

**ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF ARTS  
AND SOCIAL SCIENCES**

**EXPLAINING FOREIGN DIRECT INVESTMENT INFLOWS TO TURKEY:  
USING TIME-SERIES AND AUGMENTED GRAVITY MODEL  
ESTIMATIONS**



**M.A. THESIS**

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**Department of Economics**

**Economics Program**

**DECEMBER 2017**



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**DECEMBER 2017**



**İSTANBUL TEKNİK ÜNİVERSİTESİ ★ SOSYAL BİLİMLER ENSTİTÜSÜ**

**TÜRKİYE'YE GELEN DOĞRUDAN YABANCI YATIRIMLARI  
BELİRLEYİCİ FAKTÖRLERİN ZAMAN SERİSİ VE ÇEKİM MODELİ  
KULLANARAK AÇIKLANMASI**

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**ARALIK 2017**









*To my family*  
*To Cerrahpasa*



## FOREWORD

Writing this thesis when I was working abroad was the hardest thing I have ever experienced. I must mention that this would be impossible without the help of Asst.Prof.Dr. Ayşegül Kayaoğlu Yılmaz. Therefore, I would like to first thank to her not only for her advises and contributions for the thesis, but also for her extreme patience and cordial relationship. I always have the feeling that I am exceptionally lucky to have an advisor like her.

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After submitting this thesis, I am aware of the fact that another level of my education life will be completed and, when I look back I can clearly see the enourmous effort of my family, Emel Şenzeybek, Hacı Şenzeybek and Hakan Güven Şenzeybek, who sacrificed from their own lives for my education. I owe them everything I have ever succeeded.

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## **ABBREVIATIONS**

<b>AIC</b>	: Akaike Information Criterion
<b>BIC</b>	: Bayesian Information Criterion
<b>CEPII</b>	: Centre d'Etudes Prospectives et d'Informations Internationales
<b>CPI</b>	: Consumer Price Index
<b>EU</b>	: European Union
<b>FDI</b>	: Foreign Direct Investment
<b>FRED</b>	: Federal Reserve Bank of St. Louis
<b>GDP</b>	: Gross Domestic Product
<b>GNP</b>	: Gross National Product
<b>IMF</b>	: International Monetary Fund
<b>MNE</b>	: Multinational Enterprises
<b>UNCTAD</b>	: United Nations Conference on Trade and Development
<b>WB</b>	: World Bank
<b>WDI</b>	: World Development Indicators



## SYMBOLS

$\varepsilon_t$	: Error Term
$X_j^{\tau_j}$	: Other explanatory variables for Gravity Model
$D_{hs}$	: Distance between host and source countries
$GDP_{ht}$	: GDP of the host country at time t
$GDP_{st}$	: GDP of the source country at time t
$t$	: Time
$FDI_{hst}$	: Foreign Direct Investment flow from source to host at time t
$z(t)$	: MacKinnon Test Statistics
$\theta$	: Moving-average Parameter
$\rho$	: Autocorrelation Parameter
$L$	: Maximum Likelihood
$k$	: Number of independently adjusted parameters
$N$	: Model sample size



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## **EXPLAINING FOREIGN DIRECT INVESTMENT INFLOWS TO TURKEY: USING TIME-SERIES AND AUGMENTED GRAVITY MODEL ESTIMATIONS**

### **SUMMARY**

Foreign Direct Investment (FDI) is a very important economic indicator for a country, especially for a developing one. It does not only provide jobs and value addition for the host country, but also creates a positive spillover effect and know-how transfer to it. Hence, it is not surprising that researches find a positive effect of FDI on economic growth and development of host countries.

As a developing country with a current account deficit problem, Turkey aims to be a more attractive place for foreign investors as it can be seen from its medium-term economic program. Therefore, understanding the factors behind the FDI inflows to Turkey is an important topic both for academia and policy-makers. However, it seems that there is not enough research about the determinants of FDI inflow to Turkey in the literature. Moreover, to best of our knowledge, none of these researches used Gravity Model to analyze the determinants of FDI inflow and they rather used outdated data sources when they analyzed this question empirically. Hence, we firstly employed Gravity Model to explain determinants of FDI inflow to emerging countries and Turkey. Secondly, to investigate whole period after globalization of the country, we used time series model by using data from 1980 to 2014.

Our findings for emerging countries show that distance between host and source country has significant and negative relationship with FDI inflow like it has been found for the trade flows in the literature. Furthermore, when GDP of host or source country is higher, FDI flow between these two countries is getting increased. Except from economic size and distance, our augmented gravity model also showed that countries with higher rule of law scores have higher FDI inflows. However, our empirical analysis could not find any statistically significant relationship of recession and common language with FDI inflows which is understandable as FDI is a kind of long-run oriented investment and short-run changes in the economy like recessions does not have a enduring effect on the FDI flow decisions. As we explain in the theoretical part of the thesis, one important reason of FDI flows is to reach the local markets by foreign companies, which is a long-run decision and therefore it is also not depending on the common language factor.

When we repeated the same augmented gravity model analysis only for FDI flows to Turkey, we found that our results were very close to the findings when we have used the whole emerging country dataset although some exceptions emerged. Firstly, the relation between rule of law and FDI inflow to Turkey is found to be statistically insignificant. Secondly, the economic significant of the association between the FDI inflow and GDP is found to be much more higher in the latter case which suggests that Turkey economic well-being in terms of gross productivity is the key factor behind the FDI inflows.

Lastly, our time series analysis showed that increase in market size of Turkey, infrastructure investments and economic growth of the country are both statistically and economically significant and positively correlated with FDI inflow increase to Turkey. In addition, relationship between exchange rate change and FDI inflow variation is found to be statistically significant and negative which can be interpreted that macroeconomic stability is also important factor for explaining the FDI inflows to Turkey.



# **TÜRKİYE'YE GELEN DOĞRUDAN YABANCI YATIRIMLARI BELİRLEYİCİ FAKTÖRLERİN ZAMAN SERİSİ VE ÇEKİM MODELİ KULLANARAK AÇIKLANMASI**

## **ÖZET**

Doğrudan Yabancı Yatırımlar özellikle gelişmekte olan ülkeler için oldukça önemli bir ekonomik göstergedir. Bu yatırımlar, sadece yapıldıkları bölgede istihdam sağlayıp katma değer üretmekle kalmaz, aynı zamanda o ülke için bilginin diğer alanlara yayılma etkisini ve teknik uzmanlığın transferini sağlar. Bu nedenle, şimdiye kadar yapılan araştırmalar doğrudan yabancı yatırımların yatırımın yapıldığı ülkenin ekonomik büyümesine ve kalkınmasına pozitif etkisi olduğunu göstermiştir.

Türkiye, kalkınmakta olan ve cari açık problemi yaşayan bir ülke olarak ülkeye doğrudan yabancı yatırımlar için daha cazip bir yer olmayı hedeflemektedir ve buna orta vadeli kalkınma planında da yer ayırmıştır. Bu nedenle, doğrudan yabancı yatırımları belirleyen faktörler hem akademisyenler hem de politika yapıcılar için önemli bir konu olmaktadır. Bununla birlikte, literatürde bu konu ile ilgili yeterli çalışma olmadığını düşünmekteyiz. Ayrıca, şu anki bilgimiz ışığında, bu çalışmalardan hiçbirisinde doğrudan yabancı yatırımları belirleyen faktörler için Çekim Modeli'nin kullanılmadığını görmekteyiz. Bu nedenle, biz araştırmamızda Çekim Modeli'ni kullanarak doğrudan yabancı yatırımları belirleyen faktörleri hem yükselen ülkeler hem de Türkiye için inceledik. Ayrıca, ülkenin globalleşmeye başladıktan sonraki bütün zaman dilimini incelemek amacıyla zaman serisi kullanarak 1980 - 2014 yılları arasındaki veriyi analiz ettik.

Yükselen ülkeler için yaptığımız çalışmadaki bulgularımıza göre kaynak ve ev sahibi ülke arasındaki mesafe ve bu iki ülke arasındaki yabancı doğrudan yatırım akışı negatif ve istatistiki olarak anlamlı olmaktadır. Ayrıca, kaynak veya ev sahibi ülkelere birisinin ekonomik büyüklüğü arttığı zaman bu ülkeler arasındaki doğrudan yabancı yatırım miktarının da daha fazla olduğu gözlemlenmiştir. Ülkelerin ekonomik büyüklüğü ve aralarındaki mesafe dışında, ev sahibi ülkedeki hukukun egemenliği ile bu ülkeye gelen doğrudan yabancı yatırımların istatistiki olarak anlamlı bir şekilde pozitif ilişkili olduğu bulunmuştur. Çalışmamızda ev sahibi ülkedeki resesyon ve iki ülke arasındaki ortak dil kullanılmasının bu iki ülke arasındaki doğrudan yatırımlar ile istatistiki olarak bir ilişkisi olmadığı sonucu çıkmıştır.

Aynı analizi sadece Türkiye için yaptığımız zaman sonuçlarımız yükselen ülkeler için bulduğumuz sonuçlara oldukça yakın çıkmıştır. Sadece, Türkiye için hukukun egemenliği ile doğrudan yabancı yatırımlar arasında bir ilişki olmadığı sonucu bulunmuştur. Ek olarak, Türkiye için ekonomik büyüklüğün katsayısı yükselen ülkelere göre oldukça fazla çıkmıştır.

Son olarak, zaman serisi analizimizin sonuçları göstermiştir ki Türkiye'nin ekonomik büyüklüğü, altyapı harcamaları ve ekonomik büyümesindeki artışlar ile yabancı doğrudan yatırımlardaki artışlar arasında pozitif ve anlamlı bir ilişki vardır. Ayrıca,

kurdaki deęişimler ile doğrudan yabancı yatırımlardaki deęişimler negatif yönde ve anlamlıdır.



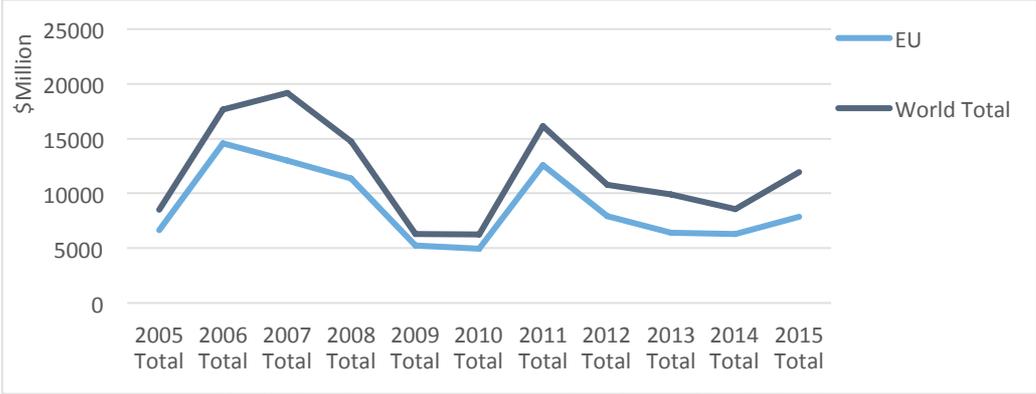
## 1. INTRODUCTION

Foreign direct investment (FDI) is an important indicator for a country's economic development and prospects. Foreign direct investment can be defined as having a productive asset of a parent company in a foreign country, and this can be in different formats, such as foreign stock ownership and fund lending to companies or governments in another country (Cypher & Dietz, 2009). Thanks to globalization, nowadays, companies can manufacture their products in countries where they can boost their profits through benefiting from lower input costs and extending their market power. On the other hand, FDIs have also significant positive effects for host countries, if it is managed by right strategies and policies. Firstly, FDI is a source of capital for developing countries, which need to finance their growth. Secondly, it helps transfer the new technologies, management techniques, and know-how of company to host countries. Thirdly, this transfer can also provide a spillover effect on different industries in host country as the increased competition, creates opportunities for local companies to replicate strategies of the foreign ones in hiring their employees or using their sources (Javorcik & Spatareanu, 2005).

There is a continuously increasing trend of FDI around the world, which started in 1980s. Especially, after 1990s, developing countries became favorite destinations for FDIs and investments to developing countries dramatically increased. Even though 2008 economic crises reduced FDI inflow to developed countries by 29%, FDI inflow to developing continued to increase by 17% (Gunay, 2011).

Because of its import substitution strategy, Turkey was not an attractive destination for foreign investors until 1980 (Tatoglu & Erdal, 2002). After the 24 January 1980, Turkish authorities decided to follow a different path with the aim of benefiting from advantages of rapid globalization. On 24 January 1980, structural reforms on Turkish economy have been made and import substitution strategy was abandoned. Moreover, Foreign Direct Investment Laws are created by the authorities and the laws had been remained in force between 1989 and 2003 (Güriş & Gözgör, 2015).

Turkey’s FDI history should not be examined without Turkey’s long membership progress history of the European Union (EU). There is a strong economic link between Turkey and the EU. Figure1.1 illustrates that total FDI inflow to Turkey highly correlated with FDI inflow that comes from EU countries. In 2015, nearly 66% of FDI inflow of Turkey came from the EU, and Turkey is also the sixth biggest trade partner for the EU. As expected, this economic relation affects the level of FDI inflow to Turkey. (European Parliament, 2016)



**Figure1.1:** FDI inflow in Turkey.  
Source: TCMB, 2017

When the sectoral FDI data of Turkey is analyzed, one can easily observe that different companies from different industries make investment to Turkey. A certain part of the companies are investing to Turkey to reach the local market; on the other hand, investors from other countries can make investment to Turkey because of its closeness to Europe, Central Asia and Middle East (Tatoglu & Glaister, 1998). A survey among investors by Ernst and Young shows that in addition to strategic location, its growth potential and domestic market also make Turkey an attractive place to invest for foreign companies (2013)

Understanding the sectorial distribution of FDI is necessary, because depending on its dispersion across sectors, FDI could have different effect on an economy. For example, effect of a manufacturing investment from a foreign high technology company expected to have different effects from an investment in the finance industry. A manufacturing greenfield investment does not only decrease unemployment in the host country, it also provides new opportunities for suppliers or suppliers of its suppliers. Aykut and Sayek (2007) which compares vertical (low-cost

production seeking) and horizontal (market seeking) FDI, shows that although total FDI flow is boosting economic growth of a country, production investments themselves have more vertical effect than service investments; therefore, percentage of manufacturing industry on total FDI flow is positively and percentage of services industry on total FDI flow negatively correlated with economic growth. Thus, revealing determinants of FDI each sector is very important for policy makers, especially during the strategic planning process.

Moreover, determinants of FDI flows may vary not only due to host country characteristic but also due to sector and source country characteristic. Previous research made by Deichmann et al. (2010) claims that if income level of the source country changes, significance of the determinants can be different.

The aim of this thesis is providing a general look for Turkish Foreign Direct inflow. Firstly, determinants for emerging countries will be analyzed by using gravity mode. In second step, we will look for determinants of FDI inflow to Turkey since open economy move of the country. Section 2 explains theoretical background. Section 3 clarifies research methodology. The empirical results are discussed at Section 4. Lastly, Section 5 presents conclusive remarks and policy suggestions.

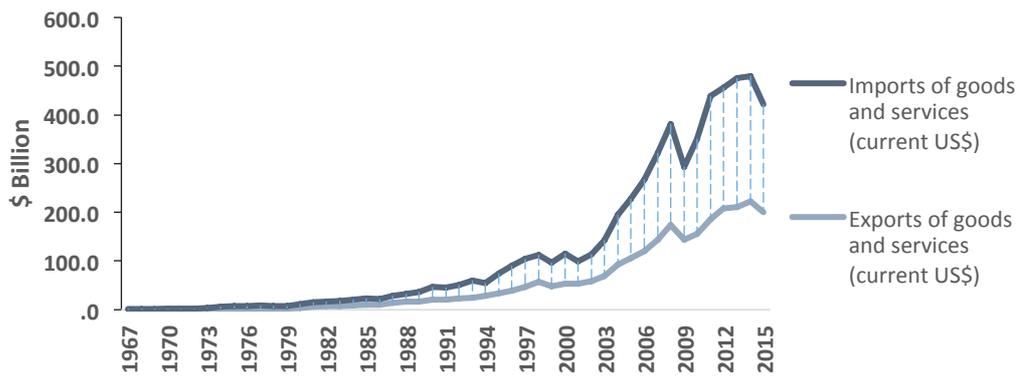


## **2. THEORETICAL BACKGROUND**

### **2.1. Turkey and FDI**

Effects of FDI on developing countries have been discussed for many years. FDI is a way of technology transferring from developed countries to developing countries. Today, there is a high competition between developing countries to attract FDI to their countries and, almost all of these countries creating their specific FDI policies to sustain and improve their economic growth. Kinda (2010) stated that although there are signs about in some cases FDI could damage an economy, however, it can be said that in large scale FDI is beneficial for an economy.

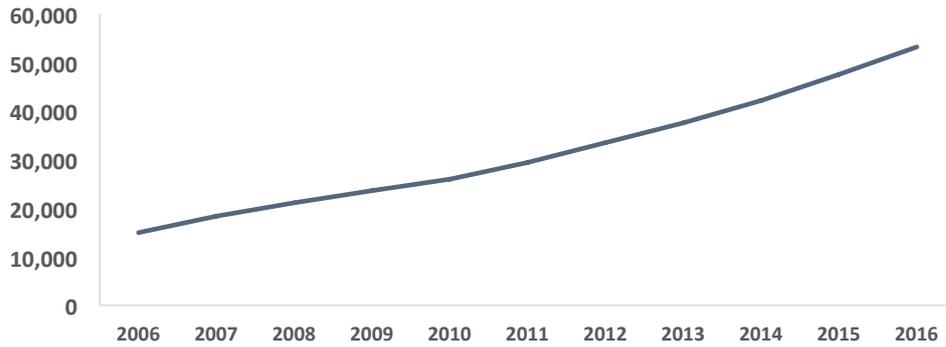
FDI also can be seen as a way to finance the current account deficit for a developing country. Turkey has suffered from its current account deficit for many years. Figure 1.2 shows that especially, after 1980, the gap between import and export increased and current account deficit has become an important issue for Turkish economy. Güriş and Güzgör (2015) stated that after the 24th January 1980 decision current account balance of Turkey have been worse, so financing current account deficit has been arisen as a problem. This problem has attempted to be solved by portfolio investments and FDI. Between 1992 and 2010 there were \$212 billion current account deficit and 45% of this deficit covered by foreign direct investments (Orhan & Nergiz, 2014).



**Figure1.2:** Historical Import and Export in Turkey.  
Source: World Bank- WDI, 2017

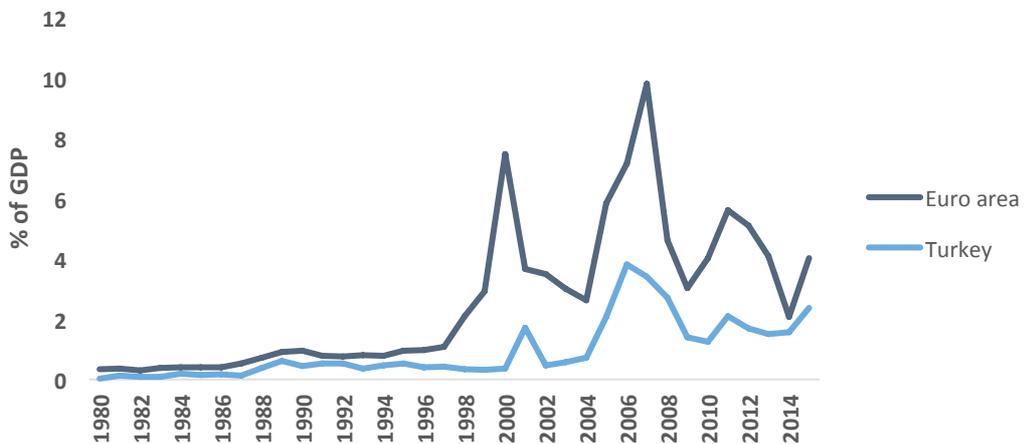
FDI inflow has been an important topic for academics and policy makers. FDI started to have more place on Turkish policy makers' agenda. In Medium Term Program (2016-2018) of Ministry of Development there are three articles about FDI which mention about using a tax system to create better environment for FDI, organizing free zone activities for assisting the progress of FDI and boosting FDI investment to increase productivity (Ministry of Development, 2016).

Except for a limited number of sectors Turkish policy makers provide same conditions for foreign investors with Turkish ones and every year more and more foreign companies started to make investments in Turkey. Figure1.3 demonstrates historical trend of number of companies with foreign capital and currently there are more than 53,000 companies with international capital in Turkey (Republic of Turkey Ministry of Economy, 2017). In 2016, even though FDI inflow to West Asia region reduced, FDI inflow to Turkey increased by 36% during same year. The key factor behind this success is investments to service industry in Turkey (UNCTAD, 2016)



**Figure 1.3:** Number of Companies with Foreign Capital.  
Source: Ministry of Development, 2017

On the other hand, FDI over GDP ratio of Turkey is still below the European countries. Figure 1.4 compares FDI inflow over GDP ratio for Turkey and Euro Area average. It can be seen that especially after 1996 compare to European Countries Turkey is not successful to attract FDI into the country. According to World Bank in 2015, FDI inflow/GDP is only 2,4% for Turkey, however same ratio is higher in the Euro Area. Additionally, in the same year, Turkey was ranked 23rd in FDI inflow ranking by country, although it is one of the top 20 biggest economies (WDI, 2017).



**Figure 1.4:** Foreign Direct Investment, net inflows (% of GDP).  
Source: World Bank – WDI, 2017

As it mentioned above after 1990s developing countries increased their share in total FDI investment, however as Figure 1.4 shows, Turkey fell behind the Euro Area. According to Erdilek (2003) if its potential considered, it can be said that Turkey's

FDI performance is disappointing. According to him although high effort for liberalization after 1980s, main reasons of this unsuccessful result can be explained with high inflation rates for many years, political inconsistency, corruption, unreliable legal system for investors. Besides, he argues that problems about privatization, unprotected intellectual property are also reasons for failure to attract FDI into the country. Eventually, Ok (2004), by using data from questionnaire survey from 140 companies, found that economic and political instability and high inflation are the biggest two obstacles for FDI inflow to Turkey. Furthermore, another study shows that high inflation rate, external debts and current account deficit have reduced FDI inflow in Turkey (Basar & Tosunoglu, 2006).

## **2.2. Theories About FDI**

To have a better explanation about the significant determinants of FDI inflow to a country, one must first answer ‘why do companies make investment abroad?’ Dunning & Rugman (1985) claims that before 1960 ‘neoclassical theory of portfolio flows’ was the dominant theory. This theory assumes there is a perfect world competition and there is not any transaction cost for capital moves, therefore only determinant of where capital goes are interest rate or profit.

On the other hand, it is expected that local firms have more information about local market than new international companies entering into the market. When a company is deciding to make an investment to abroad, if it makes plans with this assumption, it can face with fierce competition conditions than it had planned. For the reason that not only local rivals have more experience and insight about consumers but also lack of information about regulations like taxes or incentives can delay its plan or increase costs. According to Denisia (2010), Hymer (1976) was the first one who realized that local firms have competitive advantages. Firms make investment abroad only if they have concrete advantages and the market conditions allow them to use their advantage. Later, economists have established different theories about FDI.

In this section main theories about FDI will be examined. These theories are classified into five categories: Industrial Organization Theory, Product Cycle Theory, Internationalization Theory and Dunning’s Eclectic Paradigm.

### **2.2.1. Industrial Organization Theory**

As it mentioned above, Hymer (1976) did not believe that there is a perfect market for foreign investors when they invest in abroad and he thought local companies has more advantages than foreign ones (Denisia, 2010). Hymer (1976) argued that market imperfection in any economy is the reason for them investing abroad as multinational enterprises (MNE). Because of their international structure these companies can diverse their market, avoid from competition and make of an advantage. To avoid from the competition and reduce risks, multinational companies need to control their outside assets (Dunning & Rugman, 1985).

Another follower of industrial organization theory is Kindleberger (1969) who made additions to Hymer's theory. Kindleberger (1969) stated that companies invest abroad to have monopolistic power in host country and therefore imperfect market is essential for FDI. Brand name, product differentiation, marketing skills, price regulations, technological competencies, economies of scale and government restricts can be the reason for market imperfections.

### **2.2.2. Product Cycle Theory**

Another theory to explain Foreign Direct Investment flows was developed by Vernon. Vernon (1966) stated that new product has three stages in its lifecycle; these are appearance, maturity and death. According to product lifecycle theory, when a company is developing a new product and launching it to the market, the company prefers home market because not only they have more experience about the market but also they can minimize the transition cost. Later, the product will be standardized and if foreign demand occurs the company firstly prefer to export existing product to foreign markets or it can license a foreign producer. Because of its technological progress and economies of scale advantage the company expected to gain monopolistic power in the market. Afterwards, local companies in the foreign market can realize the demand and new rivals can arise. In this situation, the company will lose its monopolistic power in the market because of the cheaper prices by rivals. Thus, the company starts to investigate producing in the foreign market and if producing abroad is cost effective than exporting, it will start to produce in the foreign country (Vernon, 1966).

During his research, Vernon (1966) examined MNEs that are located in US and making investments to European countries. Therefore, the theory can explain Foreign Direct investment from a technologically advanced country to a country with less technological progress. However, Densia (2010) claims that during the time when Vernon did his analysis, US companies made investments to countries where they have technological advantages compare to their rivals. Also, according to Vernon's theory, companies start to operate in their home country and making FDI to foreign countries only if they believe, there are opportunities for their products in these markets. Therefore, his theory cannot explain 'born global' firms (Buckley & Casson, 1976).

### **2.2.3. Internationalization Theory**

To understand existence of MNEs Buckley & Casson (1976) started with different question. Their first question was 'What explains the existence of the firm?' and they criticized earlier theorist, because of lack of explanation for 'born global' firms. (Buckley & Casson, 2009).

According to internationalization theory multi-stage production can be defined as a combination of different activities and transportation of semi processed materials link these activities. MNEs attempt to maximize their profit, however the markets that are selected by MNEs to maximize their profits are imperfect and there are external market forces, such as trade barriers and price differential in there. Therefore, MNEs are investing there to avoid risks while managing external forces is easier than exporting (Buckley & Casson, 1976).

In this theory, for a MNE, decision process of manufacturing in another country is not different from producing in domestic market. If the company has enough information about a foreign market, it could foresee effects of market forces in this country. In this theory, all foreign countries are considered as internal market and the firm makes investments here if this place maximizes its profits.

### **2.2.4. Eclectic Paradigm of Dunning**

Main purpose of Eclectic Paradigm was creating a holistic approach that explains push factors on expanding abroad for production or market seeking. Although the theory has been criticized because it cannot perfectly explain or foresee special types

of international production or individual enterprise's behaviors, it was formulated as a testable, general paradigm of international trade (Dunning, 1988). After the paradigm was introduced, it has been the most dominant theory to understand foreign direct investment decisions of MNEs (Dunning, 2000).

The eclectic paradigm is also known as OLI paradigm. OLI is abbreviated from initial components of the three sub-paradigms; these are ownership advantages, location advantages and internationalization advantages.

Firstly, tangible and intangible assets are called as internal endowment of a company. The company can benefit from them everywhere it produces, therefore this internal endowment called as ownership advantage (Dunning, 2015, p. 20). Although multinational companies produce in different countries, they can continue to take advantage from their property rights or know-how. Therefore, ownership advantages have important role during decision process for producing abroad. It is maintained that if a company has bigger competitive advantages than the other companies located in the target country, possibility of making investment in this market is getting higher (Dunning, 2000).

Second types of advantages are called as location specific advantages. According to Dunning country endowments can boost benefits from firm's competitive advantages. If foreign country's endowments are more integrated than domestic, foreign country can be chosen for investment by the firm (Dunning, 2000). Resource endowments, input prices and quality, trade barriers, distance, transport and communication costs, incentives, economic system and policies in the country can be classified as location specific variables (Dunning, 2015, p. 27).

While Dunning writing his Ph.D. thesis he expected to see that US based manufacturing companies in UK were more productive than UK based manufacturing companies in UK, because earlier research had showed that US manufacturing industries are much more productive than that in UK and because of their ownership advantages US companies were expected to perform better than UK companies. However, records of US companies in UK were not better than their UK rivals and naturally worse than parent companies. Dunning claims this is a result of difference between UK and US economies and explained it as locational specific components (Dunning, 2001).

The last sub-paradigm of the eclectic paradigm is internationalization. Internationalization advantages can be defined as complements of ownership and locational advantages. According to Dunning (2015), answers of ‘why to be an MNE’ and ‘where to produce’ are ownership and locational advantages. Moreover, there is one more question to answer before FDI decision; this is ‘how to produce’. Answers of the third question address internationalization advantages (Dunning, 2015, p. 30). Hence, without ownership and locational advantages, internationalization advantages are not enough for international production.

Ownership advantages and internalization advantages are confusingly similar to each other. Endowments of companies like capital or technology are the main ownership advantages. Sustainability of production and risk reduction are the key internationalization advantages. Other ownership and internalization advantages differ by types of internationalization production. Dunning (1980) states that for resource based production, access to market and for import substituting manufacturing, organizations skills and economies of scales are also ownership advantages, in addition to capital and technology. On the other hand, more than stabilization, other internationalization advantages are control of markets for resource-based production and preventing transaction cost and buyer uncertainty for import substituting production (Dunning, 1980, p. 13).

Multinational companies invest in Turkey only if they have advantage of doing it. Therefore, these theories mentioned above help us to construct our empirical models, which aim to explain the determinants of foreign direct investment in Turkey. A determinant that does not provide any benefit to a multinational company cannot be a factor of foreign direct investment to a country. Therefore, understanding why companies make FDI is important before understanding the factors that shape the flows of FDI.

Multinational companies make investment to Turkey only if they have advantages of it. Therefore, these theories above helped us to choose determinants of foreign direct investment. A determinant that does not provide any benefit to a multinational company cannot be determinant of foreign direct investment to a country. Therefore, understanding why companies make FDI is important before selecting determinants of FDI.

### **2.3. Previous Researches**

Although FDI has been an important topic for Turkish economy, there was a lack of scientific research about it until the end of 1990s. The first detailed empirical research made by Tatoglu and Glaister (1998) who analyzed firm-level FDI motives for wholly owned subsidiaries and joint ventures from manufacturing and service industries. After they had collected firm level data, they used OLI paradigm when they decide their hypotheses to test and analyzed effects if OLI variables on FDI decisions of western companies by using managerial perspective. Afterwards, Tatoglu and Erdal (2002) made another pioneer research about location-related determinants of FDI between 1980 and 1998. It was the first econometric study using secondary data. Findings of their time series analysis shows that while market size, openness, infrastructure, and market growth have positive effects on FDI, exchange rate volatility negatively affects FDI inflow. In addition, interestingly, negative effect of macroeconomic instability is found to be statistically insignificant. (Tatoglu & Erdal, 2002).

Another detailed research made by Deichmann et al. (2010) where they classified FDI inward flows by region, industry, type of the investment and source country by using conditional logit model. After they investigate 293 firm data, they found that main purpose of the service companies, which has 70% of the total FDI, was to enter to the local market. On the other hand, what cared most by manufacturing companies is found to have reduction in their production costs. Besides, source country of multinational company can also change statistical significance of the determinants. For example, although market-size is statistically significant factor for high-income economy based companies, it is not statically significant for low-income based ones (Deichmann, Karidis, & Sayek, 2010).

Even though most of the studies about Turkish FDI focus on the determinants of FDI inflows, determinants of FDI outward are also studied. Kayam and Hisarciklilar (2009) employed Gravity Model to analyze FDI outflow from Turkey to 11 counties, which have total share of 90% of total Turkish FDI outflow, between 1999 and 2005. Their results show that main reason for Turkish companies to be multinational companies is to reach different markets. Products of Turkish firms are low quality; hence Turkish FDI reduces as destination countries' income-level increases.

Another research, which is based on primary data, by Duumludag (2009) aims to understand the effects of institutional variables on FDI inflow to Turkey (2009). He explains that Turkey was not successful to attract FDI compared to Hungary and Czech Republic and the results of the study shows that the biggest obstacles for FDI inflow are political and macroeconomic instabilities of the country (Duumludag, 2009).

It is interesting to note that different types of studies provided different results for the importance of political and economic instability. For example, Erdal & Tatoglu (2002) used secondary data in their research and claim that macroeconomic instability has negative effect although statically insignificant. On the other hand, Duumludag (2009) and Deichmann et al. (2010) used questionnaire survey data and suggest that macroeconomic instability and political instability are the most important factors that reduce FDI inflow to Turkey. In the managerial perspective, political and economic stability are very important factors for foreign investors, however exchange rate and interest rate are also highly affected from these instabilities. Therefore, the effects of exchange rate and interest rate volatility cannot be fully separated from the political instabilities which is why the definitions of political and economic instability are very important for the researches, which use secondary data.

As it is mentioned in introduction section, nearly 66 percent of FDI inflow to Turkey comes from European Union based companies. Therefore, membership process to European Union is expected to have an important effect on the future FDI inflows. Gunay (2011) analyzed determinants of FDI inflow for two groups of European Union countries, the first group, which is EU15, includes early members of the union, and the second, EU12, compound by new members after the 2004 and 2007 enlargement together with the two candidates namely Turkey and Croatia. Important finding from this research for Turkey was that market size is found to be a significant determinant to attract FDI in new members or candidate countries. It is found that main motivations of investors are niche opportunities, geographic location to reach other markets or future expectations like potential EU membership of the country (Gunay, 2011, p. 79).

Most recently, effects of democracy and fundamental macroeconomic variables on FDI flows to Turkey between 1977 and 2011 are analyzed (Durmaz, 2017). Durmaz

(2017) claims that especially after coup d'état in 1980, reputation of Turkey is harmed in international business environment, and democracy became a significant determinant for FDI inflow.





### **3. RESEARCH DESIGN**

Three different analyses will be performed in the empirical section. We will start with analyzing main determinants for emerging countries by using Panel Data Gravity Model. Then, we will continue to use Panel Data Gravity Model to examine determinants of FDI inflows to only Turkey. Lastly, to understand the effect of determinants in a longer term we will use time series analysis again using only the Turkish data. Thus, the first sub-section of the empirical analysis aims at understanding the determinants in a broader context which will enable us to compare it with a specific case; Turkish FDI inflows. This will enable us to understand if the FDI inflow to Turkey follows a different path or not. The last sub-section presents the determinants of FDI inflows to Turkey using the recent time-series data. Thus, this section provides two main contributions to the existing literature on the FDI inflows. First, it extends the data period that is analyzed in the literature so far. Second, it employs gravity model estimation technique both to understand FDI flow determinants for emerging countries and for Turkey separately.

#### **3.1. Determinants of FDI Inflow in Emerging Countries**

Before analyzing the determinants of the FDI flows to Turkey, it is important to first understand FDI determinants of emerging countries. We used S&P Dow Jones Indices (2017) when we chose emerging countries. For those countries classified as emerging, we collected bilateral FDI flow data from UNCTAD between 2002 and 2012; therefore, we were able to know source of the FDI flows and could collect data about source country which is necessary for Gravity Model analysis. In addition to UNCTAD data, other data sources are also used to understand the role of other potential determinants on FDI inflow.

We applied gravity model analysis for 12 countries (Brazil, China, Czech Republic, Greece, Hungary, India, Indonesia, Mexico, Poland, Russian Federation, South Africa, Turkey) which have data for all the variables in the time range of analysis in

this thesis. After collecting data for every variable and country, we had 7,304 observations for 664 pair countries during 11 years.

### **3.1.1. Variables for FDI inflow in emerging countries and Gravity Model**

#### **Estimation**

Gravity model is, basically, based on Newton's law of gravity. In the economics, the model is firstly used for explaining trade between two countries by using their GDPs and the distance between them. Wei (1996) claims that for trade between two countries, Gravity Model is the most commonly used model, and the basics of a gravity model, which are GDP or GNP of two countries and their distance, are used to explain trade amount between them. Like trade amount, FDI amount is also related with economic sizes of countries and their distance; therefore the model is also commonly used to investigate determinants of FDI. Blonigen (2005) claims that researches for FDI and trade are usually in the same direction, so gravity model is working well not only for trade, but also for FDI.

In our model, firstly, to explain FDI inflow, we only used basic gravity model variables. These basic variables are GDP of host country, GDP of source country and distance between countries. Definition of these variables are explained below:

*FDI Inflow:* To be able make a gravity model analysis, one needs to have a bilateral FDI data for all countries and their trade partners. We obtained bilateral FDI data from UNCTAD (2017) between 2002 and 2012. The data shows million US\$ amount of every FDI inflow from a country to our selected countries. Then, to see real value of FDI Inflow, we adjusted our data by using Consumer Price Index (CPI). In our data, the highest FDI flow was from Hong Kong to China. Surprisingly, in Europe, the highest FDI record is between Cyprus and Russia in 2008, it was more than \$20billion. Also, nearly 10% of our FDI inflow values are negative. Negative FDI inflow value means 'disinvestments'. In our data European Countries, especially Hungary, Poland and Russia, suffered from high amount of disinvestments.

*CPI:* As it mentioned above, we used CPI to calculate the real values of FDI inflows. We obtained our CPI data from World Bank – World Development Indicators (2017) FDI inflow value is divided by CPI values of same year, then multiplied with 100 to find value of FDI inflow in 2010.

*GDP Host-Source:* For GDP value, we used GDP (constant 2010 US\$) from World Development Indicators (World Bank, 2017). World Bank (2017) calculates GDP by value added method.

*Distance:* The last basic determinant of the Gravity Model is distance. We obtained distance data from CEPII's Distances Measures (CEPII, 2017). CEPII is an international economy research center located in France. They calculate distance between two countries by using city level coordinates of the most important cities in terms of population in these countries (Mayer & Zignago, 2011).

Apart from these main gravity model determinants, we also included other variables to our augmented gravity model estimations, to have better explanation for FDI inflow. We included mean distances of host and source countries to other countries.

*Mean Distance Host-Source:* This variable is the average distance of host and source countries with their trade partners from CEPII Databases (2017). Wei (1996) suggests that distance between Australia and New Zealand is almost same with distance between Spain and Sweden, but these two trade relations are different from each other, because Australia is far away from other countries and that's why its trade relation with New Zealand is much more important. Therefore, we included these variables to our equation, and we expect if the mean distance of a country with its trade partners is high, FDI inflow between these a country and its nearby partners will be larger.

Apart from including mean distances we also included rule of law variable and common language dummy variables to improve the explanatory power of our augmented gravity model estimations, as they will help to mitigate the omitted variables problem.

*Rule of Law:* Our main purpose to add rule of law variable is to examine the effect of political instability on FDI flows. When Dauti (2015) analyzed determinants of FDI for South-east European countries by using gravity model, effect of rule of law were significant at fixed effect and random effect panel models. Rule of law data is obtained from the World Bank – World Governance Indicators (2017).

*Common Language:* Wei (1996) found that linguistic tie has significant effect on bilateral trade amount between countries; therefore we included this variable to our model to check if this is also the case for the FDI flows. This data is obtained

from the CEPII database (2017). We created a dummy variable, which is equal to 1 if minimum 4% of population of each country can speak at least one common language.

Lastly, recession dummy variable added to the augmented Gravity estimations to analyze effect of macroeconomic stability of host countries on FDI flows.

*Recession:* Federal Reserve Bank of St. Louis (FRED, 2017) has recession indicator which is based on weekly collected data. We used annual average recession from their website.

Short definitions and sources of our dependent and independent variables can be seen in Table 3.1 below.

**Table 3.1:** Variables used for Gravity Model.

<b>Variable</b>	<b>Definition</b>	<b>Source</b>
FDI Inflow	CPI deflated Bilateral FDI flow from source country to host country	UNCTAD
GDP Host	GDP (constant 2010 US\$) of host country	World Bank – World Development Indicators
GDP Source	GDP (constant 2010 US\$) of source country	World Bank – World Development Indicators
Distance	Distance of the most important cities of host and source countries	CEPII
Mean Distance Host	Average distance of host countries to other countries	CEPII
Mean Distance Source	Average distance of source countries to other countries	CEPII
Rule of Law	Perception of applicability of laws	World Bank – World Governance
Common Language	Dummy variable for minimum 4% of populations can speak same languages	CEPII
Recession	Dummy variable to show that there is a recession in this year	Federal Reserve Bank of St. Louis

### 3.1.2. Hypotheses for FDI inflow in emerging countries

After defining our variables and explaining how we obtain data for them, we present our hypotheses below considering the previous findings in the literature.

*H1.1:* GDP of host country has positive effect on FDI inflow to emerging countries.

*H1.2:* GDP of source country has positive effect on FDI inflow to emerging countries.

*H1.3:* Distance between host and source countries has negative effect on FDI inflow to emerging countries.

*H1.4:* Average distance of host country to other countries has positive effect on FDI inflow to emerging countries.

*H1.5:* Average distance of source country to other countries has positive effect on FDI inflow to emerging countries.

*H1.6:* Rule of law of host country has positive effect on FDI inflow to emerging countries.

*H1.7:* Common language, between host and source country, has positive effect on FDI inflow to emerging countries.

*H1.8:* Recessions in the host countries has negative effect on FDI inflow in emerging countries.

### 3.1.3. Gravity Model for FDI inflows to emerging countries

Mathematical expression of the gravity model can be seen below:

$$FDI_{hst} = \beta_0 \frac{GDP_{ht}^{\beta_1} GDP_{st}^{\beta_2}}{D_{hs}^{\beta_4}} X_j^{\tau_j} + \varepsilon_t \quad (3.1)$$

In the model below  $FDI_{hst}$  is used to show FDI inflow to host country  $h$  from source country  $s$  at year  $t$ .  $GDP_{ht}$  and  $GDP_{st}$  are used to show GDPs of host and source countries, respectively.  $D_{hs}$  is the distance between host and source countries. Lastly, other explanatory variables which may also have effect on FDI are denoted with  $X_j$ ,

The formula is converted to log format to be able to create a linear model:

$$\ln(FDI_{hst}) = \ln \beta_0 + \beta_1 (\ln GDP_{ht}) + \beta_2 \ln(GDP_{st}) + \beta_4 \ln(D_{hs}) + \tau_j \ln X_j + \varepsilon_t \quad (3.2)$$

Equation 3.2 is our basic gravity model and depending on the explanatory variables added to it we will have different versions of our augmented gravity estimations. To test our hypotheses we will use random effect panel data. The reason for choosing random effect model is that if we selected fixed effect model, we would not test effects of our time-invariant variables which are very important for our analysis.

As it mentioned above around 10% of our FDI inflow is negative and using logarithmic version of this data is not possible. Besides, we decide to keep this negative data to prevent selection bias; therefore, we required to transformation for negative FDI values. To solve this problem, we will try two different methods that are used so far in the literature. Firstly, we will use same method with Busse et al. (2010) which uses the transformation below.

$$y = \ln(x + \sqrt{(x^2 + 1)}) \quad (3.3)$$

Also Kayam and Hisarcıklılar (2009) used different method to transform their negative values to logarithmic format. If FDI inflow is equal to zero they added one to this variable, because FDI inflows are mostly calculated by millions or billions US\$, they claim that effect of this will not create biased results. Also, for negative values they had taken logarithm of absolute values, and then multiplied it with -1 before the regression analysis. Their method may disturb the distribution of the variable especially if there is data between 0 and 1. In the UNCTAD data, FDI inflows are calculated by million US\$, and there is not any flow value between 0 and 1 US\$, so when we take logarithm, we do not have any value whose logarithm is negative. Therefore, applying the method of Kayam and Hisarcıklılar (2009) will not change the order of our variables. We will also show results of gravity model estimations using this method as a robustness check.

### **3.2. Determinants of FDI Inflows to Turkey Using Panel Data**

After analyzing determinants for emerging countries, we filter our data to have a closer look at the FDI inflows to Turkey. Main purpose of the thesis is analyzing determinants of FDI inflow in Turkey; therefore, we will perform our gravity model explained above only for Turkey data in this sub-section.

If we filter our emerging countries data for Turkey, we have 715 observations from 2002 to 2012. As source countries of these FDI flows, we have data from 65 different countries.

After analyzing data for Turkey, we will have a chance to compare the results for Turkey with other emerging countries and, thus, we will be able to see whether determinants of FDI inflow in Turkey are different from other emerging countries.

### **3.2.1. Variables of Gravity Model Estimation for the FDI inflows to Turkey by panel data**

When we investigate, determinants of FDI inflow Turkey, we also use the same variables which we used for the emerging countries analysis. As it mentioned above, in this section, our aim is comparing effects of gravity model variables on FDI inflow in Turkey and emerging countries.

As the host country will not change in this analysis, using host mean distance is will be same in all observations. It is therefore excluded from the regression analysis. In addition, in CEPII (2017) data all of common language dummy variable for Turkey and sources countries are zero. Therefore, we excluded these two variables from our model. The summary of variables used in this section can be seen in Table 3.2 below.

**Table 3.2:** Variables used for Gravity Model in Turkey.

<b>Variable</b>	<b>Definition</b>	<b>Source</b>
FDI Inflow	CPI deflated Bilateral FDI flow from source country to host country	UNCTAD
GDP Host	GDP (constant 2010 US\$) of host country	World Bank – World Development Indicators
GDP Source	GDP (constant 2010 US\$) of source country	World Bank – World Development Indicators
Distance	Distance of the most important cities of host and source countries	CEPII
Mean Distance Source	Average distance of source countries to other countries	CEPII
Rule of Law	Perception of applicability of laws	World Bank – World Governance
Recession	Dummy variable to show that there is a recession in this year	Federal Reserve Bank of St. Louis

Bilateral analysis shows that the highest FDI inflows to Turkey are from Netherlands in 2006 and 2007. Total FDI inflows from Netherlands are more than \$5billionUS both in these two years. Also, there is not any negative FDI inflow value (disinvestment) although FDI inflow in 315 observations is equal to zero.

### **3.2.2. Hypotheses for FDI inflow in Turkey by panel data**

As it can be seen above, mostly, we will use same variables for Turkey with emerging countries. Therefore, our hypotheses will only have small changes.

*H2.1:* GDP of Turkey has positive effect on FDI inflow to Turkey.

*H2.2:* GDP of source country has positive effect on FDI inflow to Turkey.

*H2.3:* Distance between Turkey and source countries has negative effect on FDI inflow to Turkey.

*H2.4:* Average distance of source country to other countries has positive effect on FDI inflow to emerging countries.

*H2.5:* Rule of law of Turkey has positive effect on FDI inflow to Turkey.

*H2.6:* Recessions in Turkey has negative effect on FDI inflow to Turkey.

### **3.2.3. Gravity Model for FDI inflows to Turkey by panel data**

We will use same model in emerging countries analysis. In Turkish data, we do not have any negative FDI inflow value, but still we have high amount of values which are equal to zero. Therefore, we need a transformation from taking the log of FDI data. We will use transformation methods both from Busse et al. (2010) and Kayam and Hisarcıklılar (2009) as in the previous section.

### **3.3. Determinants of FDI Inflow In Turkey by Time Series**

Lastly, to understand historical determinants of FDI inflow to Turkey, a time series analysis is used. What makes this part important is that we will use data from 1980 to 2014; therefore, we will have chance to analyze nearly whole period after the 24 January 1980 decisions in Turkey which are famous in adopting the neo-liberal policies. Tatoglu and Erdal (2002) also performed a time series analysis for FDI inflows to Turkey; however, their analysis only includes data between 1980 and 1998. Now, we have opportunity to analyze two times the longer period from their research and cover the period after AK Party ruling. Because data availability is very limited for 1980s, some of our explanatory variables are different from our panel models.

#### **3.3.1. Dependent and explanatory variables used in the time series analysis**

Detailed explanation of variables used in the time series analysis and their sources are provided below.

*FDI Inflow:* For FDI inflow we used Foreign Direct Investment, Net Inflows (BoP, Current US\$) from World Bank-World Development Indicators (WDI). This data contains equity capital, reinvestments of earnings and other capital movements from another country to Turkey. The investor must have at least 10% of voting stock (World Bank, 2017). Data starts with \$18million in 1980 and reaches its peak at \$22billion in 2007. We deflated FDI inflow by using CPI data from World Bank (2017).

*Market Size:* For market size, GDP is used as an indicator in many articles; hence, we used GDP (Current US\$) from World Development Indicator (WDI, 2017) as FDI inflow. To see effect of GDP calculation method, in this section, differently

from second section, we took current US\$ format of GDP like Ranjan and Agrawal (2011) did. Like FDI inflow we deflated GDP values by using CPI data.

*Attractiveness:* Economic growth of a country is used as a proxy for the market potentials of the host country. Tatoglu and Erdal (2002) claim that effect of a country's economic growth has significant and positive effect on FDI inflow to the host country. The data is obtained from International Monetary Fund (IMF, 2017).

*Economic Instability:* Busse and Hefeker (2005) stated that low interest rate is a result of good macroeconomic policy and it can boost FDI when growth rate is high. Deposit Interest Rate used by Tatoglu and Erdal (2002) is used to analyze effect of macroeconomic instability; therefore, we added deposit interest rate from WDI to our equation. Definition of deposit interest rate is, basically, bank payments for savings deposits (World Bank, 2017).

*Trade Performance:* Tatoglu and Erdal (2002) used Import/Export ratio as a variable and named this variable as openness. We included this variable in our equation and called it trade performance. Export and Import values are also taken from WDI (2017).

*Infrastructure Investments:* Infrastructure of the country is especially very important for transportation, energy and telecommunication industries. Tatoglu and Erdal (2002) used these industries in their study. Therefore, to see effect of infrastructure investments, we will look effect of investments in these industries. We collected data from the Ministry of Development – Gross Fixed Investments by Sectors. Again, we apply CPI deflation for this variable.

*Exchange Rate:* Dumludag (2009) and Javorcik & Spatareanu (2005) found that after economic and macroeconomic instability, exchange rate is the biggest barrier for FDI inflow to Turkey. Tatoglu and Erdal (2002) also claim that exchange rate volatility has significantly negative effect on FDI inflow. For exchange rate, we used Nominal Effective Exchange Rate from Bruegel Datasets (2017).

Summary of our variables and their sources can be seen in Table 3.3. As it will be explained in section 3.3.3, we will use ARIMA (2,1,2) model. Therefore, we will analyze relationship between variations of independent variables with variations of FDI inflow. This is why our variables will be shown with  $\Delta$  signs.

**Table 3.3:** Time Series Variables.

<b>Variable</b>	<b>Definition</b>	<b>Source</b>
$\Delta$ FDI Inflow	Changes of Foreign Direct Investment, Net Inflows (BoP, Current US\$)	World Bank – World Development Indicators
$\Delta$ Market Size	Changes of GDP (Current US\$)	World Bank – World Development Indicators
$\Delta$ Trade Performance	Changes of Export/Import	World Bank – World Development Indicators
$\Delta$ Economic Instability	Changes of Deposit Interest Rate	World Bank – World Development Indicators
$\Delta$ Infrastructure Investments	Changes of Gross fixed investment in transportation, energy and telecommunication industries	Ministry of Development of Turkey
$\Delta$ Attractiveness	Changes of Real Economic Growth	International Monetary Fund
$\Delta$ Exchange Rate	Changes of Nominal Effective Exchange Rate	Bruegel

### **3.3.2. Hypotheses tested for the FDI inflows to Turkey using time series analysis**

Differently from first two models, in this model, we will have chance to test effects of some other variables. Tested hypotheses are stated below. Instead of looking direct effect of our variables, we will look effect of changes in these variables on changes on FDI inflow to Turkey. Reason for this differentiation will be explained in section 3.3.3.

*H3.1:* Changes of Market Size of Turkey has positive relationship with changes of FDI inflow to Turkey.

*H3.2:* Changes of Trade performance of Turkey has positive relationship with changes of FDI inflow to Turkey.

*H3.3:* Changes of Economic instability of Turkey has negative relationship with changes FDI inflow to Turkey.

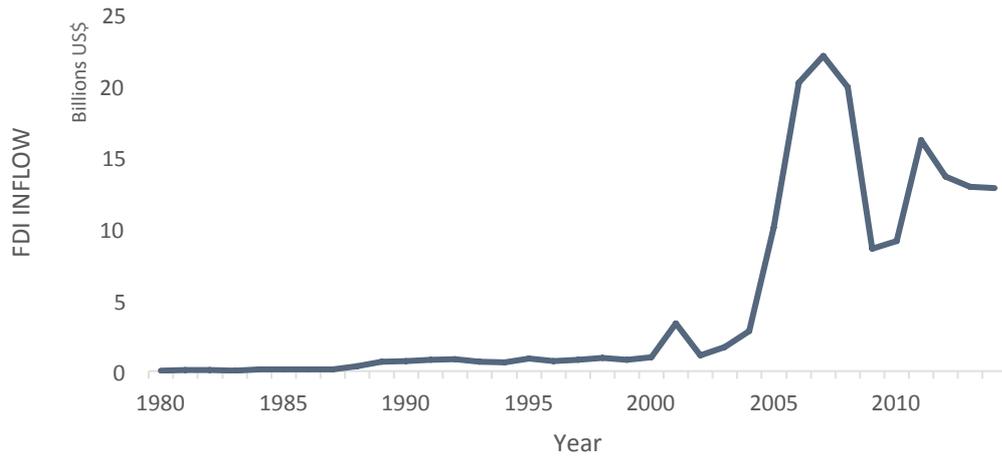
*H3.4:* Changes of Infrastructure investment in Turkey has positive relationship with changes of FDI inflow to emerging countries.

*H3.5:* Changes of Attractiveness of Turkish Market has positive relationship with changes of FDI inflow to Turkey.

*H3.6:* Changes of Exchange rate in Turkey has negative relationship with changes of FDI inflow to Turkey.

### **3.3.3. Time series regression model to explain the FDI inflows to Turkey**

There are different types of time series models. Choosing the right model requires various tests before it. Firstly, we need to examine our dependent variable in terms of stationary, which is FDI Inflow to Turkey. Figure 3.1 shows, FDI inflows do not follow a stationary path and, especially after 2000, not only FDI inflow increased dramatically, but also variance of FDI inflow enlarged too.



**Figure 3.1:** Net FDI Inflows to Turkey.  
Source: World Bank - WDI, 2017

Figure 3.1 illustrates that it is hard to say our dependent variable, which is FDI inflow in Turkey, is stationary. To check unit root of the variable we used Augmented Dickey Fuller test. The results of the test are presented at Table 3.4.

**Table 3.4:** Augmented Dickey-Fuller test results FDI Inflow.

Dickey Fuller test for unit root		Number of observation = 34		
		Interpolated Dickey Fuller		
	Test Statistics	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.226	-3.689	-2.975	-2.62
MacKinnon approximate p value Z(t) = 0.6622				

Result of the unit root test, at Table 3.4, means that we cannot reject the null hypothesis of Dickey Fuller test, which argues that there is a unit root for selected variable. To continue our analysis with a stationary dependent variable we used  $\Delta \ln$  (FDI Inflow) instead of using FDI Inflow.

First, we tried to understand if the process determining our time series variable contains a unit root. The Augmented Dickey-Fuller test uses OLS to fit the equation given below:

$$\Delta y_t = \alpha + \beta y_{t-1} + \delta t + \gamma_1 \Delta y_{t-1} + \dots + \gamma_k \Delta y_{t-k} + \varepsilon_t \quad (3.4.)$$

The addition of lagged variables in the above equation is used to absorb the serial correlation that gives us identically and independently distributed error terms. Choosing the appropriate number of lags depends largely on guesswork. In other words, one needs to pay attention to different lag alternatives to observe if the significance of the test statistic is sensitive to changes lag choice.

**Table 3.5:** Augmented Dickey-Fuller test results for ΔLn (FDI Inflow).

Dickey Fuller test for unit root		Number of observation = 31		
		Interpolated Dickey Fuller		
	Test Statistics	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.632	-2.473	-1.703	-1.314
MacKinnon approximate p value Z(t) = 0.0069				

Table 3.5 shows that our variable is now traveling around a mean, and mean of our variable does not change with time anymore. Also, Table 3.5 demonstrates the result of Augmented Dickey-Fuller test, and the results shows that we can reject the null hypothesis. Rejecting null hypothesis of Augmented Dickey-Fuller test means that our Δlog (FDI Inflow) data is stationary.

We made our analysis by using ARIMA model in Stata. ARIMA model is notated as ARIMA (p, d, q), where p shows autoregressive order of the model, d shows difference order of the model and lastly q shows moving-average order of the model. Because our dependent variable is not stationary when it is not differenced, we build our model when d=1. For auto regression and moving average order, we applied different models when p and q have different values. The results of the models are compared to find the best model.

Except from differentiated variables ARIMA model is like ARMA model. In ARMA model both AR(p) and MA(q) estimations are included to our formula. For example, equation for ARMA(1,1) can be written like this:

$$y_t = \beta x_t + \mu_t \tag{3.5}$$

$$\mu_t = \rho \mu_{t-1} + \theta \epsilon_{t-1} + \epsilon_t \tag{3.6}$$

In Equation 3.6, ρ shows autocorrelation parameter, θ shows moving-average parameter. If we use ρμ<sub>t-1</sub> + θε<sub>t-1</sub> + ε<sub>t</sub> instead of μ<sub>t</sub>, model for ARMA(1,1) will be like below,

$$y_t = \beta x_t + \rho \mu_{t-1} + \theta \varepsilon_{t-1} + \varepsilon_t \quad (3.7)$$

After we understand how to form the model for ARMA(1,1), if we look for the general model for ARMA(p,q) we can write the model as;

$$y_t = x_t \beta + \rho_1(y_{t-1} - x_{t-1} \beta) + \rho_2(y_{t-2} - x_{t-2} \beta) + \dots + \rho_p(y_{t-p} - x_{t-p} \beta) + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \dots + \theta_q \varepsilon_{t-q} + \varepsilon_t \quad (3.8)$$

By using the equation 3.8, we will compare different ARIMA(p,1,q) models to find best model for our variables. Comparison of the models made based on Akaike information criterion (AIC) and Bayesian information criterion (BIC) results of the selected models. The AIC and BIC results of the models calculated after running each ARIMA model in stata.

Akaike information criterion is created by Akaike (1974) for testing time series model with the aim of finding the model that has the best results. Equation of the method can be seen below.

$$AIC = -2\ln L + 2k \quad (3.9)$$

In this equation,  $L$  defines maximum likelihood and  $k$  defines number of independently adjusted parameters within the model (Akaike, 1974). Smaller AIC result means that the model fits better to data.

After Akaike (1974), Schwarz (1978) built another method, which is called Bayesian information criterion (BIC), for testing time series models. Formulation of BIC is defined as below.

$$BIC = -2\ln L + k \ln N \quad (3.10)$$

In BIC equation, like AIC,  $L$  defines maximum likelihood, but differently from AIC model sample size ( $N$ ) is also included in calculating the BIC statistic. Again, like AIC results, the smaller is the BIC statistic the better is the fit of the model. Moreover, although the result are in similar direction both in AIC and BIC model, Dziak et al. (2012) claims that when AIC is gives better results with small sample size, BIC is better with large samples.

AIC and BIC scores of different ARIMA models are presented in Table 3.6.

**Table 3.6:** Arima Results for AIC and BIC.

Model	AIC	BIC
ARIMA(0,1,0)	65.7305	77.94139
ARIMA(0,1,1)	67.66673	81.40398
ARIMA(0,1,2)	62.64643	77.91004
ARIMA(0,1,3)	62.55661	77.82022
ARIMA(1,1,0)	67.69861	81.43585
ARIMA(1,1,1)	62.34546	76.08271
ARIMA(1,1,2)	62.62609	77.88969
ARIMA(1,1,3)	66.39116	84.70748
ARIMA(2,1,0)	67.49861	82.76222
ARIMA(2,1,1)	59.21066	74.47426
ARIMA(2,1,2)	52.16257	68.95253
ARIMA(2,1,3)	59.80178	78.11811
ARIMA(3,1,0)	65.45213	82.2421
ARIMA(3,1,1)	58.7696	75.55957
ARIMA(3,1,2)	62.77255	82.61524
ARIMA(3,1,3)	61.7066	80.02293

As it can be seen at Table 3.6, ARIMA(2,1,2) model has both lowest AIC and BIC scores. Therefore, we will continue our analysis by using ARIMA(2,1,2) model in our time-series analysis.

## 4. RESULTS

### 4.1. Results for the determinants of FDI inflow to Emerging Countries

We made our analysis of basic gravity and augmented gravity model estimations for four different models with two different transformation methods. Table 4.1 shows the results of those models by using methods from Busse et al. (2010).

**Table 4.1:** Augmented Gravity model for emerging countries.

	Model1	Model2	Model3	Model4
Ln (FDI Inflow) (Dependent Variable)				
Ln (GDP Host)	2.698*** (0.239)	2.329*** (0.239)	2.944*** (0.312)	2.947*** (0.312)
Ln (GDP Source)	1.716*** (0.127)	1.346*** (0.118)	1.321*** (0.120)	1.321*** (0.119)
Ln (Distance)	-1.893*** (0.275)	-4.397*** (0.331)	-4.365*** (0.334)	-4.366*** (0.334)
Ln (Mean Distance Host)	-	3.340*** (0.813)	3.853*** (0.843)	3.849*** (0.844)
Ln (Mean Distance Source)	-	6.207*** (0.546)	6.153*** (0.550)	6.153*** (0.550)
Rule of Law	-	-	1.619*** (0.535)	1.615*** (0.534)
Common Language	-	-	-0.582 (0.898)	-0.584 (0.898)
Recession	-	-	-	.0722253 (0.251)
R squared	0.1007	0.1583	0.1575	0.1578
Number of Obs.	7,064	7,064	7,064	7,064

Standard error values are in parenthesis.

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, Significant at the 10% level .

Our findings show that except from H1.7 and H1.8, we cannot reject our other hypotheses for the first model. So, GDP of host and source countries, distance, rule of law and average distance of source and host countries have significant effect on FDI inflow to emerging countries. To be sure that our transformation method didn't affect our result, we also applied another transformation method to our dependent variable from Kayam and Hisarcıklılar (2009). Results of these models are given as robustness check in Table 4.2.

**Table 4.2:** Robustness check using different FDI transformation function.

	Model1	Model2	Model3	Model4
Ln (FDI Inflow) (Dependent Variable)				
Ln (GDP Host)	2.780*** (0.220)	2.498*** (0.228)	2.747*** (0.307)	2.747*** (0.307)
Ln (GDP Source)	1.350*** (0.115)	1.088*** (0.111)	1.084*** (0.113)	1.084*** (0.113)
Ln (Distance)	-1.454*** (0.250)	-3.398*** (0.312)	-3.375*** (0.315)	-3.375*** (0.315)
Ln (Mean Distance Host)	-	3.046*** (0.768)	3.192*** (0.796)	3.192*** (0.797)
Ln (Mean Distance Source)	-	4.609*** (0.515)	4.571*** (0.519)	4.570*** (0.520)
Rule of Law	-	-	.649 (0.528)	.650 (0.529)
Common Language	-	-	.016 (0.850)	.016 (0.850)
Recession	-	-		-.012 (0.271)
Overall R squared	0.0857	0.1171	0.1171	0.1171
Number of Obs.	7,064	7,064	7,064	7,064

Standard error values are in parenthesis.

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, Significant at the 10% level.

It can be seen from Table 4.2, results are similar with first transformation method and Augmented static gravity models performed very well with this data. Overall

results show that higher level of GDP (both host and origin country) is positively associated with the level of FDI inflow and higher level of distance decreases the level of FDI flow between to emerging countries. This finding is line with overall consensus in the trade literature researchers found similar results using the gravity model. However, the main difference is that gravity models were much more powerful in case of explaining bilateral trade than foreign direct investment flows, because R squared values is found to be much more higher in the international trade context compared with the foreign trade investment. This is not surprising because the theoretical explanations about the FDI flows suggest a more complex framework which suggest not only general economic situation of countries to have an effect on the FDI flows but also market structures, political and social institutions in countries to have a significant role.

#### **4.2. Results of the Gravity Model Analysis for the Determinants of FDI Inflows to Turkey**

After investigating determinants of FDI inflows to emerging countries, we filtered our data for Turkey. As explained in the previous section, we used transformation method from Busse et al. (2010) and gravity model. Results of regression estimations for Turkey can be seen in Table 4.3.

**Table 4.3:** Augmented Static Gravity Model for Turkey.

	Model1	Model2	Model3	Model4
Ln (FDI Inflow) (Dependent Variable)				
Ln (GDP Host)	20.178*** (1.545)	20.602*** (1.550)	20.756*** (1.554)	20.301*** (1.566)
Ln (GDP Source)	2.203*** (0.329)	1.662*** (0.320)	1.662*** (0.320)	1.654*** (0.320)
Ln (Distance)	-1.639** (0.776)	-4.911*** (1.084)	-4.911*** (1.084)	-4.917*** (1.083)
Ln (Mean Distance Source)	-	6.335*** (1.610)	6.336*** (1.610)	6.353*** (1.609)
Rule of Law	-	-	-4.905 (3.789)	-5.055 (3.780)
Recession	-	-	-	1.665 (0.799)
Overall R squared	0.3108	0.3739	0.3749	0.3776
Number of Obs.	715	715	715	715

Standard error values are in parenthesis.

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, Significant at the 10% level.

As expected, effects of variables are not so different from emerging countries. Like emerging countries we cannot reject most of our hypotheses. we can only reject H2.5 and H2.6 which are Rule of Law has positive and recession has negative effect on FDI Inflow to Turkey. Thus, we can argue that GDP of host and source countries together with distance is statistically significant at all levels. However, it is important to note that the effect of GDP in Turkey is almost 10 times higher than the positive contribution of source countries' GDP levels. The results of emerging country analysis presented in the previous sub-section above shows that this difference of the effects if not that apparent in that sample. Thus, one can argue that economic prosperity is the most important factor needed to attract the FDI inflows in Turkey according to our gravity model estimation. Mathematical explanation of this GDP coefficient is like that when the other things are same, if the FDI inflow from a source country is \$500 million when GDP of Turkey is \$700 billion, this FDI inflow would be around \$875 million when GDP of Turkey is \$720 billion. Even though,

the increase seems really high, it is the only way to explain FDI inflow fluctuation in Turkey between 2002-2012. Figure 3.1 illustrates that FDI inflow to Turkey jumped from \$2.75 billion to \$22billion between 2004 and 2007.

Besides, again, like emerging countries, effect of recession is not statistically significant at any level. Thus, it can be argued that FDI is rather a long-term decision and economic recessions do not affect FDI flows which do have rather short-term negative effects on the economy.

The most important difference between results of Turkey and emerging countries is the effect of rule of law. Although in emerging countries it is found to be statistically significant, it is not in the Turkish case. On the other hand, effects of GDPs and average distance of source are positive and effects of distance between source country and Turkey are negative on FDI inflow in Turkey.

#### **4.3. Results of the Time-series Analysis for the determinants of FDI inflows to Turkey**

In this section, we tested our hypotheses by using ARIMA time series model. As it mentioned above, for our data, best ARIMA model to fit was ARIMA(2,1,2). Coefficient estimates of our variables and their statistical significance levels can be seen in Table 4.4.

**Table 4.4:** Results of ARIMA(2,1,2) model.

	Coefficient	Standard error	z	p value
<b><math>\Delta \ln(\text{FDI Inflow})</math></b>				
<b>(Dependent Variable)</b>				
<b><math>\Delta \ln(\text{Market Size})</math></b>	4.545***	0.510	8.91	0.000
<b><math>\Delta \text{Attractiveness}</math></b>	2.316*	1.402	1.65	0.099
<b><math>\Delta \text{Economic Instability}</math></b>	0.156	0.189	0.82	0.411
<b><math>\Delta \ln(\text{Trade Performance})</math></b>	3.299***	0.443	7.44	0.000
<b><math>\Delta \ln(\text{Infrastructure Investments})</math></b>	1.292***	0.387	3.34	0.001
<b><math>\Delta \ln(\text{Exchange Rate})</math></b>	-2.409***	0.778	-3.10	0.002
<b>Sample</b>	1981-2014			
<b>Number of Observation</b>	34			
<b>Wald chi square</b>	5657.88*** (0.000)			

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, \* Significant at the 10% level.

What Table 4.4 shows is that effects of market size, trade performance and infrastructure investments on FDI inflow are positive and statistically significant at every conventional level, so we cannot reject H3.1 (GDP has positive effect), H3.2 (Trade Performance has positive effect) and H3.4 (Infrastructure Investments has positive effect). In addition, according to the results exchange rate has negative and significant effect on FDI inflow; therefore, H3.6 (Exchange rate has negative effect) cannot be rejected. Attractiveness or economic growth of Turkey has positive coefficient, but the coefficient is only significant at 10% confidence interval. Hence, we cannot reject H3.5 (Attractiveness has positive effect) at 10% level. The importance of the economic development of Turkey on its FDI inflows is also found to be both economically and statistically significant in the augmented gravity model. Lastly, the effect of economic instability seems not significant in Table 4.4, the explanation for this result can be that high exchange rate is also another sign of economic instability; therefore, foreign investor can consider exchange rate as an

indicator for economic instability. As a result, we can reject H3.3 (Economic Instability has negative effect).

Coefficient of the Market Size (GDP) is lower than our panel data analysis for Turkey because period between 2004 and 2012 was the most fluctuated period of FDI inflow to Turkey. In this time series analysis we could analyze a longer period; therefore, now we have more reliable results. Our results from Table 4.4 shows that if Market Size of Turkey increase 1% FDI inflow to Turkey will be increased nearly 4,5%.





## 5. CONCLUSION AND RECOMMENDATIONS

In this thesis, we analyzed the determinants of Foreign Direct Investment inflows firstly in emerging countries. Then we narrowed our study and focused specifically on Turkey. Our findings are, mostly, in the same path with our expectations. Results of our gravity model estimations for emerging countries show that gravity model is not only a good way to explain trade flow between two countries, but also useful in understanding the determinants of foreign direct investments. Results of this model show that GDP's of host and source countries has positive effect on FDI inflow between these countries and, as it has also been found in the trade literature, higher distance between source and host countries causes a lower FDI flow between them. Different costs and social barriers can be reasons for this finding (transportation cost, cultural differences, time zones).

In the second step, we filtered our gravity model panel data analysis and focused only on Turkey. Our findings were almost same with emerging countries. The effect of GDP in Turkey is found to be almost 10 times higher than the positive contribution of source countries' GDP levels. The results of emerging country analysis showed that this difference between the effects of home and source GDP levels not that apparent. Thus, one can argue that economic prosperity is the most important factor needed to attract the FDI inflows in Turkey according to our gravity model estimation. Besides, again, like emerging countries, effect of recession is not statistically significant at any level. Thus, it can be argued that FDI is rather a long-term decision and economic recessions do not affect FDI flows which do have rather short-term negative effects on the economy. Another difference between results of Turkey and emerging countries is the effect of rule of law. Effect of rule of law is not statistically significant in the Turkish case. Besides, effects of GDPs and average distance of source are positive and effects of distance between source country and Turkey is negative on FDI inflow in Turkey.

In general, we can argue that our gravity model estimations performed well but their explanatory power is not that strong as it has been argued in the trade literature

which is not surprising though because the decision behind FDI investments are more complex compared with the case of the international trade.

Lastly, we performed a time series data analysis. We examined data for 35 years which is a contribution to the literature. This period cover almost all the time after Turkey started its globalization story. Our findings were also similar to our expectations. Market size of Turkey was statically significant and positive in all of our three models; therefore, we can say that foreign companies are making investment to Turkey to sell their products in Turkey. In other words, as it has been suggested in theoretical explanations of FDI flows, the main aim for FDI inflows to Turkey was to reach the Turkish market.



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