore often seen as the engine for it in developing countries (Basu and Guariglia, 2007, Encinas-Ferrer and Villegas-Zermeño, 2015). Most importantly, FDI is one of an important indicator for integration in the world economy. In a closed economy, invest equals saving. In a global open economy, world trade generates more possibilities of higher profit since base on the classical factor endowment theory. However, it is not the direct money that contributes to the growth, but other effects that generate more energy in the host country. For example, many research pointed out that FDI brings in skilled workers since at the initial startup for the business requires experienced workers to operate. There are two reasons behind this process, first is MNEs tend to "in possession of technological advantage over domestic firms, yields productivity differences between national and foreign firms influencing wages directly"(Driffield and Taylor, 2000, p. 91), in other words, foreign firms tend to pay more wage because of productivity advantage. This could further cause wage inequality in the host country. The second reason is that even within the same industry, foreign firms tend to have different demands of labor compare to domestic firms (Driffield, 1999). Combined with the labor migration from foreign to domestic firms, FDI could also cause knowledge spill over. (Görg and Strobl, 2005) pointed out after FDI established, workers who once worked for the multinational firms before could start their own business in the same industry with the advantage of higher productivity. This could be the result of the knowledge and management skills acquired from MNEs before that could further be implemented on local firms.

FDI also has a correlation with employment and wage but performs differently between countries. First (Driffield and Taylor, 2000) argued that FDI firms have different employment patterns than domestic firms, foreign firms tend to have a higher skilled ratio of employees than domestic firms do. FDI also create jobs, "Greenfield investment is supposed to have the highest potential for employment creation, as it creates new jobs that did not exist before"(Jude and Silaghi, 2016, p. 34). But increase FDI inflows could have a negative impact on the employment rate since their high efficiency in labor (Conyon, Girma, et al., 2002, Benacek, Gronicki, et al., 2000, Girma, 2005). FDI could have different correlations with the employment rate base on its sector. A research conducted in Nigeria find out that FDI in the manufacturing sector has a positive relationship with employment rate, while FDI in the service sector has a negative relationship (Inekwe, 2013). With wage difference, it differs between countries as well. (Choi, 2006) pointed out that this effect is minor within developed countries and economic booming countries, but stronger in bigger countries and Latin American and Caribbean countries.

Overall FDI would cause employment rate change and wage increase, therefore alter the labor condition of the host country. There are spillover effects caused by FDI, such as knowledge and management skills that will further benefit the domestic firms once the labor migrated, however, the rising of wage condition could lead to unequal distribution, but the effect is different between timescale, different sectors, and host countries.

### **2.4 Housing market factors**

In the previous section, we understand the nature of FDI and its ration in choosing the invest location, however, does FDI causes effects at the location which it chooses? Furthermore, previous research has linked FDI with the cities' economic and spatial structure as well as

pointed out the spillover effects that FDI is causing. However, do these FDI spillover effects influence the housing market and what are the possible channels? We will try to discuss in this section.

The housing market is never determined simply by supply and demand constraint. A desirable environment is likely to increase the housing price of its location(Luttik, 2000). Some researchers argued that it is a mixed composition of local land value and improvement value(Krause and Bitter, 2012, Hwang and Quigley, 2006), others believed that since there is an imbalanced dynamic of demand-supply relation, consumer behavior (McCord, Davis, et al., 2012) and spatial heterogeneity also influence the housing price (Bitter, Mulligan, et al., 2007). Indeed, the most determine factor and well recognized in housing market price is its object's location (McCord, Davis, et al., 2012, Wilhelmsson, 2002, Bitter, Mulligan, et al., 2007) Location could be such an important factor is mostly because of the surrounding environment. To understand this influence, two types of effect are often used to explain, namely *spatial dependence* and *spatial heterogeneity*(Wilhelmsson, 2002).

- Spatial dependence: According to (Wilhelmsson, 2002), spatial dependence means the observation of the location depends on other locations, or in other words, "the spatial dependence of nearby observations" (Krause and Bitter, 2012, p. 21). This observation could result in three effects, such as spillover of the one housing price to its neighbors, other variables that are omitted, and error of measurement, which could have a combined effect.
- Spatial heterogeneity: It refers to the relationships between variables across space(De Graaff, Florax, et al., 2001). Meaning there are effects between a dependent variable (price) and independent variable (space attributes).

Although there are two types of effects, it has been suggested that both effects should be evaluated as a sum. Since it is difficult to separate the effects of both, spatial dependence could be the same as spatial heterogeneity in an observational sense, also, spatial dependence could have "heteroskedasticity" form as well, making it harder to distinguish between the two different processes (De Graaff, Florax, et al., 2001). Therefore, to sum it up, housing price is a complex result of local factors as well as the dynamic relation between demand and supply.

Housing price has a complex relationship with wealth (Malpass, 2008, Stephens and van Steen, 2011). A person's welfare state correlates with one's wage, income, and social security, access to public services, education and income derived by home ownership. To buy a home of oneself, for most people it represents a huge decision-making regarding asset distribution and fanatical balance. It will alter the person's disposable income distribution, reduce the level of saving, and also often to buy a house means taking a mortgage, this will further depend on the accessibility to credit market (Davidoff, 2006). Since housing price is positively correlated with income, households with lower income will be exposed to higher risk when entering house-ownership, and more likely to purchase smaller dwelling since limited access to capital (Davidoff, 2006). Researchers suggested that housing system (housing market and housing policies) and welfare system (labor market and its interactions with the tax and social security system) could have similar outcomes in producing poverty (Ronald, 2008). However, "housing income/ resources arises because by themselves they are distributed far less equally than disposable income, so creating a much higher rate of housing poverty, which occurs predominantly among those who are not income poor" (Stephens and van Steen, 2011, p.1035). This indicates that by improving the housing system, the result could help reduce the poverty impact, regardless of the welfare structure of the state (Stephens and van Steen, 2011).

## 2.5 Conclusion of chapter 2: FDI and Housing price relationship

#### **Spatial Influence**

With the help of previous literature reviews, there are some key concepts that we need to keep in mind in order to further explore the relationship between FDI and housing price. First, FDI is a major important component in globalization, the effects that it cause on recipient country is complex and across different domains. FDI and its decision-making in invest location most affected by government policies and its nature of profit-driven, namely 4 types of FDIs (*Market-seeking FDI, Efficiency-seeking FDI, Resource-seeking FDI, and Strategic-asset-seeking FDI*). Different types of FDI will form different strategies based on acquirable resources and industry clusters, these strategies result in a different location decision.

Housing price is strongly correlated with the location factors. There are two types of effects that influence this process, namely spatial dependence and spatial heterogeneity. Spatial dependence refers to housing price depends on the other observations near the location. Spatial heterogeneity refers to the different attributes of the neighborhood affect the price of the observation over space, in other words, the characteristics and components of the surrounding determines housing price.

FDI tend to strongly depend on the location factors of investment, in other words, certain characteristic of the location combined with policy incentives help the firms' decision-making process. However, these effects have a different result between countries. We argue that after the investment, the services these FDI provides become one of the influence and characteristic of the neighborhoods. With more high-end services and shops, the process will further increase the desirability of these neighborhoods. This result will further contribute to the pressures of residential as well as business housing demand of the neighborhoods, making the housing price to rise. In other words, these investments further initiate the process of gentrification.

#### Social influence

Previous studies have shown that FDI could have multiple spillover effects on the host country, which would change the host country's social conditions. These include knowledge spillover, a driven force for skilled and knowledge-based workers to move and change the wage condition of the host countries. FDI has a positive effect on host countries economic growth and acts as a stimulation of employment. The increase of employment would further increase the pressure on housing demand of the surrounding investment site since more people need to work close by and to move close by, therefore potentially raising the housing price of the surrounding locations. The increased wage condition also contributes to raising the housing price as well. People with more financial sustainability could pay more and take less of loan for purchasing a house, therefore increase the demand for housing in the market and further increase the price. Housing price also has a strong relationship with income and wage. Research has shown that house-ownership affects people's financial balance regarding of income and credit market accessibility. It is still an uncertain trend since in a long run housing capital helps contribute the overall financial capital, however, in short run, a higher price of housing would make young adults less capable of acquiring one's own housing (Bonnet, Bono, et al., 2014).

There is another knowledge spillover effect, which is the spillover of construction knowledge. The new knowledge of construction should reduce the cost of building the dwelling. However, newer construction style might be fashionable or considered a trend in the host country, therefore increase the demand and price for it.

#### **Economical influence**

FDI could also choose to invest in the real estate market directly as well. In this case, it is often addressed as Foreign Real Estate Investment (FREI), and it generally has a positive effect on raising the housing price (Hui and Chan, 2014, Masron and Nor, Abu Hassan Shaari Md, 2016, Guest and Rohde, 2017). FREI could easily be seen in the countries with a dramatic growth in the real estate market (Hui and Chan, 2014). For example, in China, the real estate market has been booming since the open-door policy was implemented. After 2001 when China joined WTO the market was once again further open to the world, especially in service sectors. FREI started to pour in since "the land reform in the late 1980s which separated transferrable land use rights from state ownership, foreign investment in China's real estate market has kept on growing at a rapid rate" (Hui and Chan, 2014, p. 232). Researchers think FREI is correlated with the fact that developing countries absorb a large amount of foreign capital, and spillovers of investment from other markets could happen. Also, with the new market opening, it is important for the MNEs to "access potentials large market, or to establish a foothold in the market, accumulation of experience in the market, gaining a dominant position", also, tax incentives provided by the host country could contribute to the increase of FREI as well(Gholipour Fereidouni and Ariffin Masron, 2013, p. 452). Therefore, host countries with higher property prices are more favorable to FREI; regions with higher growing rate of housing prices would attract FREI as well(Guest and Rohde, 2017, Gholipour Fereidouni and Ariffin Masron, 2013).

### **2.6 Conceptual Framework**

Base on literature, we understand that FDI invest decision depends on factors of the location, we argue that after these investment took place, the business would further influence the surrounding through direct effect as well as indirect spill over effects, continue to change the characteristic of the location. Therefore, our independent variable is the FDI investment location, which will influence the dependent variable, which is the investment location's districts as well as neighboring districts' housing price in the Netherlands. We argue that this process will be mediate by the nature of FDI (i.e. types, value, source), causing different degree of housing price change over time.

Figure 4: Conceptual Framework



## **Chapter 3: Research Design and Methods**

In this chapter we will discuss how the research is conducted, the methodology and what are the independent variables, as to how to evaluate the effects on the depend variable.

### **3.1 Revised Research Question(s)**

The main research question:

"Do FDI location choices have an impact on local housing prices?"

### **3.2 Research Strategy**

In order to resolve this kind of question, we need to address according to the nature of our research question. Our research question asks how the FDI effect surrounding housing price over time, therefore we are required to have FDI data as well as housing price data in the Netherlands on a district scale. Since the Netherlands is a developed country, previous research and data collection have been sufficient, therefore, with the eligible resource; desk research combined with second-hand data analysis is preferable to answer this question. To be more specific, statistical/secondary analysis of desk research suits best for our research (Van Thiel, 2014).

In order to isolate the effects of FDI location to the surrounding housing price, we should have two parts of data processing in order to neutralize other spatial heterogeneity effects on housing price. First, we would need to identify the districts with FDI investment. By using ArcGIS Pro software, we can map down the FDI location by using coordinates. After mapping and joint the attributes, we extract the data combined with districts attributes for further analysis. With the combined data, we can run the Spatial Econometrics Model regression to determine FDI effects on housing price over space distribution and to evaluate FDI effects on the surrounding districts as well.

### 3.3 Research Methodology

As we know based from previous research, to evaluate the effects of FDI on its location neighborhoods, the nearby neighborhoods with FDI would also impact the effect. Therefore, we need to take space into consideration as well. Spatial Econometrics is the method for this task. This approach could evaluate multivariate cross-sectional data, unlike the standard hedonic approach; this method incorporates a spatial weights matrix into a standard multivariate analysis (Elhorst, 2014). Thus, the housing price is a function of FDI characteristics, and spatial dependence. With the cross-sectional data, spatial panel data models can be express as below:

$$Y_{it} = \alpha_t + \delta W Y_{it} + \beta X_{it} + \theta W X_{it} + \varepsilon_{it}$$

Where *i* is the neighborhood (spatial units), when i=1,..., N, and *t* is an index for the time dimension (time periods), with t=1,...,T. This model could explain four effects of the correlation:

- 1) Neighboring neighbor's Y value effect on our dependent variable:  $\delta W Y_{it}$
- 2) The district's own characteristic (X) effect on dependent variable:  $\beta X_{it}$
- 3) Neighboring neighbor's characteristic (X) effect on dependent variable:  $\theta W X_{it}$
- 4)  $\varepsilon$  means the unexplained residues of the equation, also residual effects on dependent variable

The W refers to the spatial Weight Matrix, which is expressed as below:

$$W = \begin{cases} 0 & \omega_{1,2} & \dots & \omega_{1,N} \\ \omega_{2,1} & 0 & \dots & \omega_{2,N} \\ \vdots & \vdots & \ddots & \vdots \\ \omega_{N,1} & \omega_{N,2} & \dots & 0 \end{cases}$$
$$\omega_{ij} = \begin{cases} 1, & \text{if } i \text{ is a neighbour } of j \\ 0, & \text{otherwise} \end{cases}$$

Generally, a spatial weight matrix is an N \* N matrix that describes the spatial arrangement of the spatial units(Elhorst, 2001). In the binary contiguity matrix, it only distinguishes between neighboring observations and non-neighboring observations. Here in W, the N \* N spatial weights matrices the diagonal elements are set to 0, others are defined as 1 if it is a neighbor, 0 if otherwise. For this research, we set up the weight matrix as within 5 km distance, within 5 km the districts will be considered as neighboring, and beyond 5 km will be considered not.

In this research, we use spatial Durbin model as our spatial panel data model; we argue this model could reflect the relationship between FDI and local housing price. Spatial Durbin Model was purposed by James LeSage, because of its ability to "include both endogenous and exogenous interaction effects" (Elhorst, 2014, p. 6). Other models such as spatial lag model or spatial autoregressive model only takes one of the interaction effects. Which could result in inaccurate calculation of the actual relationship and possible endogeneity problems. Spatial autoregressive model takes endogenous interaction effects, and spatial error model also takes error terms into account (Elhorst, 2014). Spatial Durbin model were selected for this research because of the complexity of our dataset. With 2,181 districts, the matrix will be in 2,181 \*2,181 matrix, making it very difficult to calculate and include a spatial error term. Therefore, we argue with spatial Durbin model capturing both dependent and explanatory variables' spatial effects will be enough to reflect the nature of our research site and the most suitable for this research. Graph 1 gives an overview of the relationships between different spatial dependence models and different combinations of interaction effects that can be considered, as well as different spatial effects that each model could capture.

#### Graph 1 The relationships between different spatial dependence models for crosssection data



Source: (Elhorst, 2014, p. 9)

### **3.4 Operationalization: variables, indicators**

To analyse the effects of FDI on housing price, we first need to locate the FDI in the Netherlands. By using FDI data from FDi Markets database and combined with geographical coordinates with ArcGIS, along with our control variables which are selected based on literature review, we can measure and identified the attributes of each neighbourhoods along with the FDI locations, forming a district scale of investment map in the Netherlands. However, there might still be some variables that cannot be observed, which would still be potentially attractive characteristics for FDI.

We then look into different variables and their indicators that should help us measure the process. To select independent variables, base on the data availability and literature review. Base on the theory of spatial heterogeneity, we know that housing price is determined by it own characteristic as well as surrounding characteristics. Therefore, we want to evaluate the effects of FDI, we first need to isolate them as part of the spatial characteristics in the districts. Table 1 shows the independent variable that this research wishes to test. The main source of this data is FDi Markets, with the values of the investment as well as investment count from 2007 to 2015.

Table 1: Independent variable					
Concept	Variables	Indicator	Source	Value	Expected impact
Spatial Hetero geneit y	FDI count	Numbers of FDI in the districts	FDi Markets	count	+

FDI capital Investment FDi Markets US\$ million + value in the districts	
--	--

Table 2 shows the dependent variables that we wish to analysis. Housing price is determined by the surrounding factors as well as location factors and it's own characteristic. We wish to understand fully the impact on the housing price market as well as rent, which is an part of relatively large proportion in people's monthly expenditure, therefore for the dependent variables we choose average price of first and second hand price in the districts of the Netherlands.

Table 2: Dependent variable				
Variables	Indicators	Source	Value	
Housing price	The value of average purchase price of first & second hand housing in the districts	CBS	1,000 Euro	

Control variables are the variables we wish to control in order to isolate the effects that FDI causes. In Table 3 is showing the location factors and district characteristics that have an impact on housing price as well. By control them in regression models we should truly evaluate the effects of FDI location factors on housing price.

Table 3: Control variable of the neighbourhoods				
Concept	Variables	Indicators	Descriptions	
	Housing market	Housing stock	The total number of dwellings	
District Characteristics	Income	Average income of the district	Average income per income receiver	
	Ownerships Ownerships Business	Purchased	House residents have purchased the house	
		Rented	House residents have rented the house	
	Business	All business firms	Number of all business firms in the district	
		Agriculture business firms	Number of agriculture firms in the district	
	Living amenities	Accessible restaurants	Average distance to nearest restaurant	

		Accessible hotels	Average distance to nearest hotel
		Accessible department- stores	Average distance to nearest department store
	Hospital accessibility	Accessible hospitals	Average distance to the nearest hospital
	Education accessibility	Accessible education	Average number of primary schools within 1 km
			Average number of secondary schools within 5 km
			Average number of secondary vocational education within 5 km (VMBO)
			Average number of higher general secondary education within 5 km (HAVO)
	Child care accessibility	Accessible kindergarten	Average number of kindergartens within 1 km
		Accessible afterschool care	Average number of afterschool cares within 5 km
ion icteristics	Location accessibility	Train station accessibility	Average distance to the nearest transit station
		Transportation accessibility	Average distance to the nearest train station
Locat Chars		Transportation accessibility	Average distance to the nearest main route

## 3.5 Reliability and Validity

The research scope of this study is within the Netherlands. For the time scope, this research is between 2007-2015, with nine years of a period. One major challenge for this research's reliability is the integrity of the dataset. With some indicators having missing values, will further limit the timescale we could have examined. However, since the secondary data is obtained from respectful and authentic sources such as FDi Markets CBS *Wijken en Buurten* datasets, the internal validity of this research should still be considered strong.

However, as previous research has suggested, the effects of FDI tend to have mixed results mostly because it strongly depends on the local context, therefore the results of this research could be more explanatory to the Netherlands situation, and might be different in other countries, hence lower external validity.

Graph 2 Study area



## **Chapter 4: Research Findings**

In this chapter presents the research finding based on statistical analysis. We will first discuss the composition of the dependent and independent variables as well as control variables that influence the relation between FDI and housing price. Afterwards the second part would be the inferential analysis and the results, which further answer our research question.

### 4.1 Descriptive analysis

The housing data we used to analyze is from CBS *wijken en buurten* database, the data contained the average housing price combined from first and second-hand housing, as well as districts characteristics and demographic information. Through data organization, we select 2,181 districts that have been consistent though out 2007 to 2015 for a continuous evaluation over 9 years. The FDI data is from FDi Markets dataset, it contains the FDI around the world that invest in the Netherlands from 2007 to 2015, with investment count and value (capital) of the investments as well as the location coordinates.

#### 4.1.1 Trend and pattern of housing price in the Netherlands

Figure 6 shows the average housing price of the dataset from 2007 to 2015. In the CBS dataset average district housing price varies from lowest  $\in$  229,190 to highest  $\in$  273,080. The trend of housing price started to climb since 2007 and reach the highest point in 2010; after 2010 the price started to decline gradually till 2015.



Figure 5 Average housing price trend in the Netherlands (2007-2015)

Table 4 is the summary of dependent variable, the housing price. Combined within 9 years of observations, the total observation of housing price is 18,729, with 900 missing values. The mean value of housing price is around  $\notin$  255,000, whereas minimum being  $\notin$  30,000 and maximum being  $\notin$  1,412,000. As shown in table 4, the average housing price of each district varies quite differently.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Housing price	18,729	255.2752	92.537008	30	1412

 Table 4 Summary of housing price variable

Graph 3 show how did the spatial distributions of the housing price at the district level changed over time. We use the data from 2007, 2011 and 2015 to represent different stages of the complete dataset. The difference is presented in different colors, with red being the highest and light blue being the lowest. The missing values are labeled as dark blue. In the comparison graphs, we can see the districts with higher housing price usually located close to cities and the Randstad region, especially close to Amsterdam, Den Haag, and Rotterdam. Whereas the northeast and southwest part of the country has a lower average housing price compare to the *Randstad* region. However, these districts with higher housing prices are not necessary within the city, suggesting that the closeness to the city amenities has some positive effect on housing price, but other natural amenities such as open green space or large water body also contribute to the housing price as well. Another noticeable difference in the northeast part of the country is that housing price is higher when closer to Groningen. Indicate that Groningen is a core city of the region, and it provides the necessary amenities that people favor. When comparing the change from 2007, 2011 and 2015, we can see although the region close to Amsterdam remains to be the highest housing price location, the southern part of the country namely close to Eindhoven has gradually become more and more expensive and aggregated. Also, regions in between Utrecht, Amersfoort and Zwolle became more condensed regarding housing price over time. The full comparison of housing price distribution from 2007 to 2015 could be seen in Annex 1.



#### Graph 3 Comparison of housing price distribution in the Netherlands





In table 5 lists the top 20 districts with highest average housing price. The districts with the highest housing price are mostly located close to the *Randstad* region, but not directly in the city center. This could indicate that although people value the convenience of closeness to amenities that a city can provide, there are other characteristics that people value and they influence the housing value as well. For example, larger green space and construction site could lead to bigger house unit and designs, therefore reduce the number of housing in the districts, and further raise the average of housing price. Also, average district housing price is almost the double of the 12th. This could heavily correlate with other characteristics of the districts.

Rank	District name	Municipality	Average housing price
			(1,000 euro)
1	Wijk 02 Buitenwijken	Huizen	1317,333
2	Wijk 02 Aerdenhout	Bloemendaal	1000,111
3	Wijk 00 Zuidwestelijk deel der gemeente	Wassenaar	974,2222
4	Wijk 03 Erica en Tafelberg	Huizen	885,3333
5	Wijk 03 Buitengebied Bergen	Bergen (NH.)	798,3333
6	Wijk 02 P.H.W.park	Baarn	681,6667
7	Wijk 03 Spiegel	Bussum	659
8	Wijk 00 Bloemendaal	Bloemendaal	633,3333
9	Wijk 01 Brediuskwartier	Bussum	619,5556
10	Wijk 32 Vechtlanden	Zwolle	618,3333
11	Wijk 18 De Berg Noord	Amersfoort	611
12	Wijk 01 Overveen	Bloemendaal	605,2222
13	Wijk 06 Van Stolkpark en Scheveningse Bo	's-Gravenhage	596
14	Wijk 01 Blockhovepark	Heiloo	593,4444
15	Verspr.h. westen en noorden Moerg.	Oisterwijk	593
16	Wijk 03 Westbroekpark en Duttendel	's-Gravenhage	579
17	Wijk 03 Bosgebied	Epe	578,6667
18	Wijk 27 Buitengebied West	Amersfoort	567
19	Wijk 10 Zorgvliet	's-Gravenhage	560,7778
20	Wijk 13 Vogelwijk	's-Gravenhage	550,2222

Table 5 Top 20 districts with the highest housing price from 2007-2015

#### 4.1.2 Trend and pattern of FDI in the Netherlands

The FDi Markets database has provided FDI in the Netherlands from 2007 to 2015. However, due to data limitation, the function of FDIs could not be acquired therefore different functions of FDI and their influence differences could not be further evaluated. However, with FDI count and capital data present, we can still analyze if FDI is correlated with housing price, what is the trend of this relationship.

As shown in figure 7, over nine years of investment in the Netherlands there is a positive trend of increasing investment numbers. The number gradually increases over the years with only slightly drop in 2008 and 2012. Overall there has been 63% growth in investment counts, which is an average of 7% per year.



Figure 6 FDI count in the Netherlands

In figure 8 we can see the trend of FDI capital change over nine years. As similar to the count of FDI, the trend is positively increased over the years. There were two slightly drop of FDI capital in 2009 and 2012, possibly owing to the global economic recession because of the second mortgage crisis affected across the world. Overall there has been over 28% of growth in investment capital, reaching 2,2749 million USD in 2015. A noticeable difference between FDI count and FDI capital is that the highest count occurred in 2015, whereas the highest investment capital happened in 2014 and reaching 2,476.56 USD, but the investments were only accounted for 92 times.
**Figure 7 FDI capital in the Netherlands** 



In figure 9 and 10 show the results when we further analyze the detailed industries that composed the FDI in the Netherlands from 2007 to 2015. In the overall nine years of investments, the majority of investing industry is in Software & IT service, reaching 200 times of investments. Following up in the second is the Business services, which received 121 times of FDI count. The industries that invest in the Netherlands much higher than other could indicate there are potential needs in the fields and profitable returns. Also, in developed countries, higher investment industries could indicate there is a strong market and labor pool located in the recipient country, therefore further strengthen the business ability to access close by markets and secure the position in global trade. The following up in the top 5 industries are Financial services (83), Communications (75), and Transportation (40).



#### Figure 8 Total FDI count in different industries between 2007-2015

In figure 10 we can see the overall percentage of the shares in different industries that invested in the Netherlands from 207 to 2015. The industry that had the largest count is the Software & IT services that occupies 26% of investment counts. Second in line which is the Business services, occupied 19%. And following up by Financial services that take 15% of the investment counts. A noticeable trend in this figure is that the top 3 industries taken over half of the total investment counts in nine years, therefore indicating the leading role of the Netherlands plays in related fields.



### Figure 9 Share of FDI counts in different industries between 2007-2015

In Figure 11 presents the capital of all the FDI happened from 2007 to 2015. A huge difference between the count and capital is the largest investment capital fell within Communication industry, in total worth of 5,345 million USD invested in the Netherlands. Which was different form the largest count being in Software & IT services. The second largest invested capital being in the Software & IT services, which had 3198.24 million USD in the field. In the top 5 invested capitals also included Financial services (2192.7 million USD), Business services (1536.04 million USD) and Real-estate (764.8 million USD). Notice the Real-estate industry only taken 16 investment counts in 9 years, but the investment capital is significantly large compared to other similar counts of industries. This could indicate that investment in real estate in the Netherlands requires a higher capital cost since the price is relatively higher compared to other countries or industries.





In figure 12 show the percentage of capital shares in different industries that invested in the Netherlands from 207 to 2015. The industry that received the largest capital input is Communications, which occupies 33% of total capital. Second in line, which is Software & IT services that occupies 20%, following up by Financial services that takes up 14% of the investment capital. It is also a noticeable trend in this figure that the top 2 industries which have already taken over half of the total investment value in nine years, therefore indicates the importance of these fields in the economy and global trade position of the Netherlands.





Looking at the investment locations, we found out in the Netherlands the majority of FDI goes to the city regions. In Amsterdam the capital city received 384 counts of FDI from 2007 to 2015, making it in the top 1 of all the cities that have received FDI. The number is over 6 times as the second city (Rotterdam) has received (58). Overall the top 10 cities have over 80 percent of both counts and value of FDI. However, Groningen received over 1,017 million USD in the past nine years, making it the second in the ranking for receiving FDI capital. Graph 4 further demonstrates the spatial distribution of FDI from 2007 to 2015. As shown in the map, the FDI locations are mostly close to the cities, and especially aggregate around Amsterdam, Den Haag, and Rotterdam. Also, there are noticeable clusters in Eindhoven and Arnhem as well. However, *Randstad* region cities are classical network cities(Batten, 1995), as besides large cities served as main hubs, other small cities would serve as nods and connections and further form a well-connected network metropolitan area. But overall these cities have comparable capacity and closeness to attract all types of FDI; therefore the distribution of FDIs in different industries should not separate significantly if without policy restriction or incentives to regulate the spatial distribution.

Rank	Municipality	FDI capital	FDI count
1	Amsterdam	8905.93	384
2	Rotterdam	946.6	58
3	The Hague	804.59	49
4	Eindhoven	469.25	34
5	Utrecht	818.4	30
6	Leiden	132.4	15
7	Arnhem	368.5	12
8	Haarlemmermeer	104	12
9	Almere	314.8	10
10	s Hertogenbosch	96.8	9
11	Breda	48.3	9
12	Groningen	1017.09	8
13	Zwolle	283.9	6
14	Venlo	22.72	6
15	Almelo	14.34	6
16	Oss	82.5	5
17	Wageningen	73.8	5
18	Amersfoort	58.2	5
19	Hilversum	26.4	5
20	Apeldoorn	173	4

Table 6 Top 20 municipalities receive FDI from 2007-2015

In table 7 shows the summary of the independent variables' observation information. Over nine years of FDI in 2181 districts, over nine years result in 19,629 observations. The maximum count received by on district is 18, and the maximum capital is 757.19. The minimum for both FDI count and capital is 0. The neighboring FDI count and capital represents the FDI count and capital calculated with a spatial weights matrix, to further represent the neighboring effects of FDI. The matrix varies depending on the closeness of the districts. Based on the literature review, we select the districts that within 5km distance will have a weights effect, beyond 5km will be considered as no spatial effect.

Variable	Obs.	Mean	Std. Dev.	Min	Max
FDI count	19,629	0.03423	0.37191	0	18
FDI capital	19,629	0.3884895	7.33782	0	757.19
Neighboring	19,629	0.0309761	0.23601	0	12.93

#### **Table 7 Summary of FDI variables**

FDI count					
Neighboring FDI capital	19,629	0.3465941	3.58310	0	376.83

# Graph 4 The spatial distribution of FDI in the Netherlands



### 4.1.3 Factors influencing the relationship between FDI and housing price

In this section, we briefly introduce the control variables that represent the district characteristics. The neighboring housing price represents the neighboring districts' housing price effect, which is the district housing price calculated with a spatial weights matrix. The maximum is 715.3985, and minimum being 0. Housing stock represents the number of total dwellings in the district on the 1th of January of the relevant year; therefore it is an indicator of the size in the housing market in each district. Income represents the average income per income recipient (1,000 euro), which indicate the finical status of the residents in the district. Purchased housing and Rented housing represent the percentage of house ownership in the district, purchased refers to the owner buys its own dwelling, rented refers to renting the dwelling. Hospital distance refers to the average distance of all residents in the district to the nearest hospital. Primary schools within 1 km refer to within 1 km distance by road, the number of primary schools accessible for all residents. Secondary schools within 5 km refer to within 5 km distance by road, the number of secondary schools accessible for all residents. VMBO within 5km refers to within 5 km distance by road, the number of secondary vocational schools accessible for all residents. HAVO within 5km refers to within 5 km distance by road, the number of secondary higher general secondary education schools accessible for all residents. Restaurant distance refers to the average distance of all residents in the district to the nearest restaurant. Hotel distance refers to the average distance of all residents in the district to the nearest hotel. Day care within 1 km refers to within 1 km distance by road, the number of day cares accessible for all residents. Afterschool care within 1 km refers to within 1 km distance by road, the number of afterschool care accessible for all residents. Distance to the main route refers to the average distance of all residents in the district to the nearest main route. Distance to train station refers to the average distance of all residents in the district to the nearest train station. Distance to transit station refers to the average distance of all residents in the district to the nearest transit station. Agriculture firms refer to the number of business companies in the district that is within the agriculture sector. All firms refer to the number of all business companies in the district. Department store within 5km refers to within 5 km distance by road, the number of department stores accessible for all residents.

These characteristics are the factors that influence housing price of the district, as well as influencing factors for FDI location. Therefore it is important to include them in the spatial weighted panel regression. These factors were included in separate models to examine their roles in affecting FDI on housing price., all the interactions are included in one model in steps to see if their effect is preserved in the presence of other factors in determining the relationship between FDI and housing price.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Neighboring housing price	19,629	230.6876	80.9613	0	715.3985
Housing stock	19,629	2895.073	4543.424	0	77969
Income	14,566	30.06818	5.795478	15.6	95.8

#### **Table 8 Summary of control variables**

Purchased housing	14,949	65.62044	15.78196	0	100
Rented housing	14,949	33.53241	15.57389	0	100
Hospital distance	19,478	8.568631	6.355039	0.5	72.5
Primary schools within 1 km	19,363	1.43611	1.112856	0	13.1
Secondary schools within 5km	19,443	3.910276	5.192654	0	37.1
VMBO within 5km	19,443	2.896703	3.700311	0	25.5
HAVO within 5km	19,443	2.090022	2.913752	0	23
Restaurant distance	19,484	1.194601	1.015243	0.1	10.9
Hotel distance	19,484	2.979429	2.142856	0.1	16
Day care within 1km	19,472	1.125514	1.61138	0	19.9
Afterschool care within 1km	19,472	1.162808	1.359612	0	11.5
Distance to main route	19,443	1.897722	2.482221	0.1	46.3
Distance to train station	19,443	7.348742	8.120428	0.2	59
Distance to transit station	19,443	13.93549	10.71176	0.2	71.9
Agriculture firms	19,629	12.27291	28.84412	0	385
All firms	19,192	143.4759	364.1141	0	12680
Department store within 5 km	19,477	2.028926	2.593777	0.1	42.1

### 4.2. Empirical analysis

In this section, we analyze spatial Durbin model of FDI on housing price on a panel of 2181 districts in the Netherlands over the period of 2007 to 2015. Table 9 demonstrates 4 models with FDI count, and in Table 10 demonstrates 4 models with FDI capital.

### 4.2.1 FDI count and housing price

We argue the effect of FDI on housing price relies on the location factors as well as other spillover effects, therefore to identify the FDI effect we need to control other effects. Table 9 demonstrates 4 models with all the dependent variable being housing price, and the independent variable being the FDI count. Spatial Durbin model were used in order to evaluate the neighboring districts effects, namely the neighboring housing prices and neighboring FDI counts. Time Lag was also added to reflect the fact that FDI will not affect housing price immediately but gradually affects over time. Control variables are the variables that determine the district characteristics, such as income level, housing stock situation, and amenities accessibility. Year fixed effects were included as well to control the aggregated effects over time.

	Model 1.	Model 2.	Model 3	Model 4.
Variable	Housing price	Housing Price	Housing price.	Housing price
Neighboring	0.259***	0.259***	0.262***	0.263***
Housing price	(0.0609)	(0.0609)	(0.0624)	(0.0625)
FDI Count		1.730**	2.857***	
		(0.788)	(0.952)	
L.FDI count	1.440*			2.308**
	(0.791)			(1.086)
Neighboring FDI		-0.660	-0.0527	
count		(1.722)	(1.854)	
L. Neighboring FDI	0.104			0.935
count	(1.706)			(1.839)
Housing stock	-0.000482	-0.000515	-0.000600	-0.000538
	(0.000488)	(0.000492)	(0.000533)	(0.000548)
Income	2.395***	2.392***	2.861***	2.871***
	(0.560)	(0.560)	(0.702)	(0.701)
Purchased housing	0.319**	0.317**		
	(0.136)	(0.137)		
Rented housing	-0.579***	-0.581***		
	(0.195)	(0.195		

Table 9 Spatial panel models of FDI count, fixed effects

Hospital distance	-0.381*	-0.384**	-0.382*	-0.373*
	(0.195)	(0.196)	(0.203)	(0.202)
Primary schools	-12.37***	-12.29***		
within 1 km	(2.837)	(2.831)		
Secondary schools	2.180***	2.180***		
within 5km	(0.434)	(0.438)		
VMBO within 5km	-0.946*	-0.948*		
	(0.526)	(0.523)		
HAVO within 5km	-0.217	-0.251		
	(0.742)	(0.733)		
Restaurant distance	1.384**	1.381**	1.941***	1.951***
	(0.610)	(0.610)	(0.708)	(0.708)
Hotel distance	0.692*	0.692*	0.906**	0.908**
	(0.360)	(0.360)	(0.446)	(0.446)
Day care within	1.193***	1.191***		
IKIII	(0.390)	(0.396)		
Afterschool care	-2.192***	-2.186***		
WIUIIII IKIII	(0.517)	(0.519)		
Distance to main	0.627	0.615	0.821	0.839
route	(1.303)	(1.304)	(1.545)	(1.546)
Distance to train	-0.00165	0.00529	0.541	0.539
station	(0.548)	(0.548)	(0.661)	(0.661)
Distance to transit	1.649	1.644	1.006	0.994
station	(1.216)	(1.216)	(1.427)	(1.429)
Agriculture1 firms	0.0304***	0.0307***	0.0412***	0.0408***
	(0.00900)	(0.00898)	(0.00929)	(0.00933)
All firms	-0.00151	-0.00162	-0.00255**	-0.00242**
	(0.00107)	(0.00101)	(0.00103)	(0.00111)
Department store	0.395	0.397	1.004	1.007

	(0.702)	(0.702)	(0.070)	(0,000)
within 5 km	(0.782)	(0.782)	(0.979)	(0.980)
2010. year	0.761***	0.749***	0.0418	0.0699
	(0.288)	(0.289)	(0.332)	(0.328)
2011. year	-2.948***	-2.984***	-4.100***	-4.037***
	(0.628)	(0.626)	(0.612)	(0.617)
2012. year	-11.45***	-11.45***	-11.44***	-11.45***
	(1.026)	(1.020)	(1.112)	(1.123)
2013. year	-19.14***	-19.16***	-19.76***	-19.74***
	(1.447)	(1.448)	(1.541)	(1.544)
2014. year	-29.50***	-29.53***	-27.82***	-27.76***
	(2.127)	(2.126)	(2.129)	(2.135)
2015. year	-35.98***	36.00***	-33.66***	-33.58***
	(2.459)	(2.463)	(2.443)	(2.447)
Constant	127.0***	127.5***	101.4***	100.8***
	(30.97)	(31.03)	(32.63)	(32.65)
Observations	14,407	14,407	14,443	14,443
Number of districts	2,089	2,089	2,092	2,092
R-squared	0.699	0.699	0.670	0.699

Robust standard errors in parentheses

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

The result has shown that there is a relationship between FDI count and housing price. The significant p-values in all four models of the neighboring housing price indicate close by neighbours' housing price has a strong correlation with location housing price as well, and all four models have a positive effect on location housing price. In other words, if the surrounding housing prices were higher, the location's housing price would be higher as well. FDI count has a positive effect on its location's housing price but does not significantly influence surrounding house prices. Income has a positive relationship with housing price, and so is the percentage of ownership of the house. The higher the purchased rate is the higher the housing price will be. Therefore the rented rate is negatively correlated with housing price. Distance to restaurants, hospitals, department stores and hotels, transportations accessibilities were included in all 4 models to represent the amenities that affect district characteristics as well as factors that attract FDI. Hospital distance is negatively correlated with housing price, meaning the further the distance the cheaper the housing price is. Restaurants and hotels are the opposite; the closer they are the cheaper the housing price is. The reason behind this could be these amenities usually represent a mixed-use of urban space and context, which usually are closer to the city center. Therefore it is understandable a more unify suburban area would have higher housing prices since the type of housing tends to be

different, and housing units are bigger than the ones close to the city center. The distance to transport amenities are not significant in all four models, perhaps correlating with FDI counts they are not the most influential factors. Agriculture firms were significantly correlated with housing price in four models. The result is explainable since agriculture firms are generally close to production areas, and farmland-housing units tend to be more expensive since the unit and land are bigger than the city center. Different level of educations has different effects with FDI on housing price. Accessibility to secondary education is positively correlated with FDI on housing price, but accessibility to primary and secondary vocational schools are negatively correlated. Accessibility to general higher education is not significant.

With Model 1 and Model 2 we included all the variables to compare with and without the time lag effect. The results show that both models the count of FDI are both significantly correlates with housing price, whether including time lagged effects or not. Without the time lagged effect, FDI count with the coefficient of 1.730 indicates that with increase 1 unit of FDI investment, the housing price will increase l,730. With the time lagged effect, FDI count with the coefficient of 1.440 indicates that with increase 1 unit of FDI investment, the housing price l,440 in the next year. The positive coefficients indicate that it is positively correlated with housing price of its location. But in both models the neighboring FDI counts, they do not significantly influence housing price.

### 4.2.2 FDI capital and housing price

In these four models, we evaluate the effect of FDI capital on housing price. Same as the models with FDI counts, the dependent variable being housing price, but the independent variable change into FDI capital. Spatial Durbin model were added on in order to evaluate the neighboring districts effects, namely the neighboring housing prices and neighboring FDI capitals. Time lag was also added to reflect the fact that FDI will not affect housing price immediately but gradually affects over time. Control variables are the variables that determine the district characteristics, such as income level, housing stock situation, and amenities accessibility. Year fixed effects were included as well to control the aggregated effects over time.

		-		
	Model 5.	Model 6.	Model 7.	Model 8.
Variable	Housing price	Housing Price	Housing price.	Housing price
Neighboring Housing	0.258***	0.259***	0.263***	0.263***
price	(0.0605)	(0.0609)	(0.0625)	(0.0625)
FDI capital		0.00330	0.00787	

	Table 10 Spatial	panel regression	models of FDI ca	apital, fixed	effects
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		(0.0126)	(0.0105)	
L.FDI capital	0.0211**			0.0254**
	(0.00864)			(0.0121)
Neighboring FDI		-0.0218	-0.0228	
capital		(0.0274)	(0.0294)	
L. Neighboring FDI	0.00918			0.00131
capital	(0.0210)			(0.0164)
Housing stock	-0.000533	-0.000404	-0.000393	-0.000397
	(0.000505)	(0.000463)	(0.000533)	(0.000533)
Income	2.417***	2.397***	2.879***	2.880***
	(0.566)	(0.560)	(0.702)	(0.702)
Purchased housing	0.326**	0.320**		
	(0.135)	(0.136)		
Rented housing	-0.584***	-0.577***		
	(0.196)	(0.196)		
Hospital distance	-0.368*	-0.379*	-0.371*	-0.371*
	(0.189)	(0.195)	(0.202)	(0.202)
Primary schools	-12.17***	-12.39***		
within 1 km	(2.822)	(2.841)		
Secondary schools	2.260***	2.199***		
within 5km	(0.437)	(0.441)		
VMBO within 5km	-0.632	-0.922*		
	(0.512)	(0.526)		
HAVO within 5km	0.370	-0.185		
	(0.726)	(0.744)		
Restaurant distance	1.427**	1.394**	1.966***	1.970***
	(0.617)	(0.612)	(0.712)	(0.712)
Hotel distance	0.705*	0.693*	0.906**	0.906**
	(0.363)	(0.360)	(0.446)	(0.446)
Daycare within 1km	1.304***	1.201***		
	(0.391)	(0.395)		

Afterschool care	-2.121***	-2.218***		
within 1km	(0.515)	(0.526)		
Distance to main	0.572	0.611	0.799	0.791
route	(1.293)	(1.309)	(1.557)	(1.556)
Distance to train	0.0214	0.00334	0.551	0.552
station	(0.549)	(0.548)	(0.663)	(0.663)
Distance to transit	1.562	1.656	0.965	0.963
station	(1.216)	(1.219)	(1.433)	(1.433)
Agriculture firms	0.0289***	0.0306***	0.0412***	0.0413***
	(0.00926)	(0.00898)	(0.00930)	(0.00929)
All firms	-0.00140	-0.00164	-0.00272**	-0.00274**
	(0.00111)	(0.00112)	(0.00114)	(0.00112)
Department store	-0.0385	0.407	1.028	1.029
within 5 km	(0.0506)	(0.783)	(0.985)	(0.985)
2010. year	0.680**	0.753***	0.0529	0.0579
2010. year	0.680** (0.321)	0.753*** (0.288)	0.0529 (0.330)	0.0579 (0.329)
2010. year 2011. year	0.680** (0.321) -3.092***	0.753*** (0.288) -2.979***	0.0529 (0.330) -4.123***	0.0579 (0.329) -4.123***
2010. year 2011. year	0.680** (0.321) -3.092*** (0.649)	0.753*** (0.288) -2.979*** (0.638)	0.0529 (0.330) -4.123*** (0.629)	0.0579 (0.329) -4.123*** (0.627)
2010. year 2011. year 2012. year	0.680** (0.321) -3.092*** (0.649) -11.66***	0.753*** (0.288) -2.979*** (0.638) -11.47***	0.0529 (0.330) -4.123*** (0.629) -11.51***	0.0579 (0.329) -4.123*** (0.627) -11.51***
2010. year 2011. year 2012. year	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094)	0.753*** (0.288) -2.979*** (0.638) -11.47*** (1.031)	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128)	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126)
2010. year 2011. year 2012. year 2013. year	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094) -19.36***	0.753*** (0.288) -2.979*** (0.638) -11.47*** (1.031) -19.18***	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128) -19.84***	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126) -19.84***
2010. year 2011. year 2012. year 2013. year	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094) -19.36*** (1.508)	0.753*** (0.288) -2.979*** (0.638) -11.47*** (1.031) -19.18*** (1.457)	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128) -19.84*** (1.557)	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126) -19.84*** (1.557)
2010. year 2011. year 2012. year 2013. year 2014. year	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094) -19.36*** (1.508) -29.74***	0.753*** (0.288) -2.979*** (0.638) -11.47*** (1.031) -19.18*** (1.457) -29.55***	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128) -19.84*** (1.557) -27.84***	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126) -19.84*** (1.557) (2.142)
2010. year 2011. year 2012. year 2013. year 2014. year	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094) -19.36*** (1.508) -29.74*** (2.142)	0.753*** (0.288) -2.979*** (0.638) -11.47*** (1.031) -19.18*** (1.457) -29.55*** (2.134)	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128) -19.84*** (1.557) -27.84*** (2.142)	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126) -19.84*** (1.557) (2.142)
2010. year 2011. year 2012. year 2013. year 2014. year 2015. year	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094) -19.36*** (1.508) -29.74*** (2.142) -36.23***	0.753*** (0.288) -2.979*** (0.638) -11.47*** (1.031) -19.18*** (1.457) -29.55*** (2.134) -36.02***	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128) -19.84*** (1.557) -27.84*** (2.142) -33.65***	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126) -19.84*** (1.557) (2.142) -33.66***
2010. year 2011. year 2012. year 2013. year 2014. year 2015. year	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094) -19.36*** (1.508) -29.74*** (2.142) -36.23*** (2.490)	0.753*** (0.288) -2.979*** (0.638) -11.47*** (1.031) -19.18*** (1.457) -29.55*** (2.134) -36.02*** (2.466)	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128) -19.84*** (1.557) -27.84*** (2.142) -33.65*** (2.452)	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126) -19.84*** (1.557) (2.142) -33.66*** (2.453)
2010. year 2011. year 2012. year 2013. year 2014. year 2015. year Constant	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094) -19.36*** (1.508) -29.74*** (2.142) -36.23*** (2.490) 127.4***	0.753*** (0.288) -2.979*** (0.638) -11.47*** (1.031) -19.18*** (1.457) -29.55*** (2.134) -36.02*** (2.466) 126.4***	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128) -19.84*** (1.557) -27.84*** (2.142) -33.65*** (2.452) 100.5***	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126) -19.84*** (1.557) (2.142) -33.66*** (2.453) 100.5***
2010. year 2011. year 2012. year 2013. year 2014. year 2015. year Constant	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094) -19.36*** (1.508) -29.74*** (2.142) -36.23*** (2.490) 127.4*** (30.79)	0.753*** (0.288) -2.979*** (0.638) -11.47*** (1.031) -19.18*** (1.457) -29.55*** (2.134) -36.02*** (2.466) 126.4*** (30.94)	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128) -19.84*** (1.557) -27.84*** (2.142) -33.65*** (2.452) 100.5*** (32.67)	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126) -19.84*** (1.557) (2.142) -33.66*** (2.453) 100.5*** (32.66)
2010. year 2011. year 2012. year 2013. year 2014. year 2015. year Constant Observations	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094) -19.36*** (1.508) -29.74*** (2.142) -36.23*** (2.490) 127.4*** (30.79) 14,407	$0.753^{***}$ (0.288) -2.979^{***} (0.638) -11.47^{***} (1.031) -19.18^{***} (1.457) -29.55^{***} (2.134) -36.02^{***} (2.466) 126.4^{***} (30.94) 14,407	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128) -19.84*** (1.557) -27.84*** (2.142) -33.65*** (2.452) 100.5*** (32.67) 14,443	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126) -19.84*** (1.557) (2.142) -33.66*** (2.453) 100.5*** (32.66) 14,443
2010. year 2011. year 2012. year 2013. year 2014. year 2015. year Constant Observations Number of districts	0.680** (0.321) -3.092*** (0.649) -11.66*** (1.094) -19.36*** (1.508) -29.74*** (2.142) -36.23*** (2.490) 127.4*** (30.79) 14,407 2,089	$0.753^{***}$ (0.288) -2.979^{***} (0.638) -11.47^{***} (1.031) -19.18^{***} (1.457) -29.55^{***} (2.134) -36.02^{***} (2.466) 126.4^{***} (30.94) 14,407 2,089	0.0529 (0.330) -4.123*** (0.629) -11.51*** (1.128) -19.84*** (1.557) -27.84*** (2.142) -33.65*** (2.452) 100.5*** (32.67) 14,443 2,092	0.0579 (0.329) -4.123*** (0.627) -11.51*** (1.126) -19.84*** (1.557) (2.142) -33.66*** (2.453) 100.5*** (32.66) 14,443 2,092

Foreign Direct Investment and Housing price in the Netherlands

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The result has shown that there is also a relationship between FDI capital and housing price. The significant p-values in all four models of the neighboring housing price indicate close by neighbours' housing price has a strong correlation with location housing price as well, and all four models have a positive effect on location housing price. In other words, if the surrounding housing prices were higher, the location's housing price would be higher as well. FDI capital has a positive effect on its location's housing price, but only when a time lagged effect was included. FDI capital does not significantly influence surrounding housing prices, no matter with or without time lagged effect. Income has a positive relationship with housing price, and so is the percentage of ownership of the house. The higher the purchased rate is the higher the housing price will be. Therefore the rented rate is negatively correlated with housing price. Distance to restaurants, hospitals, department stores and hotels, transportations accessibilities were included in all four models to represent the amenities that affect district characteristics as well as factors that attract FDI. The result showed similar turnouts as the models of FDI count. Hospital distance is negatively correlated with housing price. Restaurants and hotels are the opposite; the closer they are the cheaper the housing price is. The distance to transport amenities is not significant in all four models either. Agriculture firms were significantly correlating with housing price in four models as well, a similar result as FDI count models. Different level of educations has different effects with FDI on housing price. Accessibility to secondary education is positively correlated with FDI on housing price, but accessibility to primary schools is negatively correlated. Accessibility to general higher education is not significant neither in these four models.

With Model 5 and Model 6 we included all the variables to compare with and without the time lagged effect. The results show that with the capital of FDI, it is significantly correlated with housing price only when the time lagged effect was added. With a positive coefficient, this indicates that it is positively correlated with housing price of its location. But in both models, the neighboring FDI capitals are not correlated with housing price.

With Model 7 and Model 8 we selected some of the control variables to estimate if the effects are different. The result shows only the FDI capital with time lagged effects is positively correlates with location housing price, same as Model 5 and 6. And the neighboring FDI capitals do no correlate with housing price either.

### 4.3 Summary

Based on the inferential analysis, it is concluded that there is a relationship between FDI and housing price. With the panel regression calculated with spatial weights matrix and fixed effect model, we further investigate the relationship of close by neighbors' influences. The results show that with an influence of FDI, different districts' housing prices are positively correlated with each other. The investment counts from foreign countries positively relate to the investment location's housing price. The count of FDI also affects the housing price after a period of time, showing FDI has a continuous effect after the investment happened. The amount of value invested also affects the local housing price, but only after a period of time. Nevertheless, neighboring investments do not affect housing price directly nor significantly, this could indicate that FDI is more influential with the investment location, but spill effects

on housing price do not go beyond to outside region. Another reason could be although spill over effects is part of the spatial heterogeneity of the location, but this is spread amount the whole nation therefore unable to isolate the effect. Due to the data limitations, the characteristics of the investment locations could not fully be evaluated. Therefore with different spatial structure models, the result could be different. As we know housing price is both spatial dependency and spatial heterogeneity if the complete spatial structure is not well represented the result could be skewed. And with explanatory variables, it will be much difficult to isolate individual parameters.

# **Chapter 5: Conclusions and recommendations**

# **5.1 Introduction**

This research studies the effect of FDI on housing prices in the Netherlands from 2007 to 2015. FDI is the result of increasing frequency of global trading activities, with the economic benefits as the incentive; countries around the world are competing to attract more into the state. The pros and cons of this action have been studied and discussed in previous research, and the result varies in different countries. Therefore, with the dynamic global-local context, the impact of FDI on the recipient country's social and economic structure is not fully understood yet. The dwelling is an important aspect of a person's social condition; the housing market also heavily correlates with the country's economy and social structure. However, the relationship between FDI and housing price has not been fully evaluated yet. This research used secondary data on statistical analysis, using spatial weighted matrix model while controlling other domestic social factors to evaluate the influence of FDI. In this chapter, we conclude the findings of our research and offer policy recommendations for the reader as well as state the limitation of this study.

# 5.2 Retrospect: research objective

The research objective of this thesis is to understand the relationship between FDI site and the surrounding location's housing price in the Netherlands. We seek to understand if FDI serves as a spatial characteristic in determining local housing price, and how strong is this influence over spatial distribution.

We first identify the locational characteristics of FDI investment in the Netherlands, and the spatial distribution of the FDI. We further compare the difference in average housing price change of the districts, in this research, we study FDIs investment distribution (location) as the independent variable, and for dependent variables, which are invested districts' housing price. We control other influential variables to isolate FDI's influence, fixed effect models, as well as year fixed effects, were included to control the aggregated effects over time and other unobserved factors.

# **5.3 Conclusion and Discussion**

To answer the research question: Do FDI location choices have an impact on local housing prices? Our finding indicates that in the Netherlands, FDI does have a relationship with local housing prices, and it is a positive influence. We used time lag to see if the influence will affect over time as well, the result shows positively that FDI will continue to influence housing price over time, especially when the investment value was taken into consideration. With spatial Durbin model, we also discovered the neighboring housing price has a significant impact on housing price, thus verify the theory of housing price is spatial dependent. However, our regression models have shown the FDIs in close by neighbors do not have a significant relationship with neighboring districts' housing prices. In our regression models, the control variables are the local influential factors that correlate with FDI location decision as well as the housing price of the location. However, these factors may not be the full representation of all the possible factors, therefore the influence of FDI may not be fully explained yet. In conclusion, FDI do have a relationship with the housing price in the Netherlands, but housing price is spatial dependent and influenced by spatial heterogeneity, thus this relation could be mediated by other unexplained factors.

# 5.4 Limitation of this research

The limitation of this research could be pointed out in several factors:

- Due to the lack of FDI functions in the FDi markets dataset used in this research, the difference of influence caused by different FDI activities and firms could not be further investigated.
- The housing price data used in this research were the average of first and second hand housing price combined in the districts, therefore without more detailed categories such as commercial, new built or second-hand, the more detailed and explainable analysis could not be conducted. Also, without the average rent dataset, the impact of FDI on rent market condition could not be conducted either.
- Due to missing values in the dataset, there were some other influential factors that could not be included in this study, therefore there could be other factors influencing the relationship but unobservable in this research.
- The study area of this research is the Netherlands, therefore it would be difficult to generalized the findings to other countries, as to our understanding the social and economic condition as well as FDI spill over effects differ between countries.

### 5.5 Policy recommendation and future research implications

The finding of this research contributes to the understanding of the impact that FDI causes in the recipient country. Increasing FDI is a global trend in competing for a more beneficial outcome; nevertheless, the negative impact would require more policy regulation to prevent social inequality and other negative impacts. From our research findings, we understand that FDI is correlated with housing price. The Netherlands is a developed country in Europe, generally has less social conflicts that are related to wealth inequality. However, with rising housing price in the country, especially close to the Randstad region, this could be a potential threat to urban development and stability of the economy. For as we know with higher housing price comes with speculation of real estates from investors and heavier finical burdens for average citizen when trying to acquire dwelling. Urban planners and policymakers need to address this problem with caution. FDI as a measurement of urban competitiveness, it could also be served as a steering tool for the development direction in the urban context. Since the understanding or this relationship between FDI and housing price, we recommend policymakers take this into account when introducing incentives to attract FDI into the desired location. Avoid the "hot zone" area where development is overheated and import the resources into other areas. With local competitive advantages, FDI could serve as a measurement of what matters in the location, as in both infrastructures-wise or social component-wise. FDI could also serve as "incentive" for other business services to put in, further improve the location's condition. Therefore when evaluating what to improve in the area, resources could be more put into with more efficiency and cause less negative impacts. As we know the public infrastructures are mostly invested and constructed by governments, perhaps with future development projects integrated with FDI, profits form the investment could further give back into the community in a more positive way.

On the other hand, findings from this research have revealed the ideal locations for FDI as well as the spatial distribution of high housing price locations. This information further gives the trend of more desirable living space and economic activities, with two important factors regarding both living conditions as well as working conditions in the Netherlands, urban policy makers and planners should be aware of the influence within each other. This could be

the key factor to explain why the Netherlands is currently playing a leading role in global trade activities, which might be a truly competitive advantage that the Netherlands withholds.

For future research recommendations, we recommend further dig into what are the differences that FDI would cause on housing price between different activities. With a more complete database to analyze if FDI would affect rent rate in the location of investments, or differences in different types of housing units. This research was conducted at a district level, if available at the neighborhood level, the result would have a more refined demonstration of how FDI affects over spatial distribution. Also, with the more current data accessible, the evaluation could be more actuate in reflecting the current trend of housing price changes and to a possible prediction of the future.

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Annex 1: Comparison of housing price distribution in the Netherlands from 2007-2015


















## Annex 2: Hausman test of the regression models

## Hausman test:

	chi2	Prob>chi2
Model 1	276.53	0.0000
Model 2	135.23	0.0000
Model 3	123.55	0.0000
Model 4	24.97	0.0150
Model 5	290.69	0.0000
Model 6	287.56	0.0000
Model 7	188.65	0.0000
Model 8	188.02	0.0000

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg Test: Ho: difference in coefficients not systematic

chi2(18) = (b-B)'[(V\_b-V\_B)^(-1)](b-B)

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