Determinants of foreign direct investment in Turkey: a panel study approach

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This study examines the determinants of foreign direct investment (FDI) using a panel of bilateral outward FDI stocks of 19 OECD countries in Turkey between 1982 and 2007. Employing a knowledge-capital model, this study finds that joint national incomes, per capita difference, investment liberalisation and the cost of exporting to Turkey have significant effects on FDI in Turkey. In addition, the prospect of European Union membership, government stability, infrastructure, bilateral exchange rate, exchange rate volatility and openness to trade play an important role in determining the amount of FDI in Turkey. Finally, this study finds that high relative unit labour costs and corruption provide stimuli to FDI.

Key words: Foreign direct investment, knowledge-capital framework, EU membership, Turkey.

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Abbreviations

CBRT	Central Bank of Republic of the Turkey
CU	Customs Union
CEEC	Central and Eastern European Countries
EEC	European Economic Community
EU	European Union
FDI	Foreign Direct Investment
IMF	International Monetary Fund
ICRG	International Country Risk Guide
MNEs	Multinational Enterprises
OECD	The Organisation for Economic Co-operation and Development
RTPMUT	Republic of Turkey, Prime Ministry, Undersecreteriat of Treasury
UNCTAD	United Nations Conference on Trade and Development
UK	United Kingdom
UN	United Nations
USA	the United States of America

1.0 INTRODUCTION

In recent years, foreign direct investment (FDI) flows have formed a bigger proportion of private capital flows going to developing economies and covered a larger geographical span than before. UNCTAD (2007) reports that over the period 1982-2007, inward FDI stocks in developing economies soared from 346 billion to 4393 billion of US$, growing 11% on annual average. Even though developing economies registered an unprecedented growth in inward FDI stock during this period in absolute numbers, developed economies still held 67% of total inward FDI stocks in 2007 with a 13.7% growth on annual average.

Turkey outperformed both developing and developed economies in attracting FDI over the same period. FDI stocks between the years 1982 and 2007 rose from 8 to 157 billion of US$, growing 14.1% on average. The boom in the inward FDI was accompanied by a surge in imports to Turkey. Intermediate goods constituted the biggest part of the imports. Apart from the increase in FDI and imports, fast growth in the gross domestic product (GDP), changes in policies to liberalise FDI and trade, gradual decrease in corporate income tax, and the prospect of European Union (EU) membership marked the last two decades in Turkey.

FDI in Turkey has been studied by several scholars, such as, Erdilek (1982), Coskun (1996), Tatoglu & Glaister (2000), Halicioglu (2001), Erdal & Tatoglu (2002). Using questionnaires, Erdilek (1982) finds that FDI inflows into manufacturing sector are mainly motivated by market access to Turkey. In addition, the author cites that bureaucratic, political obstacles and discrimination against foreign companies constitute major impediments to foreign companies. In a similar study, Coskun (1996) uses survey method to identify the importance of factors influencing foreign investment decision in manufacturing sector. He shows that the two important factors motivating FDI in manufacturing sector are the growing local market and promising performance of the Turkish economy. In another study, Tatoglu & Glaister (2000)

confirm the conclusions of Erdilek (1982) and Coskun (1996) in identifying the market attractiveness of Turkey as an important factor for FDI in Turkey. Perceived potential risk of doing business and host country government policy constitute the other important findings of the study of Tatoglu & Glaister (2000).

Furthermore, a number of empirical studies using econometric analysis exist in the literature on FDI in Turkey. For example, Halicioglu (2001) and Erdal & Tatoglu (2002) use time series data while Sayek (2007) incorporates Turkey into a panel data along with other countries. The authors employ aggregate FDI data at country level and document market size, exchange rate, exchange rate volatility, openness to trade, institutional factors and the Customs Union (CU) and the candidate status of Turkey for EU membership as the factors motivating FDI into Turkey.

Given the coverage of previous studies on FDI in Turkey, there is scope for the inclusion of tax and start of negotiation of membership with the EU into the analysis of the determinants of FDI in Turkey. The effects of bilateral exchange rate, exchange rate volatility, and transport costs on inward FDI in Turkey are the other areas that existence studies do not shed light on. Lastly, the methodology used by the previous studies is limited to survey methods and time-series econometric techniques using aggregate country data for FDI.

In order to fill these gaps in the literature mentioned above, I examine the determinants of FDI in the context of Turkey using panel data estimation techniques. I employ a knowledge-capital framework (Markusen *et al.,*1996) augmented with control variables to account for the impact of corporate income tax, exchange rate and exchange rate volatility, investment liberalisation and the start of membership negotiations with the EU on inward FDI.

By combining the knowledge-capital model with the set of locational factors identified by the empirical literature, I extend the studies of Carr *et al.,* (2001), Egger & Winner (2006) and

Gast & Herrman (2008) that employ a knowledge-capital framework by testing the knowledge-capital framework with additional variables. I also contribute to the existing literature on FDI in Turkey by using a new bilateral data for FDI and trade at country level and adding corporate income tax and the prospect of EU membership.

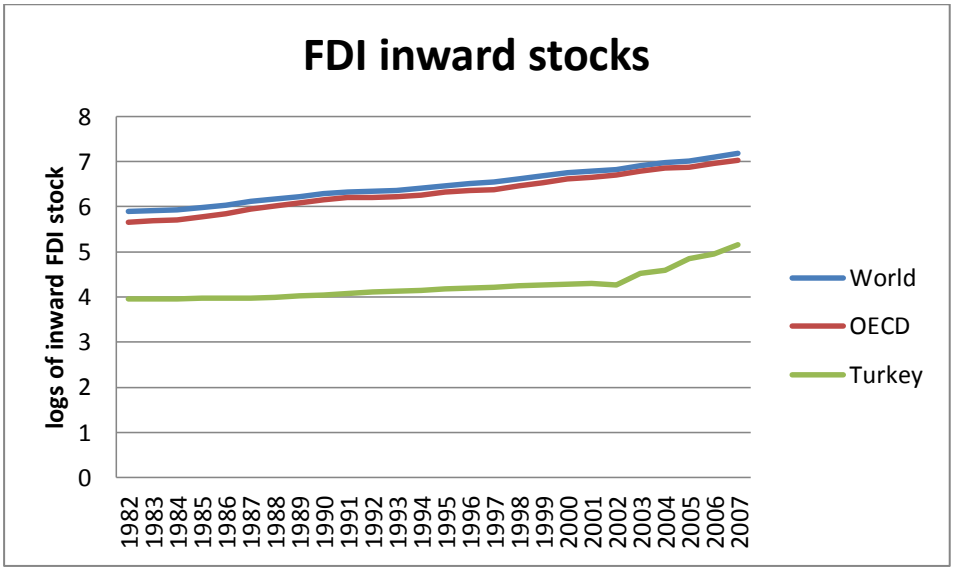
After controlling for relative labour cost, real exchange rate, exchange rate volatility, EU effect, openness to trade, infrastructure, corporate income tax difference and institutional factors, I find that combined market size and per capita difference are positively related to FDI. In addition, I find that investment liberalisation and the cost of exporting to Turkey have positive and significant effect on FDI. These results suggest that FDI in Turkey is horizontally motivated, even though there is an element of vertical direct investment. Furthermore, the start of negotiations for EU membership has a significant positive effect on FDI. A reduction in the corporate income tax in Turkey does not seem to have attracted FDI to Turkey. Overall, the results confirm the previous findings of Coskun (1996) and Tatoglu & Glaister (2000).

2.0 FDI in Turkey

Turkey followed a similar trend as the rest of the world and other OECD countries and its inward FDI stocks increased steadily between 1982 and 2007. Over this period, Turkish economy scored a 13% annual growth in FDI stocks on average, outperforming the world economy in this respect by nearly 1 percent. Yet, this fast growth was not evenly distributed among the years. The period between 1982 and 2001 saw FDI inward stocks in Turkey growing slower than those of World and OECD stocks with an annual growth of %3.7 as Figure 1 below demonstrates. Nevertheless, the growth of FDI inwards stocks with a 53% annual increase on average paints a different picture between the years 2002 and 2007 (UNCTAD, 2008). Cumulative FDI inflows also reflect two different trends for the same

periods. Turkey attracted joint FDI inflows around 57 billion of US$ in the second sub-period between the years 2002-2007, four times greater than cumulative FDI inflows in the first sub-period.

Figure 1 Inward FDI Stocks in Turkey, the OECD Countries and the World



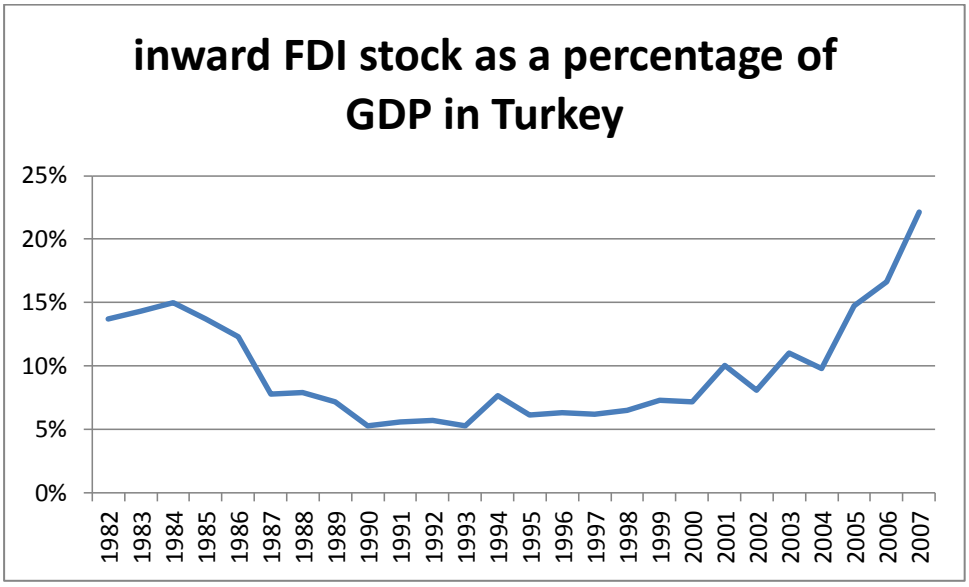
Source: Based on data compiled from UNCTAD (2008).

The success of a country in attracting FDI is often measured by the ratio of FDI inflows into or stocks in the country to gross domestic product of that country OECD (2008). Figure 2 depicting development of FDI relative to GDP in Turkey reveals a wide u-shape. The bottom of the trend represents the low steady level of FDI stocks between 1986 and 2001. The hikes in 1994 and 2001 do not represent a discernible increase in FDI stocks, but a contraction in the economy in these years. However, it is striking to note that FDI grew relatively higher than that of GDP between the years 2002 and 2007, where national income recorded the highest growth in the last three decades.[1] Consequently, Turkey was elevated from 109 in

[1] Data on National Income is compiled from UNWIR and Inward FDI Performance Index (UNCTAD, 2008)

2002 to 84 2007 in Inward FDI Performance Index, which ranks countries in accordance with the amount of inward FDI, relative to the size of their economies (UNCTAD, 2008).

Figure 2 Ratio of FDI inward Stocks to GDP of Turkey



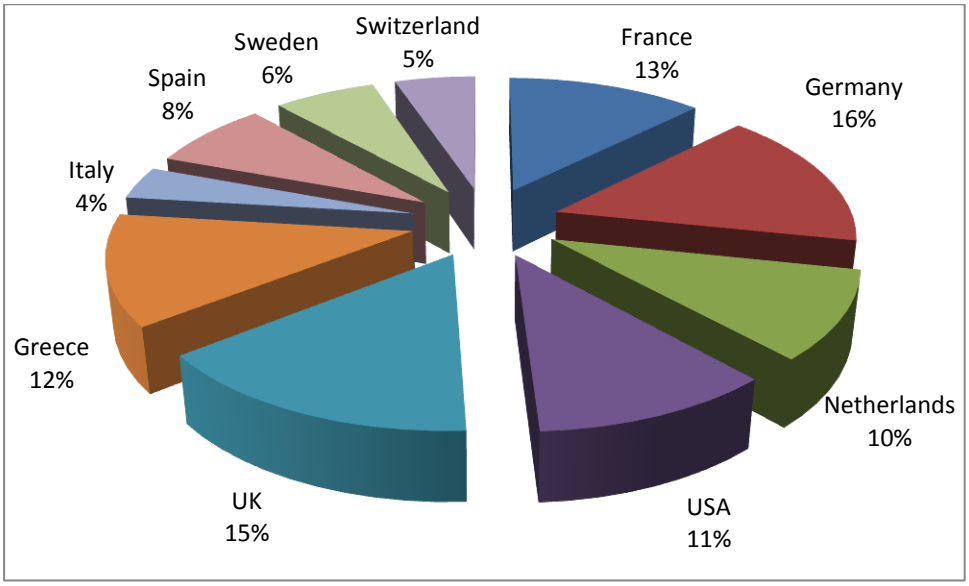
Source: Own Figure, based on data compiled from The World Bank (2008) and UNCTAD (2008).

The recent influx of FDI flows to Turkey after 2000 did not make a big difference in the country's inward FDI stock in terms of the share's of the main countries, i.e. EU and OECD. Even though OECD countries share in FDI stocks in Turkey decreased from 97% in 2000 to 82% in 2007, they are still larger investors in Turkey, while EU countries provides 72% of total FDI stocks in Turkey as the biggest regional bloc investing in the country in 2007 (CBRT, 2009). In addition the share of EU countries in OECD stocks rose from 81% in 2000 to 87% in 2007.

Germany, France, the UK, the USA, the Netherlands, Greece, Switzerland, Spain, Sweden and Italy bring about 58% of total inward FDI coming from OECD (CBRT, 2009). If this share is distributed among these ten countries, five countries, namely France, Germany,

Netherlands, the UK and USA dominate with 65% as Figure 3 reveals (OECD, 2008). According to the estimations of UNCTAD (2008) these countries jointly make up 61% of total outward investment originated from developed countries.[2]

Figure 3 The Distribution of FDI Inward Stocks among ten Leading Investor Countries in 2007.



Source: Based on data calculated from International Direct Investment Statistics (OECD, 2008)

3.0 Theoretical Framework and Hypotheses

The theoretical diversity of FDI approaches requires categorisation of the theories by their common threads (Dunning, 1973; Cantwell, 1991). This study groups the FDI approaches under three broad categories.

The first group, known as capital abundance hypothesis draws on the assumptions of perfect competition and explains FDI as pure capital flows among countries dictated by relative

[2] According to UNCTAD(2008) the list of developed countries include 27 EU countries and Gibraltar, Iceland, Norway, Switzerland, Canada, the USA, Australia, Bermuda, Israel, Japan and New Zealand.

endowment differences. According to this hypothesis, capital flows from capital-rich to capital-scarce country to seek higher returns than the origin country and replace trade due to trade impediments in the Mundell's (1957) model.

The second group is based on the industrial organisation theory and the theory of firm. Hymer (1960) and Kindleberger (1969) link market imperfections with the existence of firm specific advantages that enable firms to invest abroad.[3] Vernon (1966) associates innovation with the ability of firms to export to and eventually invest in foreign markets in his product cycle model (PCM). Aliber (1970) views FDI as capital flows moving from strong to weak currency areas.[4] Knickerbocker (1973) and Graham (1978) relate FDI to the strategic reaction of a firm in the case of its global competitive position is threatened by other firms. Buckley & Casson (1976) explain FDI as the replacement of external imperfect markets by internal markets (internalisation) within firm across national borders.[5] Rugman (1975) relates FDI to the international diversification of risk due to the imperfection in the capital markets.

The third group aims to integrate locational factors with the second strand. Dunning (1979; 1980) develops OLI framework consisting of ownership (O), location (L) and internalization advantages (I). In a similar manner, Markusen (1996) and Markusen (1998) integrate locational factors such as transport cost and home and host country sizes with ownership advantages in a knowledge-capital framework.

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[3] Brand name, patented technology, marketing skills and managerial skills are some of the firm specific advantages that the various studies refer to (Agarwal, 1980; Buckley, 1981).

[4] Along with the currency area hypothesis (Aliber, 1970), international diversification hypothesis (Rugman 1975) is categorised under the second group, since they incorporate the market imperfections in capital markets (Buckley & Casson, 1976, Rugman, 1980, Buckley, 1981, Pitelis & Sugden, 1991).

[5] The creation and operation of internal markets are not costless (Coase, 1937); therefore the cost of creating internal markets versus cost of using external markets determines using of external or internal markets for a firm.

The knowledge-capital model presumes the world consisting of two countries and two homogeneous goods. There are skilled-labour-intensive goods, X and unskilled-labour-intensive goods, Y. The knowledge-capital model further assumes two homogenous factors, unskilled and skilled labour and the both factors are internationally immobile. The model allows FDI as an alternative for exports to serve demand in foreign markets. The choice between exports or FDI depends on country characteristics, trade and investment costs.

The key assumption is that skilled-labour intensive and knowledge-generating activities, such as, research and development (good X) could be separated from unskilled-labour intensive production (good Y) at the plant level.[6] This fragmentation of activities enables firms to locate knowledge-generating activities and production in skilled and unskilled labour abundant countries respectively (vertical investment) to exploit difference in labour costs between two countries.

Within the model, it is assumed that the knowledge (in the form of a production method or a blueprint and modelled as firm-specific costs) within the firm has a joint-input character. Thus the knowledge could be utilised at multiple production facilities without diminishing in value in existing locations. Hence, the cost of creating this knowledge per plant decreases with an additional plant, which gives rise to firm-level scale economies. Then firms facing high trade cost due to the distance build a second plant in a foreign country with a large market to exploit the plant-level scale economies by using the knowledge created within firm. Hence, firms replace exports from home to host country by production in host country.

Smaller foreign market is served by exports rather than foreign production due to the high fixed cost of a second plant (modelled as plant-specific fixed costs). The choice between

[6] Here, R&D is regarded as a source of ownership advantages in the terminology of Dunning's OLI framework (Markusen, 1998).

foreign production and exports depends on the size of the foreign market, trade cost of exports to the foreign market and building a plant in the foreign country. If firm-specific and transport costs are small or high relative to plant specific costs, then firms are likely to export to or open a plant in foreign country. Hence, dissimilarity between two countries with respect to size and endowment differences dictates location of production (good Y) and knowledge-generating activities (good X) in accordance with either skilled or unskilled labour. Location of plant production is placed in the bigger country (to exploit plant level scale economies) and endowed with unskilled labour while knowledge-generating activities take place in the smaller country. With respect to relative endowment differences, Brainard (1993b) and Egger & Winner (2006) use per capita income difference assuming that knowledge-generating activities are also capital-intensive.

Based on the predictions of the theoretical discussion above, the hypotheses H1 to H6 are derived to empirically investigate the determinants of FDI in Turkey:

> **Hypothesis 1 (H1)** *An increase in the sum of the world income leads firms to switch from exporting to local production in host country.*

Due to the high transport costs, firms might serve the foreign country through local production rather than exports to meet the demand in the foreign location as a result of increasing world income. Exports are an option with high marginal cost, while local production involves the fixed cost of building a plant (Markusen, 1995).

I measure the national income size of the countries by GDP and an increase in the sum of incomes lead firms to switch from export to FDI because of transport costs (Markusen, 1998; Markusen & Venables, 1998). I use the logarithm of total income (*ln Sum*) and the expected sign is positive.

Hypothesis 2 (H2) *Similarity in size of two countries increases FDI between them.*

The logic behind this hypothesis is that when countries differ in size significantly, production would be located in the one with the larger market, and the smaller market would be served through exports. Similarity of countries in terms of market size (GDPs) signifies the convergence in country size. The expected sign is positive since convergence in country size should motivate horizontal FDI (Markusen, 1998).

Similarity (*lnSim*) is calculated as the logarithm of similarity index (Simindex). Simindex takes values between 0 and 0.5, values close to 0 representing high difference in country size and values close to 0.5 indicate similarity in country size. Following Helpman (1987), similarity index is calculated by the formula;

$$Simindex = \left(1 - \left(\frac{GDP_{it}}{GDP_{it}+GDP_{ht}}\right)^2 - \left(\frac{GDP_{iht}}{GDP_{it}+GDP_{ht}}\right)^2\right) \qquad (1)$$

where *i* subscript stands for home country *i* and *h* is Turkey and t denotes time.

Hypothesis 3 (H3) *Difference in relative endowments (skilled labour or capital) would motivate vertical direct investment to exploit factor-price differences between home and host countries.*

Knowledge generating activities are skilled-labour or capital intensive in contrast to plant production. Firms could locate knowledge generating activities in skilled labour or capital abundant countries and production in unskilled labour abundant or capital scarce countries. Skilled labour ratio difference is aimed to capture the endowment difference with respect to population with high education. High endowment difference in skilled labour should

encourage vertical FDI given the ability of multinationals to locate production in countries abundant with low-cost (unskilled) labour. In order to measure skill difference, Markusen & Maskus (2002) and Carr *et al.*, (2001) use the ratio of professional, technical workers, administrative and managerial workers to total employment from the Yearbook of Labour Statistics. However, the Yearbook of Labour Statistics has many gaps in time dimension; therefore I turn to other proxies. Gast & Hermann (2008) use the difference in share of population in agriculture as a proxy. This proxy does not control for endowment difference in skilled labour. Carstensen & Toubal (2004) use the number of students in education as a proxy. In line with Carstensen & Toubal (2004), I employ the difference between home countries and Turkey in the ratio of gross education enrolment in tertiary education to the total enrolment covering primary, secondary and tertiary education. In order to calculate skilled labour ratio difference (*SKRD*), I take the ratio of enrolment in tertiary education to those of primary and secondary education for home countries and Turkey. Then, I calculate the difference between these ratios. The number of students in education is taken from UNESCO and OECD databases. In order to fill the gaps in the data, I use interpolation and extrapolation methods. A positive sign would support the hypothesis of vertical direct investment. Per capita difference between home countries and Turkey is aimed to capture the endowment differences in capital. The sign of this variable could be positive or negative. A positive sign would indicate vertical FDI while a negative sign would be an indicator for horizontal FDI. Per capita difference (*lnPERCD*) is calculated as the logarithm of the difference of GDP per capita between home countries and Turkey. The data for GDP and population of home countries and Turkey are taken from World Bank (December, 2008).

Hypothesis 4 (H4) *High transport cost of exports would motivate firms to produce in destination market.*

Trade costs associated with exports to host countries might motivate firms to switch from exports to production abroad. This kind of investment might also displace trade between countries. Several empirical studies (Balasubramanyam *et al.*, 2002; Waldkirch 2003) accommodate geographical distance as a proxy for transport costs in gravity equations modelling FDI and trade flows. Long distance between the countries is associated with high transport costs. Since the geographical distance is constant over time, it does not account for falling trade costs, as Baier & Bergstrand (2001) argue. In order to overcome this disadvantage, Brainard (1997) uses freight expenditures and tariffs for trade costs and Carstensen & Toubal (2004) employ the ratio of tariff revenue to the imports of host countries' as a proxy for trade costs.

In this study, Turkey is a single host country; therefore tariff revenue would not match bilateral trade cost between Turkey and home countries. Freight costs are not available for Turkey. I follow Baier & Bergstrand (2001) and Limao & Venables (2001). I use c.i.f. /f.o.b. ratios as a proxy for transportation costs (*OTRC*) from home countries to Turkey. Hummels & Lugovsky (2006) report that the matched trade partner is a useful control variable for bilateral transportation costs. The expected sign is positive.

> **Hypothesis 5 (H5)** *Trade costs associated with exporting back to the home country negatively affect vertical investment.*

High cost of exporting back to home country deters firms to get involved in vertical investment. While high trade cost of export to host country encourages horizontal FDI, high trade cost (*TTRC*) of exporting back home from host country discourages vertical investment if multinationals aim to send back goods produced in host country. I also use matched partner

data for this variable. The export and import data to calculate OTRC and TTRC are taken from IMF (2009a).

Hypothesis 6 (H6) *Liberalisation of investment policies of a country would increase its inward FDI.*

It is apparent from the theoretical discussion above that firms adding a second plant would incur costs related to production abroad. Firms investing abroad would operate in an unknown environment (Markusen, 1998). Unknown environment refers to ignorance of foreign firms to the legal and institutional framework of host country and uncertainty connected to fair treatment by authorities in host country. Investment liberalisation aims to reduce the uncertainty associated with operating in host country. Intuitively, investment liberalisation should encourage horizontal or vertical FDI. Carr *et al.,* (2001) use an index to control for investment liberalisation. Since this index is not available for Turkey, I use BITs by Turkey and home countries to proxy for investment liberalisation (*INVL*) in Turkey. Gast & Hermannn (2008) use cumulative number of BITs signed by host country. Different from the proxy used by Gast & Hermann (2008) I use a dummy variable between country pairs. *INVL* takes value 1 if there is a ratified bilateral investment between Turkey and home countries and 0, otherwise. The number of bilateral investment treaties is taken from the Undersecretariat of Treasury (RTPMUT, 2009). I expect the bilateral investment treaties to affect FDI in Turkey, positively. Table 1 summarises the hypotheses on FDI:

Table 1 Hypotheses on FDI

	FDI
Sum of GDPs (H1)	+
Similarity of GDPs (H2)	+
Difference in Endowments (H3)	+/-
Trade Cost Home (H4)	+
Trade Cost Host (H5)	-
Investment Liberalisation (H6)	+

4.0 Sample Data and Dependent Variable

The dataset comprises 19 home countries that report FDI stocks in Turkey: Austria, Canada, Denmark, France, Finland, Greece, Germany, Hungary, Italy, Japan, Republic of Korea, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, UK and USA. The period under consideration is 1982-2007. Observation for FDI is not available for each year for each country; therefore the panel is unbalanced with 299 observations for FDI.

The choice of proxy among affiliate sales, FDI stocks, and flows is widely debated in the literature. The availability of affiliate sales is often cited as an issue by several authors (Brainard, 1997; Carr *et al*., 2001) investigating the determinants of FDI. Brainard (1997) suggests that affiliate sales should be used if one aims to establish links between FDI and exports. However, affiliate sales are available for only a handful of economies. Therefore it would be appropriate to utilise either FDI flows or stocks. FDI stocks are preferable to flows due to the time span between the initial investment and the start of production. In addition, FDI flows exhibit large fluctuations over time. Taking these issues into account, I use FDI stocks of home countries in Turkey. FDI stocks are compiled from various resources, mainly

from OECD International Direct Investment Statistics Database (2008). FDI data from OECD is extended with the data taken from, Eurostat, Central Bank of Netherlands, Statistics of Canada, and Japan External Trade Organisation. In line with the OECD database, I convert the values from national currencies into dollar. Exchange rates are taken from main indicators of OECD database. FDI stock data is from OECD International Direct Investment Year Book (OECD, 2008) that estimates FDI on the basis of market values. Therefore, negative values of FDI stocks are possible because of different accounting practices among countries. In line with Bénassy-Quéré *et al.* (2007), I add a small constant to real FDI values deflated by the GDP deflator of each country taken from United Nations (UN) database to transform the negative values of FDI to positive. I use the logarithm of real FDI values (*ln FDIN*).[7]

5.0 Methodology and Econometric Model

I specify a panel model with two cross-section dimensions (home countries i=19 and h, the host county Turkey) and one time dimension t, year, t=26 to test hypotheses H1-H6;

$$lnFDIN_{iht} = \beta_1 lnSum_{iht} + \beta_2 lnSim_{iht} + \beta_3 lnPERCD_{iht} + \beta_4 SKRD_{iht} + \beta_5 OTRC_i + \beta_6 TTRC_{ht} + \beta_7 INVL_{iht} + \varepsilon_{iht} \quad (2)$$

where the script *i*, *h*, *t* stand for home country *i*, Turkey and year respectively. $lnFDIN_{iht}$ is the log of outward FDI stocks of home country *i* in Turkey at time *t*; $lnSum_{iht}$ is the log of sum of the GDPs of home country *i* and Turkey at time *t*, $lnSim_{iht}$ is the log of similarity index of GDPs of home country *i* and Turkey at time *t*; $lnPERCD_{iht}$ is the log of per capita difference between home country *i* and Turkey at time *t*, $SKRD_{iht}$ is the ratio of skilled labour in home country *i* to Turkey at time *t*; $OTRC_i$ is the trade cost of exports from home country *i*

[7] The original deflator is based on year 1990 (US$ dollars), I convert the index into 2000 (US$), hence I am able to add a small constant. GDP deflator taken from UN is similar to the one used by World Development Indicators that take the purchasing power parity into account. 1.5 is added to the deflated FDI values in order to convert negative values to positive.

to Turkey at time *t*; $TTRC_h$ is the trade cost of exporting from Turkey to home country *i* at time *t*; $INVL_{iht}$ is bilateral investment treaties ratified between home country *i* and Turkey ε_{iht} is the error term.

The error component structure in equation (2) could be written as;

$$\varepsilon_{iht} = \mu_{ih} + v_{iht}\,, \qquad (3)$$

ε_{iht} is the error component structure, where μ_{ih} model time-invariant country pair specific effects between home country *i* and Turkey and v_{iht} is a stochastic error term that is assumed to be uncorrelated over all *i*, *h*, and *t*.

The treatment of the heterogeneity in country pair specific effects (μ_{ih}) is often discussed in the literature. Cross-sectional data for individuals, firms or countries might have heterogeneity in terms of unobservable specific effect to cross-section units or time periods (Hsiao, 1986). Therefore time-series and cross-section studies, which do not account for this heterogeneity, carry the risk of obtaining biased results (Baltagi, 2005). In this context, modelling international trade or FDI among countries give rise to heterogeneous trading or investment relationships among countries. In order to cope with heterogeneity arising from diversity in country samples, several papers introduce panel data models such as fixed effect and random effects into the gravity equation (For a detailed review, see Cheng & Wall, 2005). In addition, the selection of fixed or random effects and econometric specification of the gravity model are presented in the literature (Mátyás, 1997 and 1998; Cheng & Wall, 2005; Egger 2000).

Mátyás (1998) puts forward that large country specific effects should be treated as non-observable random effects in case of large country samples. Egger (2000) suggests that fixed effects model would be the right choice if data sample include countries, which belong to the

same regional blocs such as EU. Membership to same regional bloc is determined by cultural and political similarities between countries or geographical distance among them. Therefore, these country specific effects should not be treated as non-observable random effects. Cheng & Wall (2005) argue that fixed effects models could be a better choice as long as specification includes country-pair fixed effects.

The sample in this study covers nineteen home countries, some of which are also members of EU. Turkey is in the process of membership negotiations with the EU. I control for this country pair specific effect by including a dummy variable. Even though the choice of countries in the sample is guided by data availability, the sample covers EU and OECD member countries, which have cultural and political similarities and geographical proximity among them. Hence, I would use both the fixed effects model and random effects and decide on the appropriate model in accordance with Hausman (1978) specification test, which is often used in studies with panel data analysis.

6.0 Control Variables

In the spirit of existing literature, I also specify seven control variables and I augment the equation (2) with:

$$lnFDIN_{iht} = \alpha_i + \beta_1 lnSum_{iht} + \beta_2 lnSim_{iht} + \beta_3 lnPERCD_{iht} + \beta_4 SKRD_{iht} + \beta_5 OTRC_i + \beta_6 TTRC_h + \beta_7 INVL_{iht} + X_{iht} + W_{ht} + \varepsilon_{iht} \quad (4)$$

where X_{iht} is the control variables that vary between home country *i* and host country,Turkey, at time *t* and W_{ht} is the control variables that vary over time and over Turkey; and μ_{ih} models the time-invariant country pair specific effects and ε_{iht} is error term. Relative labour cost, real exchange rate, the prospect of EU membership, openness to trade, taxation are the variables (X_{iht}) that vary between home country *i* and Turkey at time *t*. Infrastructure and institution variables vary over time and over Turkey (W_{ht}).

6.1 Relative Labour Cost

The prevalence of low labour costs in developing countries and CEECs are assumed to constitute an incentive for MNEs to locate labour-intensive production in developing countries (Wang & Swain 1995; Carstensen & Toubal, 2004; Bellak *et al.*, 2009). In line with Resmini (2000) and Carstensen & Toubal (2004), this study uses the relative unit labour cost (exchange rate adjusted labour costs) between Turkey and home countries provided by OECD (*RELAB*).

OECD defines exchange rate adjusted unit labour costs as the ratio of the total labour costs (compensation of employees) to real output. The data for compensation of employees in Turkey is missing for the year 2007 in the dataset provided by the OECD; therefore the estimated value for the year 2007 is obtained from the Eurostat. High labour cost of Turkey relative to home countries is predicted to affect FDI, negatively. Relative unit labour cost is calculated by the following formula:

$$RELAB_{iht} = \frac{ULC_{ht}}{ULC_{it}} \qquad (5)$$

where ULC_{ht} presents unit labour cost of Turkey at time t and ULC_{it} stands for unit labour cost of home country *i*.

6.2 Real Exchange Rate and Exchange Rate Volatility

Real exchange rate index (*REER*) is included in the equation (27) in order to account for the relative wealth effect of changes in host country against home countries (Froot &Stein, 1991; Klein &Rosengren, 1994). As in Bénassy-Quéré, *et al.*, (2003) I use the lagged value of Real Exchange Rate to avoid reverse causality. Nominal exchange rates of US$ for home countries taken from IMF; then the real exchange rate of the currencies of home countries against Turkish Lira is calculated.

IMF reports data for currencies of the euro countries in European currency unit (ECU). Similar to the method followed by Bénassy-Quéré, *et al.*, (2007) I take conversion rates from European Central Bank (ECB) to calculate the exchange rate between European Monetary Union (EMU) countries in the sample and Turkey prior to the year 1999 (when euro was first introduced). In order to work out the bilateral real exchange rate, I use consumer prices of home countries and Turkey from IMF and calculate bilateral exchange rate as:

$$REER_{iht} = \frac{E_{iht}.P_{it}}{P_{ht}} \qquad (6)$$

where E_{iht} represents the nominal exchange rate of home country *i* against Turkish currency, and P_{it} and P_{ht} stand for the consumer price indices of home country *i* and Turkey, respectively. A rise in $REER_{iht}$ represents an appreciation of home country *i* currency against the currency of Turkey. The expected sign of *REER* is positive.

There are mixed results in the literature regarding the impact of exchange rate volatility on FDI. Due to empirically controversial results in the literature, the sign of this variable could be negative or positive. Goldberg & Kolstad (1995) and Disdier & Mayer (2004) use the standard deviation of nominal exchange rate to proxy for exchange rate volatility (*ERV*). Based on the formula used by Disdier & Mayer (2004) I use the annual standard deviation of the log difference of the monthly bilateral nominal exchange rates in preceding year to proxy for exchange rate volatility (*ERV*).[8] Monthly nominal exchange rates are taken from CBRT annual reports. The formula (30) below is used to calculate exchange rate volatility between country *i* and Turkey;

$$ERV = \sqrt{\frac{\sum_{m=1}^{12}(d_m - \bar{d})^2}{12-1}} \qquad (7)$$

[8] Monthly consumer price indices were not available for Turkey to calculate real exchange rate volatility; therefore nominal exchange volatility is used.

where ERV is annual exchange rate volatility; d_m are the log differences of monthly bilateral nominal exchange rates for home country currencies against Turkish currency in the preceding year. $\bar{d}$ bar in formula (29) is the mean value of the log differences of monthly bilateral nominal exchange rates.

6.3 EU Announcements

Integration of Turkey with the EU started when Turkey became a member of CU with the CU in 1996 and gained momentum after Turkey was given the candidate statues by the EU in 1999. Eventually, negotiations for EU accession started in December 2004 between Turkey and the EU. The Copenhagen criteria accepted by EU countries require candidate countries to gradually bring their laws in line with EU standards. Similar laws in a candidate country might lower the risk associated with operating in unknown environment for firms from EU countries. Therefore, the prospect of EU membership might have enhanced FDI coming from EU countries to Turkey. In the spirit of Bevan & Estrin (2004) and Clausing & Dorabantu (2005), I control for the effect of the membership negotiations with the EU on FDI located in Turkey. I use a dummy variable (*EUNEG*) that takes value 0 for the years preceding the start of negotiations with the EU in 2005 and 1 for the years 2005, 2006 and 2007. The prospect of the EU membership is predicted to affect FDI destined for Turkey, positively.

6.4 Openness

The measurement of openness shows diversity in the literature. Tariff rates (Culem, 1988) and revenues of duties in imports (Carstensen & Toubal, 2004) are the most common proxies used. Several authors, such as Kumar (1998) and Kumar (2000), Clausing & Dorobantu, (2005), Resmini (2000), Asiedu (2001) and Quazi & Mahmud (2006) use the ratio of total trade of home countries with host country to the GDP of the host countries.[9] Data provided

[9] Kumar (1998, 2002) suggests that the ratio of total trade to GDP of host country should be regressed on the area, transport cost (cif/fob) population of host country and the residual

by GATT on tariff rates are not complete for Turkey for the period under consideration in this study; therefore I employ the ratio of trade to GDP of Turkey as a proxy for openness. I use the ratio of total trade of Turkey with home countries to the GDP of Turkey as well as the residuals suggested by Resmini (2000) to account for structural and policy openness. The recent empirical literature correlates openness of a host country positively to the amount of FDI, which a host country attracts. Given internalisation advantages through common ownership of assets, MNEs tend to import and export in case of vertical FDI. As a result, countries following a liberal trade policy are likely to attract FDI (Bevan & Estrin, 2004). The ratio of sum of exports and imports of home countries to GDP of Turkey (*OPEN*) is used to measure the openness of host country. In order to control the structural openness, I also use the residuals (*REST*) derived from regressing the ratio of total trade to the GDP of Turkey on population and squared population of Turkey in accordance with Clausing & Dorabantu (2005). The expected signs of openness (*OPEN*) and the residuals (*REST*) are positive.

6.5 Infrastructure

Several empirical studies, such as, Kumar (2000), Campos & Kinoshita (2003), Bellak *et al.*, (2009), and Khadaroo & Seetanah (2009) point to the positive effect of infrastructure on FDI. According to Gramlich (1994) relevant infrastructure consists of transport, communication and electricity production. In line with Kumar (2002) and Bellak *et al.*, (2009), I use road length per square kilometre (*ROADS*) and commercial vehicles per 100 inhabitants (*COMVEH*) as proxies for transport, telephones per 100 habitants (*TEL*), and annual

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should be used as a proxy to disentangle policy openness from structured openness. However using this method would result in high correlation with transport cost in the regression; therefore I would not use it. On the other hand Clausing & Dorabantu (2005) proposes that imports of host country could be regressed on the population and squared population of host country and the residuals measure the extent of import penetration, which is not explained by host country's population.

electricity production (*ELC*).[10] *TEL* is obtained from the, World Bank (2008), *COMVEH* is taken from Statistics of the Automotive Manufacturers Association of Turkey, *ROADS* is obtained from the Statistics of the General Directorate of Highways of Turkey and *ELC* is acquired from Environment and Energy Statistics of the Turkish Statistical Institute. Instead of using these proxies separately, in the spirit of Loree & Guisinger (1995) Kumar (2002) and Bellak *et al.,* (2009), I derive an infrastructure index (*INFRAI*) using principal components analysis (PCA). High correlations among these proxies make it difficult to use them together in the regressions. PCA procedure finds linear combinations among the proxies and reduces the proxies to a composite infrastructure index. The composite infrastructure of host country (Turkey) index keeps the important information contained in the proxies. Infrastructure is predicted to be positively correlated with FDI inwards.

6.6 Taxation

Taxation might have an impact on the choice of location of FDI since taxes could reduce the income stream obtained from investment abroad. Even though effective average tax rate is favoured over the corporate income tax (*CITD*), existing data in effective average tax rate do not cover the entire period for Turkey. Therefore, I use corporate income tax rate (*TAX)* in line with Carstensen & Toubal (2004). In order to account for the different fiscal regimes, I follow the calculation method used by Carstensen & Toubal (2004):

$$TAX_{iht} = TAX_{iht} - TAX_{it} \qquad (8)$$

If home country i adopts an exemption scheme, then the calculation (30) above applies. If home country i uses a (partial) credit scheme and $TAX_{it} > TAX_{ht}$, then $TAX_{iht} = 0$. If home country i adopt a (partial) credit scheme and $TAX_{it} < TAX_{ht}$, then the calculation (30) applies.

[10] Kumar (2002) also used information infrastructure including newspapers and televisions per 1000 inhabitants and included energy use per inhabitant rather than generation.

Corporate income tax rates are obtained from KPGM and Tax Database of OECD. In the light of the related literature reviewed, corporate tax differential is expected to negatively affect FDI.

6.7 Political Stability and Institutions

The choice of database to derive the proxies for political stability and institutions is largely determined by the availability of data. In this regard, the ICRG is more comprehensive than other sources. Therefore, I use the risk ratings of the ICRG to measure political stability and the quality of institutions.

Among the proxies used for political stability are the number of seats of the ruling party (majority) in the parliament (Fehrs & Axelrod, 2006), government unity (Aizenman & Noy, 2006; Joyce & Noy, 2008). An index for government stability provided by ICRG includes government unity, legislative strength and popular support as subcomponents. Instead of utilizing separate proxies for political stability, I use the index for government stability (*GOVSTA*) provided by the ICRG. According to the ICRG, a score of 12 for (*GOVSTA*) indicates very low risk and a score of 0 points to very high risk.

Following Globerman & Shapiro (2002), Sayek (2007) and Fan *et al.*, (2007), I use both the index for corruption (*CORR*) and quality of bureaucracy (*BUR*). Given the interference of the army in political life in Turkey (see section 2.2), it is also appropriate to use the military in politics index (*MILINP*). The indexes for *CORR*, *BUR*, and *MILINP* are obtained from the ICRG. A score of 6 for (*CORR*) and (*MILINP*) indicates low risk and a score of 0 represents very high risk. A score of 4 for (*BUR*) corresponds to low risk and a score of 0 indicates very high risk. *GOVSTA*, *CORR*, *BUR* and *MILINP* are predicted to be positively related to FDI. Table 2 summarises the definitions and expected signs of control variables.

Table 2 Definitions and Expected Signs of the Control Variables

Variable	Definition	Unit of Measurement	Expected Signs
RELAB	Relative labour cost	ratios	-
REER	Real exchange rate index	index	+
ERV	Exchange rate volatility	Standard deviation	+/-
EUNEG	Start of membership negotiation with the EU	0 or 1	+
OPEN/REST	Ratio of Exports +Imports with OECD country to GDP of Turkey /Residuals	ratios/residuals	+
INFRAI	Infrastructure index	index	+
TAX	Corporate income tax	percentage	-
GOVSTA	Government stability	index	+
CORR	Corruption	index	+
BUR	Bureaucracy	index	+
MILINP	Institutions	index	+

7.0 Empirical Results

7.1 Descriptive Statistics and Correlation Matrix

Table 3 below, displays the descriptive statistics of the dependent and independent variables, including mean, standard deviation and the number of observations for each variable and minimum and maximum value of the variables.

An inspection of Table 3 reveals a number of interesting aspects. First, the labour cost of Turkey relative to that of home countries (*RELAB*) is less than 1 on average. It might constitute an important advantage for home country companies to exploit this difference in labour cost. However, the cost of importing from Turkey back to the home countries (*TTRC*) is higher than that of exporting from home countries (*OTRC*) to Turkey and might curtail vertical investment.

Table 3 Descriptive Statistics

Variables	Mean	Standard Deviation	Minimum	Maximum	Observations
FDIN	1.5662	0.9118	0.2183	3.8245	299
SUM	13.5023	0.9559	11.9737	16.2951	504
SIM	-1.1340	0.6148	-3.1498	-0.6931	504
SKRD	26.9150	9.5933	0.2626	72.0457	503
PERCD	9.4002	1.1243	4.0394	10.5295	505
OTRC	1.0956	0.2906	0.2683	3.3605	510
TTRC	1.3016	1.7743	0.1402	30.6929	511
INVL	0.4132	0.4928	0	1	513
RELAB	0.6875	0.1816	0.3760	1.5578	481
REER	117.0113	24.1088	45.4837	194.1163	513
ERV	0.0143	0.0118	0.0024	0.0603	416
EUNEG	0.0760	0.2652	0	1	513
OPEN	8.1909	10.8841	0.1434	59.6251	513
INFRAI	-2.12e-08	0.9815	-1.0918	2.1570	494
TAX	0.0046	0.0834	-0.21	0.3175	450
GOVSTA	7.5572	1.9139	3.6666	10.0833	456
CORR	2.7048	0.6520	2	4	456
BUR	2.2326	0.4108	2	3	456
MILINP	3.2083	1.0430	1	5	456

Second, the average value of skill ratio difference (*SKRD*) is 26, which reflects the gap between Turkey and home countries in terms of skilled-labour. Third, variance in the institutional variables (*CORR*, *BUR*, and *MILINP*) is low, except for the index of government stability (*GOVSTA*). Fourth, the average per capita difference (*PERCD*) is 9. Due to the fast growing population of Turkey, the gap between Turkey and home countries in terms of per capita difference is still high. Lastly, the average value of the currencies of home countries against the Turkish currency (*REER*) is 117% over the period 1982-2007. Increasing stability and gradual appreciation of the Turkish currency after 2001 seems to have offset the huge depreciations of the Turkish currency in 1993 and 2001. The same effect of the bilateral

exchange rate is also reflected in the volatility (*ERV*). The average volatility is closer to the minimum value.

Table 4 presents pair-wise correlation coefficients of the variables. The sum of (*SUM*) and similarity of national incomes (*SIM*) are highly correlated with each other. The correlation is 0.872 between the two variables. Therefore it would be difficult to estimate the effect of the joint income (*SUM*) on FDI independently of similarity in national incomes (*SIM*). Multicollinearity might arise if both variables are included as explanatory variables in the regressions. Moreover, the correlation between government stability index (*GOVSTA*) and infrastructure index (*INFRAI*) is 0.704, suggesting that caution should be taken with the variable INFRAI due to possible multicollinearity problem.

Table 4 Correlation Matrix

Variable	FDIN	SUM	SIM	SKRD	PERCD	OTRC	TTRC	INVL	RELAB	REER
ln FDIN		0.6060*	-0.3718*	0.1370†	0.3549*	0.0425	-0.1386†	0.2390*	-0.1477†	-0.3791*
ln SUM			-0.8723*	0.0674	0.3734*	-0.0115	-0.0566	0.2704*	0.2178*	-0.2928*
ln SIM				-0.0665	-0.1651*	-0.0025	0.0402	-0.1360*	0.1322*	0.2530*
SKRD					0.0682	-0.0152	-0.0316	0.1770*	0.1400*	-0.2121*
PERCD						0.1314*	-0.0481	0.1964*	-0.1545*	0.0454
OTRC							-0.1219*	0.0495	-0.0016	-0.1332*
TTRC								-0.0625	-0.0530	0.0680
INVL									-0.2016*	-0.1713*
RELAB										-0.2901*

	ERV	EUNEG	OPEN	INFRAI	TAX	GOVSTA	CORR	BUR	MIL
ln FDIN	0.0509	0.2457*	0.5537*	0.3564*	0.3217*	0.2436*	-0.0843	-0.1212†	-0.0668
ln SUM	0.0416	0.0478	0.6029*	0.2244*	0.1780*	0.1385*	-0.0782‡	-0.0310	-0.0626
ln SIM	0.0274	0.0847	-0.4586*	0.0456	-0.0591	0.0299	-0.0146	-0.0025	-0.0121
SKRD	-0.0234	0.2224†	0.2547*	0.3366†	0.0244	0.3736*	-0.2049*	-0.4805*	-0.2300*
PERCD	-0.0103	-0.0030	0.2171*	0.1249*	0.1793*	0.0451	-0.0336	0.0065	0.0004
OTRC	0.1259†	-0.0693	-0.2058*	0.1472*	-0.0398	0.0858‡	-0.0694	-0.0159	-0.0582
TTRC	-0.0312	-0.0255	-0.0739‡	-0.0398	-0.0712	-0.0169	0.0875‡	0.0530	0.0785‡
INVL	0.1791*	0.2522*	0.3076*	0.5484*	0.1997*	0.3833*	-0.1885*	-0.0022	-0.2093*
RELAB	-0.2126*	-0.0917†	-0.2208*	-0.0799‡	-0.4010*	-0.0276	0.1004†	0.1834*	0.1856*
REER	-0.0581	-0.2895†	-0.0413	-0.4748†	0.0627	-0.5153†	0.2240†	0.3051†	0.1732†
ERV		0.0429	0.0198	0.2596†	0.0390	-0.0728	0.0211	0.1452†	-0.0002
EUNEG			0.1287†	0.5666†	0.1399†	0.3374†	-0.0962†	-0.1734†	-0.0285
OPEN				0.1675†	0.5243†	0.1374†	-0.0738	-0.0675	-0.0816‡
INFRAI					0.1320†	0.7042†	-0.3170†	-0.2065†	-0.2850†
TAX						0.1901†	-0.1316†	0.0394	-0.3071†
GOVSTA							-0.2775†	-0.2733†	-0.5560†
CORR								0.5817†	0.5886†
BUR									0.3983†
MILINP									

*, †, ‡ represents statistical significance at the 1%, 5% and 10% level, respectively

7.2 Regression Results

Table 5 presents panel data fixed effects (F.E) and random effects (R.E) for regression models (I) to (V) using FDI stocks as the dependent variable. Appendices A4-A8 show the regression outputs from STATA. The choice of F.E or R.E is determined by the Hausman Test, which is reported in the last rows of the table. Except for the model II, the null hypothesis that difference in coefficient is not systematic and that the independent variables are not correlated with μ_{ih} are not rejected at the 10% level. In the light of the Hausman test, R.E estimates are used for the models (I), (III), (IV) and (V). Furthermore, the Breusch and Pagan Lagrangian Multiplier (BP LM) Test and F-test for $\mu_{ih}=0$ shows that there are significant random effects and country pair effects. Therefore, OLS would generate inconsistent estimates. In addition, R-squared values indicate that the variables included in the models explain 58 to 61 per cent of the variation in FDI. Furthermore, both F-tests for fixed assets and Wald Chi-square tests for random effects estimations show that variables in the regressions are jointly statistically significant at the 1 % level, rejecting the null hypothesis that the variables are jointly insignificant. Moreover, the inclusion of variables decreases the degree of freedom; therefore the value for F-tests and Wald Chi-square decline with the addition of variables. Lastly, Variance Inflation Factor (VIF) is checked for the models (I) to (V).[11]

[11] Only VIF for the variable INFRAI exceeds 5 and mean VIF stays lower than 3 for all the models. A common rule of thumb is that if VIF for a variable is greater than 5, then multicollinearity could be a problem.

Table 5 the Determinants of FDI with Robust and Clustered Standard Errors

Variables	Model (I)	Model (II)	Model (III)	Model (IV)	Model (V)
	R. E.	F.E	R.E	R.E	R.E
CONS	-5.5657*		-7.7133*	-9.4937*	-11.6566*
	(1.7736)		(1.3807)	(1.5156)	(2.2008)
ln SUM	0.4635*		0.4832*	0.5392*	0.7278*
	(0.1263)		(0.0857)	(0.1135)	(0.1716)
ln SIM		1.1485			
		(0.9222)			
SKRD			0.0098		
			(0.0072)		
ln PERCD			0.1932†	0.2339†	0.2036
			(0.0922)	(0.1032)	(0.1413)
OTRC				0.5730†	0.5421*
				(0.1302)	(0.1226)
TTRC				0.0197	
				(0.1276)	
INVL					0.1704‡
					(0.1025)
RELAB	0.3533‡	0.2575	0.0662	0.2334	0.2407
	(0.2074)	(0.3349)	(0.2037)	(0.2168)	(0.2196)
REER	0.0026	0.0032	- 0.0052†	- 0.0038‡	- 0.0031
	(0.0025)	(0.0030)	(0.0023)	(0.0022)	(0.0021)
ERV	-1.7617	-2.0806	7.1781*	6.1444*	4.8542†
	(2.5277)	(2.4028)	(2.0805)	(2.0672)	(2.0128)
EUNEG	0.0955	0.1175	0.3900*	0.4859*	0.4408*
	(0.1172)	(0.1548)	(0.1309)	(0.1253)	(0.1204)
OPEN	0.0222	0.1530	0.0175*	0.0277*	0.0283*
	(0.0055)	(0.0116)	(0.0056)	(0.0058)	(0.0067)
INFRAI	0.4948*	0.5410*			
	(0.0949)	(0.1400)			
TAX	-0.2297	-0.2795	0.7575	0.7514	0.7600
	(0.5413)	(0.8217)	(0.6088)	(0.5352)	(0.5616)
GOVSTA	-0.0483‡	-0.0485	0.0623*	0.0606*	0.0397*
	(0.0295)	(0.0327)	(0.2080)	(0.2033)	(0.0198)
CORR	0.0919	0.9518	- 0.1301‡	- 0.0899	- 0.0386
	(0.0598)	(0.0538)	(0.0692)	(0.0628)	(0.0599)
BUR	0.0286	-0.0048	0.1789	0.1198	0.0380
	(0.0809)	(0.1569)	(0.1328)	(0.0944)	(0.0988)
MILINP	-0.0689‡	-0.0655	0.0390	0.0107	0.0030
	(0.0426)	(0.0590)	(0.0427)	(0.0397)	(0.0390)
BP LM Test	634.72*		387.62*	406.50*	592.71
F Test μ_{ih}=0		26.32*			
F joint s.		21.12*			
Wald joint s.	455.83*		444.25*	435.04*	413.7*2
Hausman T.	6.87	22.79†	14.25	17.41	14.16
W. A. Test	40.53*	35.52*	44.23*	40.62*	42.27*
M.W. Test	331.32*	328.91	426.85*	239.75*	236.02*
R-squared	58%	61%	57%	%56	54%

As shown in Table 5.3, Modified Wald (M.W) Test for Groupwise Heteroskedascity rejects the null hypothesis that variance is constant across the countries (group variable *i*) in panel for the models (I) to (V). Hence, the standard errors and t-statistics with respect to coefficients cannot be reliable. In the case of heteroskedasticity, Wooldridge (2002) suggests that Eicker, Huber and White (heteroskedasticity-robust standard errors) could be used. Heteroskedasticity-robust standard errors are asymptotically valid in the case of any kind of heteroskedasticity, even in the presence of homoskedasticity.

Apart from groupwise heteroskedasticity, panel data might also suffer from serial correlation (Greene, 2003). In order to test for the presence of serial correlation, the test derived by Wooldridge (2002) (W.A.) for panel data models is used. By simulation results, Drukker (2003) confirms the power properties of the Wooldridge test in reasonable sample sizes. A significant W.A. test statistic result confirms the presence of serial correlation. As Table 5.3 shows, the null hypothesis of no first-order autocorrelation is soundly rejected for models (I)-(V). As a result of autocorrelation and hetereoskedasticity in the regression, the regressions are estimated with robust and clustered standard errors on the group variable (*i*). In addition, W.A. test rejects the hypothesis that there is no first order autocorrelation in panel data.

In order to avoid multicollinearity, variables *SUM* and *SIM* are included separately in the regressions. Furthermore, VIF is computed to check for multicollinearity among the variables.

As shown in Table 5.3, the joint income is positively related to the FDI as the coefficient estimates for *SUM*, $\widehat{\beta_1}$ are all significantly positive at the 1% level. On average, if SUM increases by 0.1 (i.e. 10 percentage points, FDI stocks increases by around 4.6-7.2 percentage points, other things being constant. Brainard (1997), Campos & Kinoshita (2003), Blonigen & Davies (2004), Mutti & Grubert (2004), Frenkel *et al.,* (2004), Lachreche-Revil (2006) and

Bénassy-Quéré, *et al.,* (2007) find a positive relationship between national incomes and FDI. My findings are consistent with their findings.

Although the coefficient for the similarity, $\widehat{\beta_2}$, has a positive sign, *SIM* is not significant at conventional levels (1%, 5% and 10%). Skilled labour ratio difference is also shown to have no significant effect on FDI. The coefficient estimate for *SKRD*, $\widehat{\beta_2}$, carries a positive sign as predicted .Consistent with the knowledge-capital model, per capita difference is positively related to FDI. However, the coefficient estimate for *PERCD*, $\widehat{\beta_4}$, is significant in models III and IV at the 5% level. On average, if per capita difference (*PERCD*) increases by 10 percentage points, FDI would increase by about 1.9-2.3 percentage points, *ceteris paribus*. The results lend support to the findings of Brainard (1993b) and Egger & Winner (2006) showing that there is a positive relationship between per capita difference and FDI.

In addition, the transport cost of exporting (*OTRC*) is positively associated with FDI as the coefficient estimate for *OTRC*, $\widehat{\beta_5}$, is significantly positive at the %1 and %5 levels. On average, if the transport cost of exporting (*OTRC*) increases by 10 percentage points, FDI would increase by about 5.4-5.7 percentage points. The results confirm the finding of Brainard (1997) that FDI increases with trade cost of exporting to host countries. Furthermore, the cost importing from Turkey back to home countries does not have a significant effect on FDI. In contrast to the predictions, the sign of the coefficient estimate for OTRC,$\widehat{\beta_6}$, has a positive sign .

Moreover, investment liberalisation proxied by BIT is positively related to FDI as the coefficient for INVL, $\widehat{\beta_6}$, is significantly positive at the 10 % level. On average, a signatory home country to a BIT agreement with Turkey is predicted to invest about 18.58% more than

a non-signatory home country in Turkey, other things being constant.[12] The results confirm the findings of Gast & Herrmann (2008), which show that there is a positive relationship between FDI and BIT.

The above empirical results indicate that an increase in the joint income (*SUM*), per capita difference (*PERCD*), and the transport cost of exporting (*OTRC*) and investment liberalisation (*BIT*) are all associated with an increase in FDI. Hence, the empirical evidence is consistent with hypotheses (**H1**), (**H3**) (**H4**) (**H6**). However, the empirical evidence shows no support in favour of hypotheses (**H2**) and (**H5).**

As far as control variables are concerned, the coefficient estimates for *RELAB* are significantly positive at the 10% level, contrary to the predictions. On average, an increase of *RELAB* by 10 percentage points leads to an increase in 3.5 percentage points in FDI. The literature suggests that high wages might indicate high productivity; therefore a positive relationship is possible between labour costs and inward FDI. My result also supports a positive relationship between labour and inward FDI and confirms the findings of Caves (1974), Swedenborg (1979), Wheeler & Mody (1992) and Wang & Swain (1995).

In addition, the coefficient estimates for *INFRAI* are significantly positive at the 1% level. The empirical results indicate that the composite index variable (*INFRAI*) consisting of road length per square km (ROADS), commercial vehicles per 100 habitants (*COMVEH*), telephones per 100 habitants (*TEL*) and annual electricity production (*ELC*) subcomponents successfully captures the effect of *INFRAI* on FDI. The empirical results of this analysis the conclusions of Root and Ahmed (1979), Kumar (1994), Cheng & Kwan (2000), Coughlin & Segev (2000), Kumar (2002), Campos & Kinoshita (2003), Khadaroo & Seetanah (2009) and Bellak *et al.,* (2009), finding a positive relationship between FDI and infrastructure.

[12] It is calculated as $100*[\exp(\widehat{\beta_6})-1]$

In contrast to the predictions, real exchange rate is negatively related to FDI as the coefficient estimates for *REER* are significantly negative at least at the 10% level. On average, if real exchange rate increases by 10 percentage points, FDI decreases by around 0.04-0.05 percentage points, other things being constant. Thus, depreciation in Turkish currency against home country currencies decreases FDI from home countries to Turkey. The empirical results lend support to the findings of Bayoumi *et al.,* (1996). Moreover, exchange rate volatility is positively associated with FDI and the coefficient for *ERV* stays positive at least at the 5% level.

Similarly, the prospect of EU membership is positively related to FDI and the coefficient estimates of *EUNEG* stay significantly positive at the 1% level. On average, Turkey is predicted to receive about 47.7-62.6% more FDI after membership negotiations with the EU starts, other things being constant.[13] The empirical results are in line with Buch *et al*., (2001), Bevan & Estrin (2004) and Clausing & Dorabantu (2005), who establish a positive relationship between FDI and the prospect of EU membership.

Furthermore, openness to trade is positively related to FDI, as the coefficient estimates for *OPEN* are significantly positive at the 1% level. On average, if openness to trade (*OPEN*) increases by 10 percentage points, FDI would increase by about 0.1-03 percentage points.[14]The empirical results confirm the conclusion of previous studies Schmitz & Bieri (1972), Kravis & Lipsey (1982), Culem (1988), Edwards (1991), Lee & Mansfield (1996), Pistoresi (2000), Asiedu, (2001), Frenkel *et al.,* (2004), which show a positive relationship between FDI and openness to trade. The empirical results show no significant relationship between corporate income tax (*TAX*) and FDI. After the removal of the infrastructure variable

[13] The same formula is used for the interpretation of *EUNEG* as for that of *INVL*.

[14] VIF for the residuals (*REST*) is close to 8; therefore the residuals (*REST*) are not included in the regressions.

(*INFRAI*), the coefficient estimates of institutional variables show the expected signs in models (III) to (V).

Finally, Government stability (*GOVSTA*) is positively related to FDI. On the other hand, corruption (*CORR*) is negatively associated with FDI in contrast to the predictions. The coefficient estimates of *GOVSTA* are significantly positive at the 1% level, while the coefficient estimate of *CORR* is significantly negative at the 10% level. One unit increase in *GOVSTA*, leads to an increase of FDI by around 3.9-6.2 percentage point. On the other hand, one unit decrease of *CORR* is associated with an increase of 13 percentage points in FDI. Bureaucracy quality (*BUR*) and military in policy (*MILINP*) do not affect FDI.

7.3 Empirical Implications

The empirical results in Table 5.3 show that both the sum of national income and the cost of exporting are the major determinants of FDI in Turkey. It means that high cost of exporting to Turkey encourages foreign firms to switch from exports to FDI as the knowledge-capital model suggests. Furthermore, the empirical results regarding the sum of national incomes and high cost of exporting to Turkey indicate that FDI in Turkey is mainly motivated by market access, i.e. locating production close to customers. The empirical results confirm the findings of Erdilek (1982), Tatoglu & Glaister (2000), Coskun (1996) and Erdal & Tatoglu (2002) that show a positive relationship between market access and FDI in Turkey. Given the large proportion of FDI motivated by market access, the results are of no surprise. An increase in the market size of Turkey is accompanied by an increase in inward FDI. Furthermore, inward FDI stocks among the sectors show that the service sector receives 73% of FDI in Turkey (See Figure 2.8). Inseparable production of services in the sectors such as bank, transports and communication, trade and repairs make market size of host country an important determinant of FDI.

Per capita difference captures vertical direct investment aspect of FDI. In comparison with the coefficient estimates for market size and the cost of exporting, the coefficient estimate for per capita difference is smaller.

The empirical results show no impact of the cost of exporting from Turkey (*TTRC*) on FDI. One explanation is the increasing exports of multinationals in Turkey to Middle East and North African countries relative to exports back to home country (Gover, 2005). The proximity of Turkey to both country groups gives an advantage to multinationals by using Turkey as an export platform. The other explanation is the large market size of Turkey. Locating an assembly plant in a small country would result in shipping most of the output from the plant back to the home country. Given the need for intermediate inputs from the home country of investment, multinationals face transport cost of getting inputs from the home country and shipping back the final good. If host country is large in terms of size, then a significant proportion of the final goods remain in host country (Zhang & Markusen, 1999).

In addition, investment liberalisation through BITs indicates Turkey's ambition to increase its inward FDI. The empirical results regarding to investment liberalisation (*INVL*) confirm the findings of Neumayer & Spess (2005) that developing countries signing BITs receive more FDI. Thus, BITs provide security and firm standards to foreign investors that domestic institutions fail to deliver.

In contrast to the findings of Halicioglu (2001), my empirical results regarding to labour cost indicate that high relative labour cost does not act as a deterrent to FDI in Turkey. High relative unit costs might indicate high productivity and skill endowment of labour. Dunning (1998) suggests firm-specific, knowledge intensive assets in production and decentralising of knowledge generating activities of firms need to be combined with skilled labour in host countries. Thus, countries endowed with skilled-labour would have an advantage over the

countries with low skilled-labour. Furthermore, Zhang & Markusen (1999) propose that vertical FDI would be low in skilled-labour scarce countries.

The appreciation of Turkish currency points to higher purchasing power of the customers in Turkey. In turn, higher purchasing power of customers motivates firms to invest in Turkey, as empirical results of this thesis indicate.

Specifically, an appreciation of Turkish currency against home countries' might increase FDI in Turkey from these countries' firms which aim to hold their assets in appreciating currency. This conclusion confirms the findings of Bayoumi *et al.,* (1996).

The results indicate that inward FDI in Turkey increases with exchange rate volatility. Given the dominance of horizontal investment, the results suggest that foreign firms in Turkey intend to serve the local market. Exchange rate volatility increases uncertainty for firms, which export to Turkey. Thus, it encourages firms to switch from exports to FDI as Goldberg & Kolstad (1995) propose.

The empirical results indicate that FDI increases with the development of good infrastructure. The level of infrastructure in Turkey is ranked as the eighth most significant factor determinant of FDI in Turkey in the study of Tatoglu & Glaister (2000). The results of this thesis show that the quality of infrastructure is an important determinant of FDI.

The prospect of EU membership has a positive effect on FDI in Turkey. In comparison with the study of Clausing & Dorabantu (2005), the coefficient estimate for the EU is lower.[15] The difference could be explained by the uncertainty surrounding Turkey's prospect of joining the EU and the competition for FDI between Turkey and CEECs (Loewendahl & Ertugal-

[15]The coefficient estimate for the announcement that grants CEECs to the EU is 0.819 in the study of Clausing & Dorabantu (2005)

Loewendahl, 2000; Dutz *et al.*, 2005). Furthermore, the empirical results shed light on the increasing FDI coming from the non-traditional investors in Turkey, namely Greece and Spain. Yannopoulos (1992) points out that FDI would take place in sectors such as banking, where market-entry barriers are substantial prior to liberalisation. Moreover, the empirical results in Table 5 support the view that investment flows increase in anticipation of full-membership with the EU The increasing involvement of the investors from Greece and Spain in Turkey is attributable to investment liberalisation provided by the ratified BIT agreements between Turkey and Spain.

The trade openness of Turkey increases the FDI it receives. This could be explained by the fact that multinationals import intermediate goods and export a proportion of final goods back home countries.

The empirical results fail to support that corporate income tax has an impact on FDI. Since the data with respect to financing of FDI (whether it is financed by debt or other channels) is not available accurately, this study uses corporate income tax to investigate the effects of taxation on FDI. Nevertheless, corporate income tax itself might not capture the effect of taxation to FDI, efficiently.

The fact that FDI is responsive to political stability in Turkey explains the low level of FDI, which Turkey received during 1990s. Inability of coalition governments to steer the country towards stability dampened FDI inflows in that period. It is also worth noting that Turkey received a big proportion of its inward FDI after political stability was restored in 2001.

High values of corruption index by the ICRG points to the low level of corruption in a given country. The negative sign of *CORR* variable indicates a positive relationship between the level of corruption and FDI. My empirical results suggest that the helping hand hypothesis hold in the case of Turkey. Furthermore, the empirical results regarding to corruption confirm

the proposition of Egger & Winner (2006) that corruption does not act as a deterrent to FDI in developing countries.

As for the institutional variables, the involvement of the military in Turkish politics does not have any impact on FDI in Turkey. Similarly, the quality of bureaucracy is the other institutional variable that does not have a significant effect on FDI in Turkey. This result is contradictory to the finding of Coskun (1996), which cites the quality of bureaucracy as an important determinant of FDI.

7.4 Policy Implications

First, the empirical results in Table 5 show that there is a positive relationship between infrastructure and inward FDI. In the light of these results, the Turkish government should allocate additional funds to improve physical infrastructure in order to increase its inward FDI in future.

Second, my empirical results presented in Table 5 point to a positive relationship between BITs and inward FDI in Turkey. Hence, the country coverage of BITs agreement should be extended to other countries so that Turkey could attract further FDI from the non-signatory countries.

Third, there is a positive relationship between relative labour cost of Turkey and inward FDI as the empirical results in Table 5 indicate. In other words, cheap labour and low skilled-labour do not constitute an advantage in receiving FDI. Thus, the government should prioritise education and vocational training if the government aims to attract FDI, especially from knowledge-based multinationals.

Fourth, inward FDI in Turkey is very responsive to the risk associated with government stability as the empirical results in Table 5 present a positive relationship between

government stability and inward FDI. Hence, forming stable governments that are able to implement long term policies would increase the chance of attracting further FDI in future.

Finally, the empirical results in Table 5 indicate that FDI in Turkey is sensitive to the prospect of EU membership. Therefore, the government should accelerate its efforts to speed up the process of membership talks with the EU in order to increase the amount of FDI. A speedy progress in negotiation might signal the ambition of Turkey to join the EU and improve its policies.

8. Conclusions

This study analyses the determinants of inward FDI stocks in Turkey and the effect of inward FDI on the imports of Turkey between 1982 and 2007. Although this study differs from the previous ones in terms of using disaggregated data for FDI at country level and gravity equations derived from knowledge-capital framework, the findings are similar to those of the prevailing researches, i.e. combined market size has a strong positive effect on FDI in Turkey after controlling for relative labour, cost, real exchange rate, exchange rate volatility, EU effect, openness to trade, infrastructure, corporate income tax difference, and institutional factors. Furthermore, per capita differences, trade cost of exporting to Turkey, and investment liberalisation have significant positive effects on FDI. On the other hand, trade cost of exporting back to home countries, skilled-labour ratio differences, similarity in national incomes between home countries and Turkey have no significant impact on FDI in Turkey.

The importance of the prospect of EU membership, infrastructure, openness to trade, and political stability for FDI is confirmed by this study. Furthermore, the results point to a positive relationship between corruption and FDI in Turkey, supporting similar results of Sayek (2007).

This study finds contradictory results to the studies of Halicioglu (2001) and Erdal & Tatoglu (2002). In contrast to the study of Halicioglu (2001), this study finds a positive relationship between labour cost and FDI. Also, my findings with respect to exchange volatility indicate a positive relationship between exchange rate volatility and FDI, contradicting the results of Erdal & Tatoglu (2002).

Corporate income tax difference between home countries and Turkey remain insignificant in the results. The gradual decrease in corporate taxes in Turkey seems to have had no significant effect on FDI. On contrary to the expectations and previous findings, military in policy and the quality of bureaucracy do not have significant effect on FDI.

The results of this study show that FDI in Turkey is mainly in horizontal nature, even though there is an element of vertical direct investment. The findings are in line with the studies of Markusen & Maskus (2002), Carr *et al.,* (2001), Egger & Winner (2006) and Gast & Herrmann (2008), on a different country context.

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