The Determinants of Foreign Direct Investment in Turkey: An Empirical Analysis

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DECLARATION

I certify that this work has not been accepted in substance for any degree, and is not concurrently being submitted for any degree other than that of the Degree of Doctor Philosophy being studied at the University of Greenwich. I also declare that this work is the result of my own investigations except where otherwise stated.

Signed:

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Supervisor_____ Date_____

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ABSTRACT

This study examines the determinants of foreign direct investment (FDI) and the effect of FDI on trade in 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. Moreover, this study finds that high relative unit labour costs and corruption provide stimuli to FDI.

Using an augmented gravity model to investigate the relationship between FDI and imports, this study finds that outward FDI stocks are positively related to the exports. Overall, the empirical results indicate that FDI in Turkey is mainly motivated by market access and sensitive to the quality of institutions.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

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
M&A	Mergers and Acquisitions
MNEs	Multinational Enterprises
OECD	The Organisation for Economic Co-operation and Development
OECDG	Austria, Canada, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Japan, Netherlands, Norway, Poland, South Korea, Spain, Sweden, Switzerland, the UK and the USA.
TSI	Turkish Statistical Institute
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
WTO	World Trade Organisation
WDI	World Development Indicators

CHAPTER 1

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. Furthermore, this study distinguishes from the prevailing ones in terms of analysing the link between inward FDI in Turkey and imports to 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. I also utilise an augmented gravity model to examine the link between inward FDI and imports to Turkey, using instrumental variables.

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.

The results of this thesis would shed additional light on the determinants of FDI that have been investigated by many researchers. In addition, the findings of this study would enable public policymakers to observe the effect of implemented policies on FDI in Turkey. Hence, the results of this study would bring benefits to the researchers interested in FDI as well as public policy makers in Turkey.

The novelties of this study are twofold:

First, I use a unique panel dataset of the nineteen OECD investor (home) countries, i.e. Austria, Canada, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Japan, Netherlands, Norway, Poland, South Korea, Spain, Sweden, Switzerland, the UK, and the USA and Turkey as the recipient (host) country for FDI for the period 1982- 2007. Second, I examine FDI-trade relationship, using bilateral investment treaties (BIT) as an instrumental variable. To my best knowledge, this study is the first in the literature using BIT as an instrumental variable for FDI.

The contribution of this study to the existing literature could be summarised as follows.

First, this study examines the explanatory power of the knowledge-capital framework with additional control variables. The results point to the robustness of the knowledge-capital framework. Second, this thesis utilises disaggregated data for FDI at country level, including Central and Eastern European Countries –Poland and Hungary as investor countries. Third, this study is the first to test the link between bilateral FDI and the bilateral exchange rate, exchange rate volatility and the start of membership negotiations with the EU, specifically for Turkey. This study presents contradictory results to previous studies using aggregate data for exchange rate and exchange rate volatility. Fourth, this study extends the literature on the relationship between BIT and FDI for developing countries. Fifth, this study contributes to the public policy debate on the link between FDI and infrastructure, investment liberalisation, education, political stability, openness to trade and the integration with the EU.

1.1 Research Questions, Research Aims and Objectives

This research aims to answers the following questions.

What are the determinants of FDI in Turkey?

Does the prospect of EU membership have impact on the inward FDI in Turkey?

How does FDI affect the bilateral trade of Turkey with the home countries?

Is inward FDI in Turkey in horizontal or vertical nature?

Given the vertical or horizontal nature of FDI, what impact does inward FDI on the overall foreign trade of Turkey?

In order to examine the determinants of FDI and the effect of FDI on imports, I use panel data econometric techniques. In particular, I use fixed effects, random effects and instrumental variable estimation methods to serve the purposes above.

In order to answer the research questions mentioned above following research aims and objectives are set out.

First, I aim to investigate the determinants of FDI in Turkey. In addition, I plan to evaluate the theories of FDI and identify the determinants of FDI. From the theories, I intend to draw a conceptual framework and construct a model to examine the determinants of FDI. Furthermore, I seek to analyse the political and economic environment of Turkey to identify factors specific to Turkey that might affect the development of FDI in Turkey.

Second, I aim to examine the effect of inward FDI in Turkey on the imports to Turkey. Specifically, I test whether inward FDI complements or substitutes the imports to Turkey after controlling for other determinants of trade.

1.2 Empirical Findings

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).

Although the FDI in Turkey is mostly in horizontal nature, as the results show, FDI does not replace the exports from home countries to Turkey. An increase in the FDI stocks of home countries in Turkey is associated with an increase in their exports to Turkey. This indicates the dominance of intermediate goods in exports from home countries to Turkey.

1.3 Structure of the Dissertation

The remainder of the dissertation is as follows.

Chapter 2 explores the links between Turkish economy and FDI.

Chapter 3 reviews the main theories of FDI and evaluates the findings of previous empirical studies.

Chapter 4 lays out the conceptual framework, establishes hypotheses and describes the data, variables and the empirical methodology.

Chapter 5 presents empirical results on the determinants of FDI and FDI-trade relationship.

Finally, Chapter 6 concludes with a summary of findings, limitations of the study, policy implications and areas for further research.

CHAPTER 2

2.0 FDI AND TURKISH ECONOMY

2.1 Introduction

Increased inward FDI in the last two decades represents an important dimension of international integration of Turkish economy. Turkey performed well above its historical trend, reaching almost billion dollars FDI inflows in mid 1980s. A big proportion of these flows came from OECD and EU countries. The literature suggests that variations in attracting FDI among countries largely depend on the investment climate of host countries underpinned by the macroeconomic, political and legislative framework. Furthermore, UNCTAD (1998) puts forward that locational determinants of FDI are firmly tied to the economical and political factors, enabling a favourable investment environment. Therefore, analysing these factors in the context of Turkey could shed some light on the determinants of FDI in Turkey.

In Turkey, the majority of foreign investors belong to OECD Group (OECDG) with a 82% total FDI stocks in the country. 19 of the OECD countries report their FDI stocks to OECD International Investment Statistics (2008), by the end of 2007. This OECD group of countries are Austria, Canada, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Japan, Netherlands, Norway, Poland, South Korea, Spain, Sweden, Switzerland, the UK and the USA (OECDG).

In what follows is an analysis of macroeconomic and political climate and then an evaluation of characteristics inward FDI in Turkey.

2.2 Trends in Turkish Economy

2.2.1 Economical Factors

High inflation rates and the shortage of hard currency in the early 1980s were among the priorities that Turkish economy had to tackle by implementing a stability programme approved by International Monetary Fund (IMF) in 1980. The stability programme was also aimed at reducing the role of state in the economy and letting demand and supply forces determine the price of goods, production factors and foreign currency. In order to obtain hard currency, import substitution polices were replaced by export-oriented industrialisation programmes with promotion of exports and reduction of restrictions on imports. By the end of 1987, the programme proved to be successful in curbing the inflation: annual inflation rate was 38% on average between the years 1982-1987, falling from 101% in 1980. Also, the economy grew at 6% on average over the same period, peaking at 9% in 1987.

Inflation triggered by widening public deficit following the election in 1987 was not on a downward trajectory anymore and again dominated the scene of Turkish economy. Inflation rates shooting record high with 73% and 70 % in 1988 and 1992 respectively resulted in increasing demand for foreign currencies and depreciation of Turkish currency around 66% and 65% in nominal terms for these years. In line with exchange rates, national income recorded sharp falls and increases between 1988 and 1992. Due to the rises in salaries and wages in 1990, which increased private consumption, the economy scored a 9% growth in that year. However, average growth over this period realised around 3.5%, reflecting the stagflation effect on national income in 1987 and 1988.

The failure of the government to deal with the huge public deficit paved the way for the economic crisis in 1994, which required another economic stability programme to seek external funds from IMF. In order to finance the public deficit, domestic borrowing was largely used in early 90s, which in turn leaded to higher interest rates. The hike in domestic interest rates attracted short term external flow into the economy (Agénor, McDermott, & Ucer, 1997). As a result, Turkish currency appreciated over 23% between 1988 and 1993 in real terms (Calculated from CBRT Exchange rates). The deterioration in current account balance was a leading factor to a record devaluation of Turkish currency in history by 169% in nominal terms in 1994. Following that Turkish economy experienced an unprecedented level of 106% inflation. Although the economy was shaken by crisis in 1994, national income rebounded from 4.6% contraction in 1994 to a 7% expansion in 1995 and kept the same level of growth in 1996 and 1997, achieving 5 % increase on average between 1992 and 1997 (Binay & Salman, 1998).

The integration of the Turkish economy to international financial markets through convertibility of Turkish currency approved by IMF in 1989 brought the chance to obtain external capital inflows that the country needed to finance its growth. However, the deepening interdependence of the national economies through globalisation made developing countries with weak economic structure more prone to the negative effects of financial crisis around the world (Şahin, 1997). For instance, the financial crisis broke out in Asia in 1997 lessened the appetite for the risk for the assets of emerging countries. Especially, the huge outflow of capital from Russia sparked similar movements in other emerging economies. This financial crisis also took its toll on the Turkish economy and 6 billions of portfolio investment fled from Turkey in 1998 (CBRT, 2009). The

growth of national income plunged from 7.6% in 1997 to 2.3 in 1998, while the year 1999 saw a negative growth of 3.3% (CBRT, 2009b).

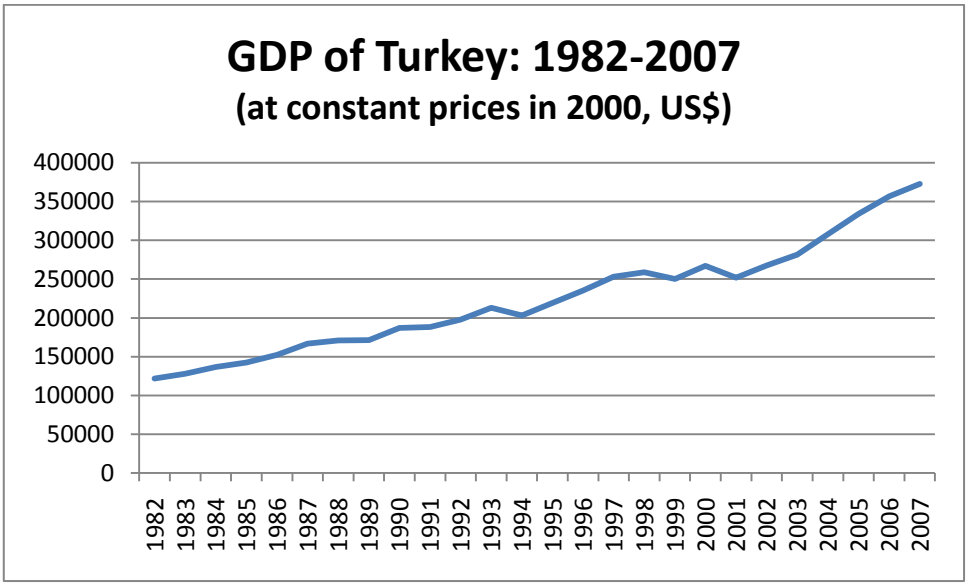
In 1999, IMF came to the aid of Turkey again with a stand-by agreement involving disinflation programme and crawling pegged exchange rate regime. In this new system, the exchange rate was allowed to float within a band and used as an anchor to control the rate of depreciation of Turkish currency against a basket of US dollar and euro to bring down inflation (TUSIAD, 2001). The positive effect of the stabilisation programme on the national income was rather short-term. Although the economy achieved a 6.7% growth level in the following year, the liquidity squeeze in 2001 crippled the economy. Crawling pegged was replaced by floating exchange regime and IMF stepped in again with another bailout worth of 19 billions of US$. Following the adoption of floating exchange rate, overvalued domestic currency depreciated against US$ nearly by 100% in nominal terms. This financial crisis brought a 5.6% decline in the size of economy and reduced the average growth of this 5 year period to 1.2%.

Turkey entered the twenty-first Century with the reforms engineered to deal with chronic inflation, unsustainable economic growth and inefficient structure of its banking system. High interest rates with low exchange rate were used to tame the chronic inflation (Ismihan *et al*., 2002). By the end of 2007, the annual inflation was again in a single digit after 38 years.[1] The role of IMF support to the stability programme functioned as an anchor to restore confidence internationally. With an annual growth of 6.8% on average, the size of economy reached 372 billion of US$. As a part of restructuring banking sector plan, three banks owned by the state were privatised.

[1] In 1969 the annual inflation rate was 5.70%, and in 2007 it was around 8%.

As could be seen in Figure 2.1, the economic crises that Turkey faced in 1994, 1999 and 2001 shaped up the development of national income of Turkey over the period, 1982-2007. The chronic inflation accompanied by volatility of domestic currency was the main element of economic instability in this period. Economic crisis erupting at 4-5 year intervals presented the symptoms of structural problems of Turkish economy. In addition, populist policies interrupting to implement structural changes strictly aggravated the climate of uncertainty. However, the performance of economy in the last six years looks quite distinguishing in this regard. Between 1994 and 2001, the economy grew only by 50000 billions of US$ dollar, while the corresponding growth doubled over 6 years of period, 2001 and 2007 (The World Bank, 2008).

Figure 2-1 Trends in National Income of Turkey

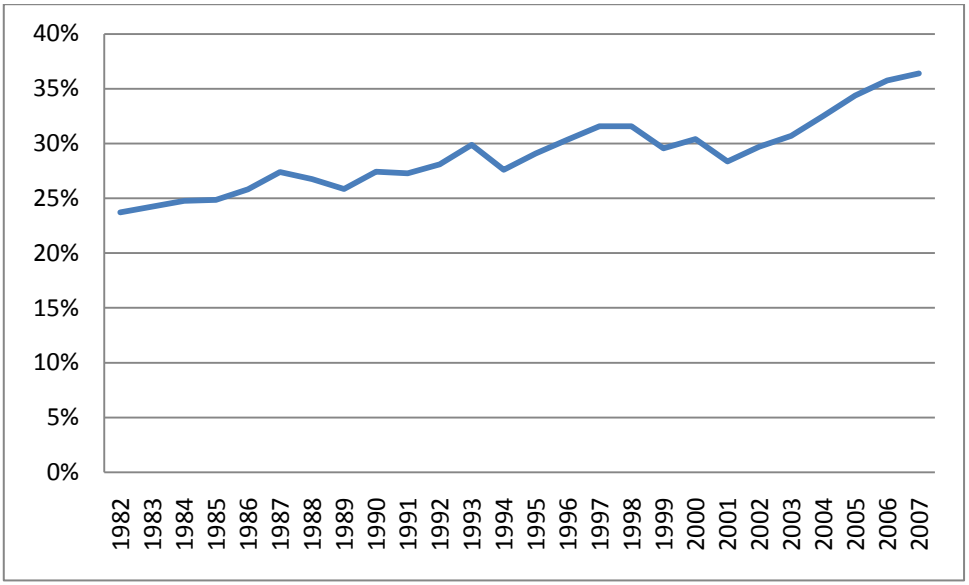


Source: Based on data compiled from World Development Indicators (The World Bank, 2008)

This considerable speed in growth is also visible in comparison of Turkey with the OECDG. Although the crisis years hampered the economic growth, the

economy came a long way to catch up with the OECDG, bridging GDP gap by ten percent roughly as Figure 2.2 displays.

Figure 2-2 Ratio of GDP of Turkey to that of the OECDG on Average

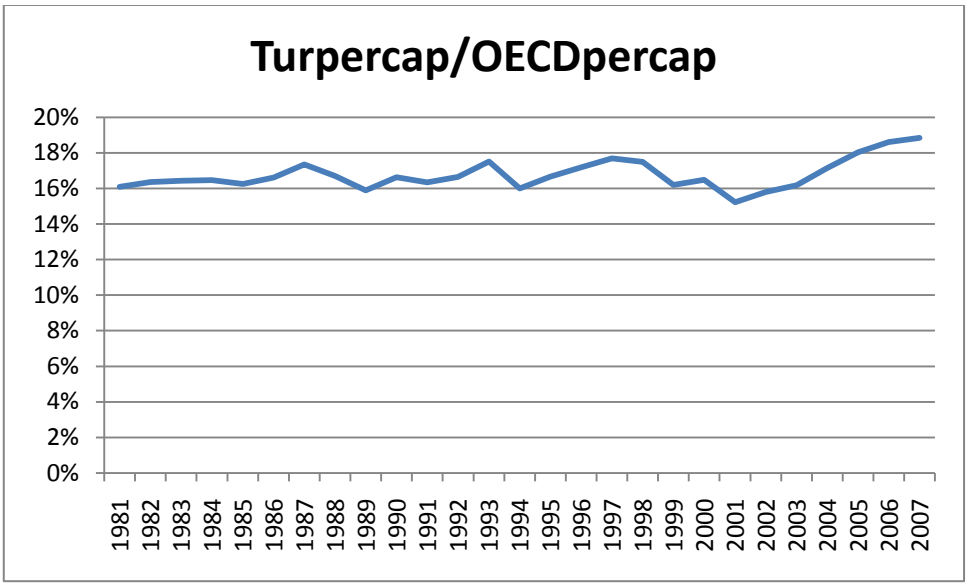


Source: Based on data compiled from World Development Indicators (The World Bank, 2008)

In terms of GDP per capita, the catching-process with the OECDG was rather slow. GDP per capita of Turkey floated within 15-20% band of that of the OECDG, reaching the 19% peak in 2007 as Figure 2.3 displays. The main reason for this slow increase is probably the high speed of population growth in Turkey over the same term relative to the OECDG.[2] The pace of the population growth in Turkey on annual average over 26 years was around 1.8%, three times bigger than that of the OECDG.

[2] The difference between the beginning and end of this period was roughly 30 millions (The World Bank, 2008)

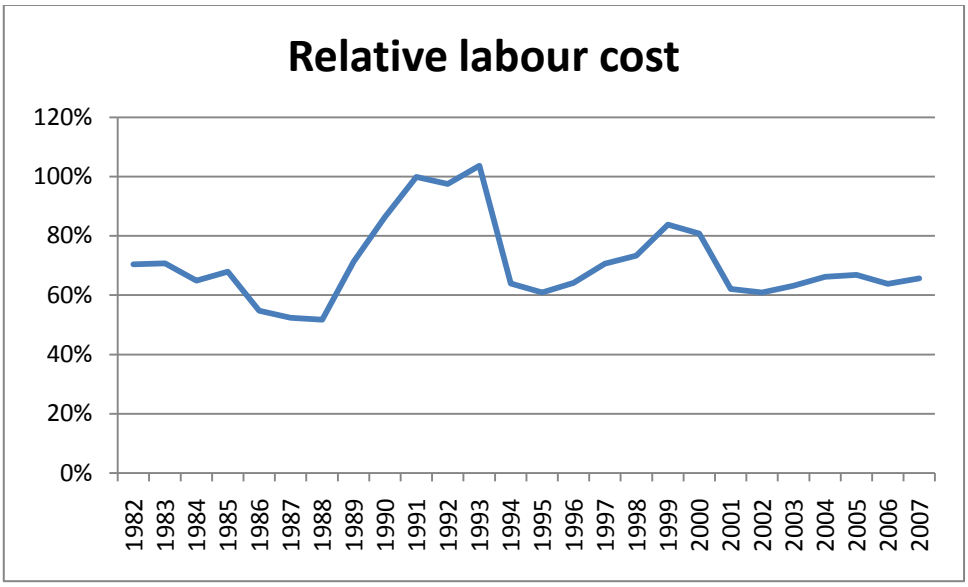
Figure 2-3 Ratio of GDP per capita of Turkey to the OECDG on Average



Source: Based on data compiled from World Development Indicators (The World Bank, 2008)

High population growth gives a competitive edge to Turkey vis-a-vis OECD countries in terms of labour force (Emerson *et al.*, 2004). In addition, this dynamic population has often been pronounced as an advantage of Turkey to attract more FDI and a bargaining power in negotiations with the EU over membership. Likewise, the abundance of labour also manifested itself in low labour costs in Turkey. According to the recent statistics by OECD (2008), exchange rate adjusted labour costs in Turkey are even lower than the latest members of the EU in 2007, Romania and Bulgaria. Figure 2.4 presents the trends in labour costs of Turkey relative to the OECDG. Relative labour cost of Turkey constitutes only 65% of the OECDG on average by the end of 2007. The steep increase between 1988 and 1990 exhibits the effects of considerable rise on wages and salaries in 1990 and gradual appreciation of Turkish currency. Steep falls in 1994 and 2001 reflect the depreciation of Turkish currency and the cost of economic crises on the share of employees.

Figure 2-4 Relative Labour Cost of Turkey to the OECDG on Average.



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

2.2.2 Political Factors

Government instability due to various coalition governments in power in late 70s was an obstacle in implementing the policies planned by each government (Tokgöz, 1999). That political conflict led to the coup in 1980. Following that all the political parties were abolished. The interference of army into political life and restrictions on freedoms were not welcomed by European Economic Community (EC). The accession process of Turkey to EC, which had started following the association agreement of Ankara signed in 1963, was put on hold by EC in 1982. [3]

After the transition period from the coup by army to democracy between 1980 and 1982, the elections in 1983 put an end to the political instability created by the fragile coalition governments in the previous decade. To a certain extent the unity in government and positive outlook in the economy revived the hopes of

[3] The signatories were France, Germany, Belgium, Luxembourg, the Netherlands and Italy and the EC agreement was extended to include the new members, the UK, the Republic of Ireland and Denmark, 1973.

joining the EC in 1987. The application by Turkey to accede to the EC for the membership was declined in 1989 on the grounds that improvements made in social, economic and political areas were promising, albeit unsatisfactory (Karluk, 2004).

The unhappiness of the voters with the ruling party on handling issues such as terrorism, inflation and growing unemployment culminated in the loss of votes for the ruling party and brought back the days of coalition governments after the elections in 1991, which would last ten years. The fact that the parties in parliament formed four governments within ten years prevented the reforms planned by each government from being implemented fully (Tokgöz, 1999). Nonetheless, the common aspiration among the mainstream political parties to join the EC resulted in progressive steps taken towards full membership in the period of coalition governments (Kazgan, 2002).

First step in this direction was to accept CU agreement with EC countries. Following the reductions in tariffs on industrialised goods, gradually, based on the Ankara agreement in 1963 and interim agreement in 1973 with the EC members, Turkey became a member of CU in 1996. This entailed the abolishment of the tariffs and excise duties on the imports from EC countries and the adoption of common external tariffs on imports from non-EC countries. The nomination of Turkey officially as a candidate for membership in 1999 by the European Council's Helsinki Summit reinforced the improving relations with EU Countries (Uysal, 2001). Eventually, the negotiations for EU membership started on 3rd October 2004.

The liberalisation of trade and integration with the EU was followed by similar changes in regulatory framework governing FDI in Turkey. The FDI law passed

in 1954 placed no limit on profit transfers or share of foreign investors and allowed equal treatment for foreign investors with domestic investors. However, foreign investor needed an authorisation from the state and had to complete a bureaucratic procedure to establish a company. In order to increase FDI through established policies and simplify the procedure faced by foreign investors, a new FDI law (replacing the old one) came into effect in 2003 (Undersecreteriat of Treasury, 2003). By the new law, the approval of foreign investment by the state required by the previous law was abolished and with additional laws in 2003, the lengthy procedure to establish a company was shortened to one day. Favourable conditions for companies provided by the policy changes over this period also involved continuous cuts in corporate income tax rate following reductions in statutory tax levels across OECD countries (Devereux *et al*., 2002).[4] By the end of 2007, of the OECDG only Poland and Hungary had lower corporate income tax rate than that of Turkey, which was 20% (OECD, 2008).

[4] Turkey has been a member of OECD since 1947.

2.3 Accession to EU and FDI

Table 2.1 presents the trends in FDI of six countries in order to provide a descriptive comparison with Turkey between 2002 and 2007. Among them, Spain, Greece, and Portugal are similar to Turkey in terms of development performance while the latter three, namely, the Czech Republic, Poland and Hungary are indentified with their attractiveness to inward FDI among the newly members of the EU.

Given the size of population and national income, Spain seems more attractive to foreign investors than Portugal and Greece. Spain increased its inward stocks of FDI from 23 billion of US$ in 1986 to 537 in 2007. Compared to Spain, Portugal attracted modest FDI over the same period with 100 billion of US$. Of the three countries, Greece recorded the lowest FDI stock increase after becoming a member of the European Economic Community (EEC) in 1981.

Table 2.1 FDI Stocks (in billions of US$, as of 2008) in Selected EU Countries

Years	Spain	Greece	Portugal	Turkey	Czech Rep[5]	Poland	Hungary
1982	5.3	6.1	3.4	9	n.a.	n.a.	n.a.
1987	23	10.1	4.9	9.5	n.a.	n.a.	n.a.
1992	107.8	8	14.9	12.8	3.4	1.4	3.4
1997	105.3	13	22.4	16.5	9.2	14.6	18
2002	257.1	15.6	44.6	18.8	38.7	48.3	36.2
2007	537.5	52.8	114.2	145.6	101.1	142.1	97.4

Source: Compiled from (UNCTAD, 2008).

[5] It was Czechoslovakia until 1993.

Of Central and Eastern European countries (CEECs), relatively bigger country Poland, leads Czech Republic and Hungary with 142.1 billions of US$, while only 4 billions of US$ dollar separates second Czech Republic from Hungary at the end of 2007. Table 2.1 suggests that the prospect of EU membership had a positive effect on FDI stocks in Poland, Hungary and the Czech Republic after signing the association agreement with the EU in 1994, 1994 and 1995 respectively.

The effect of membership prospect on FDI is more visible in the case of Turkey. Turkey increased its inward FDI stock only by 9.8 billions of US$ between the years 1982 and 2002. Following the start of EU membership negotiations with the EU, the increase in inward FDI gained momentum. However, comparison with the same countries based on the ratio of FDI stocks to GDP in Table 2.2 clearly shows that Turkey does not attract FDI as much as its potential suggests (WIR, 2008). Portugal, the Czech Republic and Hungary, holds two times larger FDI inward stock than Turkey as Table 2.2 shows. Contrary to the widespread expectations, CU agreement with the EU in 1996 shows no discernible effect on FDI stocks in Turkey. Loewendahl & Ertugal Loewandahl (2001) and Dutz *et al.*, (2005) link the low performance of Turkey in attracting FDI in 1990s to the opening of CEECs countries' markets to foreign investors, especially from Europe.

Table 2.2 FDI Stocks as a Percentage of GDP

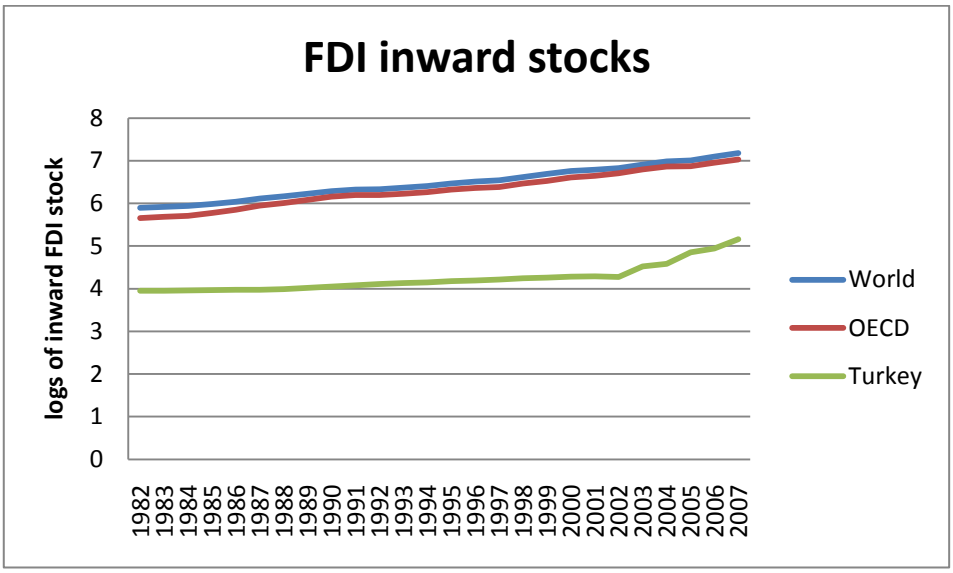
Years	Spain	Greece	Portugal	Turkey	Czech Rep.	Poland	Hungary
1982	2.8	10.2	11.7	13.9	n.a.	n.a.	n.a.
1987	7.4	14.0	10.6	10.9	n.a.	n.a.	n.a.
1992	17.6	6.2	14.5	8.1	7.6	1.5	8.9
1997	18.4	8.3	20.0	8.7	16.2	9.3	38.3
2002	37.5	9.1	35.0	10.2	51.4	24.4	54.3
2007	37.6	14.6	52.0	30.0	58.4	34.0	71.1

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

2.4 Trends in Inward 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 2.5 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 2-5 Inward FDI Stocks in Turkey, the OECD Countries and the World

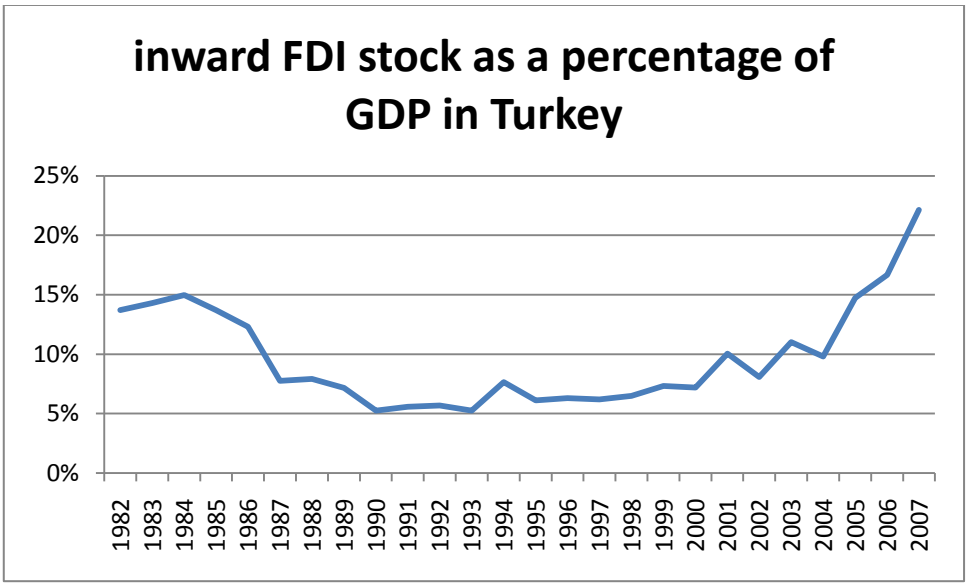


Source: Based on data compiled from UNCTAD (2008).

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 2.6 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.[6] Consequently, Turkey was elevated from 109 in 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).

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

Figure 2-6 Ratio of FDI inward stock to GDP of Turkey



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

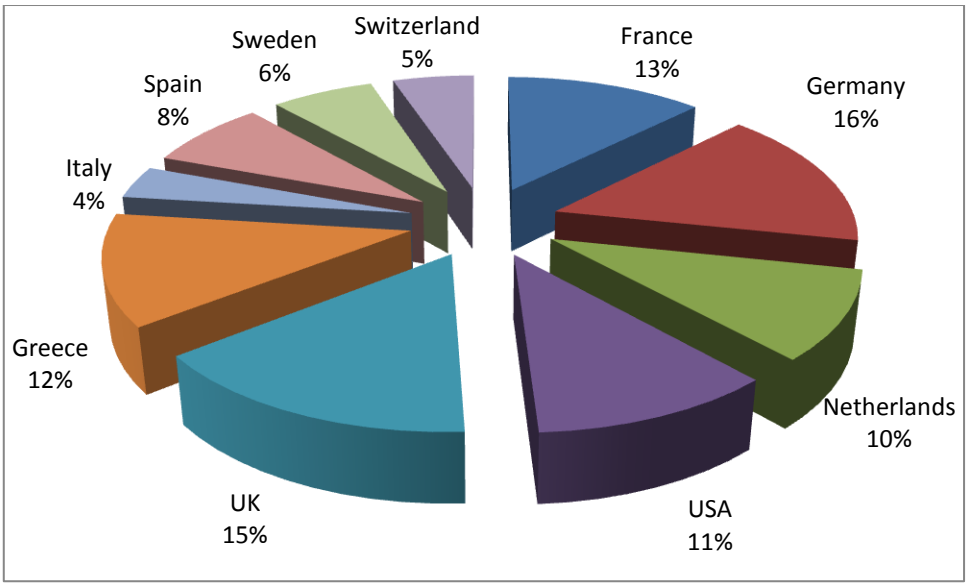
2.4.1 The Distribution of Inward FDI Among Countries and Sectors

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 2.7 reveals (OECD, 2008). According to the estimations of

UNCTAD (2008) these countries jointly make up 61% of total outward investment originated from developed countries.[7]

Figure 2-7 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)

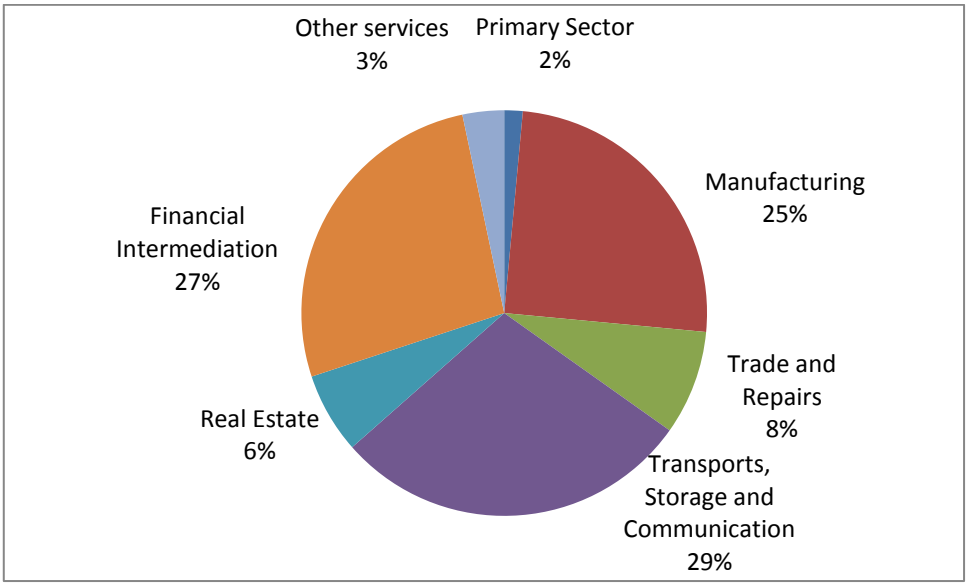
Interestingly, Greece has a share of less than 0.1% outward FDI share in developed countries, while it has a 12% share in Turkey among developed countries. This reflects the involvement of Greek Banks in Turkey through Mergers and Acquisition (M&A) in 2006 and 2007 as a part of enlargement process in neighbouring countries and in Balkans (UNCTAD, 2008).[8] The USA and the Netherlands also increased their commitments in FDI through M&A in

[7] 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.

[8] National Bank of Greece bought Finansbank in 2006 and Eurobank acquired 70% of Tekfenbank in 2006 and bought the remaining stake in 2007 (UNCTAD, 2008).

financial sector.[9] Consequently, Financial Intermediation takes the second biggest share of service sector with 27%. Of service sectors Transports, Storage, and Communication subsector hold 29 per cent of total stocks due to M&A that involves the Swedish firm Sonia with Turkcell and the UK firm Vodafone with Telsim in communication sector (UNCTAD, 2008). These activities in M&A jointly contributed to the rise in the share of service sector in inward FDI stocks in Turkey in 2007 (UNCTAD, 2007). By the end of 2007, the service sector brings about 73% of total inward FDI stock (CBRT, 2009) reflecting the structural change towards service sector in the world (UNCTAD, 2007), as Figure 2.8 below reveals. In line with the trends in the world, primary sector holds only 2% of total FDI in Turkey.

Figure 2-8 Inward FDI Stock of Turkey as of 2007.



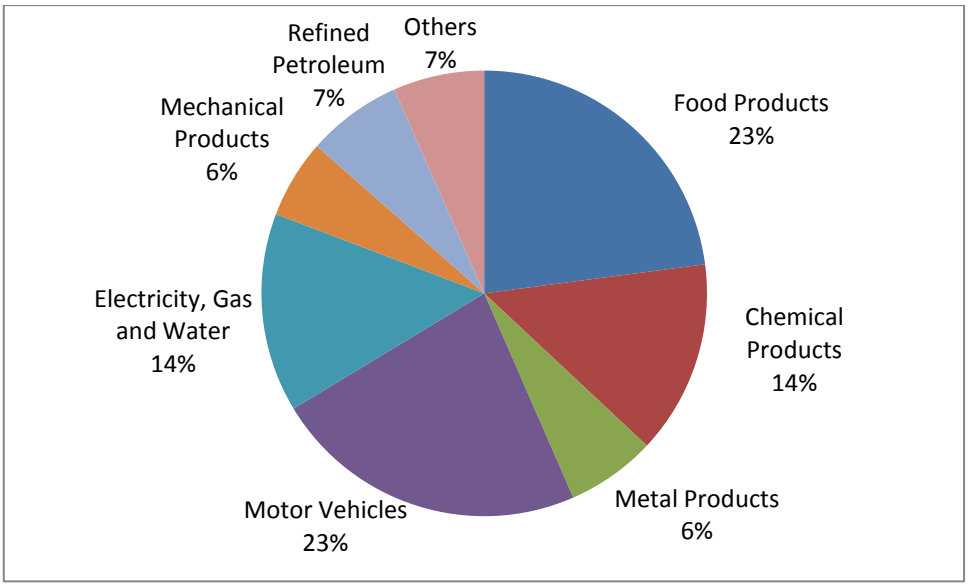
Source: Based on data calculated from (CBRT, 2009)**.**

Manufacturing sector has one fourth of total inward FDI in Turkey and food products and motor vehicles present heavy inward FDI presence in comparison

[9] Citibank from the USA and ING Group from the Netherlands acquired Akbank and Oyakbank respectively in 2007, the joint value of the deals was 5.8 billion of US$ (Deloitte Touche Tohmatsu (DTT), 2008).

with other subsectors as Figure 2.9 presents. It seems that investors show interests towards the sectors that are associated with high capital commitments as in motor vehicles, chemical products, brand names, and local presence as in food products. Chemical products and electricity, gas and water subsectors nearly doubled the amount of their amount of stocks from 2006 and 2007, taking 14% from the total inward FDI each in 2007. Remaining sectors receive relatively smaller shares around 7% as Figure 2.9 presents.

Figure 2-9 Sectoral Composition of total Inward FDI in Manufacturing in 2007.



Source: Based on data compiled from, Balance of Payments Statistics, (CBRT, 2009b)**.**

It is often argued that based on FDI trends experienced by accession countries prior to full membership, the integration of Turkey into the EU would increase the attractiveness of Turkey to the foreign investors from EU and non-EU countries. The possible motivations for that assumption are disappearing tariff and non-tariff trade barriers in the aftermath of acceding to EU. As a result, companies from this bloc might move the production plants to Turkey in order to

take the advantage of cheap labour, large host-market and supply home country or third countries with the exports from Turkey. In a similar vein, non-EU companies might also invest in Turkey for their labour intensive operations and use Turkey as an export platform.

This chapter evaluates the political and economical factors that might have an impact on FDI in Turkey. In addition, the trends in FDI over the last two and half decades in conjunction with the political and economical factors are explored. The next chapter reviews the theoretical approaches that explain the determinants of FDI and the empirical studies that investigate the determinants of FDI at country, industry and firm level.

CHAPTER 3

3.0 LITERATURE REVIEW

3.1 Introduction

The purpose of this chapter is to review the theories of FDI that could provide a framework for an empirical investigation of the determinants of FDI. This chapter commences with a review of the mainstream FDI theories and then focuses on the theories that have generally been used in empirical studies. A selective review of empirical studies follows the theoretical literature. This thesis concentrates on host country determinants of FDI. Therefore, a specific attention is paid to the previous empirical studies examining the locational determinants of FDI.[10] In the light of the available literature, the final section of this chapter identifies the gaps in the literature and summarises the contribution of this study.

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 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

[10] For an extensive review of other determinants of FDI, see Dunning & Lundan (2008).

existence of firm specific advantages that enable firms to invest abroad.[11] 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.[12] 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.[13] 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. OLI and the knowledge-capital framework have extensively been used in empirical studies to investigate the locational determinants of FDI. Next section will review these two frameworks more in depth.

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[11] 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).

[12] 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).

[13] 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.

In what follows is a brief of the prevailing theories (or as Agarwal, 1980 calls them 'hypotheses' of FDI activities of the MNEs).

3.2 Eclectic Paradigm

Generally, international production activities of Multinational Enterprises (MNEs) involve exports, imports, licensing, joint-ventures, and the raising of capital for investment and FDI. The approaches briefed in the first and second group (pp. 27-28) do not link all the aspects of international production activities of MNEs. On the contrary, the eclectic approach developed by Dunning (1979, 1980, and 1993) draws on and integrates three strands of economic theory (theory of the firm, industrial organisation, and international trade theory) to explain ability and willingness of firms to serve markets abroad via trade or FDI.

Dunning (1979, 1980) interprets FDI flows within the conceptual framework of the OLI advantages. His study suggests that a firm would get involved in FDI if the following conditions are met:

First, the firm must possess some ownership advantages (based on the approach of Hymer, 1960), which are in the form of intangible assets and exclusive to the firm at least for a period of time.

Second, it must be more beneficial for the firm to use ownership advantages itself and internalise rather than externalise these ownership advantages through licensing or similar contracts with independent firms (internalisation advantages).

Third, if the two preceding conditions are satisfied, it must be profitable for the firm to capitalise on these advantages in conjunction with at least some factor inputs (location-specific advantages) outside its home country. In the absence of

location-specific advantages, foreign markets would be served entirely by domestic production and exports.

Firms might have different motives in exploiting ownership, internalisation and location advantages. In this regard, Dunning (1993) identifies four types of MNE activities (a) Natural Resource-Seeking Investment, (b) Market-Seeking Investment, **(**c) Efficiency-Seeking Investment, (d) Strategic Asset-Seeking Investment.

a) Natural Resource-Seeking Investment

Firms involved in natural resource-seeking investment are generally motivated to minimise costs and to secure the supply of resources. In such industries as petrol and chemical, proximity to natural resource is one of the main determinants of costs for firms. Therefore, firms in this kind of industries want to make sure that they get enough natural resources for production when the need arises.

b) Market-Seeking Investment

Market-seeking investment is planned to supply goods to a market in which the investment takes place. The main drive for market-seeking investment is to avoid the restrictions, such as, tariffs and import controls imposed by the host governments on international trade. By imposing tariffs and controls on imports, host governments aim to divert the location of production into their regions and to protect their local industries against foreign imports.

Some products need some modifications to conform to local tastes. As a result physical presence in the market in question might be necessary. Furthermore, physical presence is necessary in banking, trade and hotels to serve customers abroad.

c) Efficiency-Seeking Investment

Efficiency-seeking investment takes place primarily to restructure and sometimes to enlarge the existing activities of MNEs in order to improve the efficiency or global competitiveness of the investing company. Different from market-seeking investment, efficiency seeking investment could only take place in regionally integrated markets. From the standpoint of an investing company, this kind of investment is a response to the imperative of technological developments and the liberalisation of cross-border markets.

There are two types of efficiency-seeking investment. The first is designed to make use of disparities in the availability and the cost of traditional factors of production (capital and labour) in different countries.

The other takes place in countries with similar economic development and income levels, and is planned to take the advantage of economies of scale, scope, and differences in consumer tastes.

d) Strategic Asset-Seeking Investment

The purpose of this kind of investment is to protect, sustain or improve the global competitive position of an investing company against its main national and international competitors and to promote long-term strategic objectives, usually by acquiring the assets of firms abroad. The acquisition might culminate in restructuring of the acquired firm's assets in the form of divestment of resources and capabilities, which is not related to the core assets of the business (Cantwell, 1991).

Eclectic paradigm is intended to provide an overall analytical framework for empirical investigations (Cantwell, 1991). Following the empirical study of

Dunning (1979), several other empirical studies use the Eclectic Paradigm to analyse the determinants of FDI.[14]

The OLI framework explains why firms choose to become multinationals. Nevertheless, the OLI framework fails to explain the rise of FDI among rich industrial countries at a time of falling trade barriers (Di Mauro, 1999; Bevan and Estrin, 2004). Therefore, it is essential to examine the up-to-date thinking. In this context, the New Trade Theory in relation to FDI is reviewed below.

3.3 New Trade Theory Approach to FDI

In order to address the shortcomings of the OLI framework briefed above, a new trade theory approach to FDI is developed by various authors. Building upon the OLI, the New Trade Theory Approach incorporates location, internalisation and ownership advantages into general equilibrium models and predicts the pattern of trade. Location advantages include market size, trade cost and differences in relative endowments of countries. Knowledge-capital constitutes ownership advantage. The joint-input characteristic of knowledge-capital gives rise to internalisation advantages. Given the ownership and location advantages, the location decision of MNEs is explained by two competing hypotheses within the tradition of the New Trade Theory Approach, the proximity-concentration and the factor proportion hypothesis.

The factor proportion hypothesis views the phenomenon of FDI from the perspective of MNEs' ability to locate their different stages of production in different countries, taking the advantage of differences in factor costs (Markusen, 1984; Helpman 1984; Helpman & Krugman 1985; Ethier & Horn 1990). For instance, if firm specific inputs (intangible assets, such as, knowledge-capital)

[14] See Faeth (2009) for a review.

produced at headquarters could easily be transferred to the foreign affiliates at a low cost, a single plant multinational would arise to exploit possible factor cost differences. Headquarters would be located in the country abundant with skilled labour and the production plant in the country abundant with unskilled labour. Thus, vertical expansion of firms is determined by differences in factor endowments. Given the large factor cost differences between developed and developing countries, vertical investment is more likely to arise between developed and developing countries as the factor proportion hypothesis predicts.

If factor proportions consideration dominates in a given industry, multinationals emerge in a single direction between countries. Then they export differentiated product back to the headquarters. The effect of this inter-industry trade on overall trade of a given country depends on how MNEs in this country would meet the needs of production in terms of inputs, through imports from the parent or a third country or local suppliers. Furthermore, external tariffs of regional blocs might affect the trade for inputs and induce MNEs to trade within the regional bloc.

Based on the assumption that countries are symmetric in terms of market size, factor endowments and technological development, the proximity-concentration hypothesis (Brainard, 1993a) suggests that firms prefer FDI over exporting provided that firms are motivated by proximity to customers or specialized suppliers at the expense of reduced scale (concentration). Therefore, MNEs' existence is positively correlated to high transport costs, trade barriers, low investment barriers and the ratio of scale economies at the plant level relative to the corporate level (Horstmann & Markusen 1992; Brainard 1993a). Given the symmetries in countries' market size, factor endowments and technologies, MNEs motivated by market access would invest in foreign markets to minimise transport

costs associated with exporting. This setting allows for horizontal FDI, where two-way investment between similar countries in terms of both absolute and relative factor endowment occurs. The predictions of the proximity-concentration hypothesis fit large FDI flows among industrialised countries.

Trade substituting effects of FDI is likely to dominate if MNEs are concerned with proximity. If proximity considerations dominate in a given industry, multinational sales would replace two-way trade in final goods of unequal magnitudes and might generate inter-industry trade in intermediates (Brainard, 1993a).[15] In this respect, even the presence of FDI itself might have further effects on trade between home and host country. For instance, FDI stimulate demand for imports through informational spillovers and the creation of production channels (Swenson, 2004).

Markusen (1998), Markusen & Venables (1995, 1996, and 1998) introduce asymmetries of market size, factor endowments and technological efficiency among countries in explaining the choice between trade and FDI. In these models, as the asymmetries start to disappear between countries in terms of market size, factor endowments, and technological efficiency, more firms would establish subsidiaries in these developing countries; hence FDI and trade could exist simultaneously. As a result, MNEs become more important relative to trade as countries become more similar in size and relative endowments as world income grows, and multinational production would substitute trade when countries are similar (Brainard, 1997).

[15] Brainard (1993) finds that affiliate sales and trade move in opposite directions with increases in advertising intensity, suggesting that advertising-intensive products necessitate a local presence.

Markusen *et al.*, (1996) and Markusen (1998) integrate proximity-concentration hypothesis and factor proportion hypothesis in a knowledge-capital model, in which both vertical and horizontal FDI take place. The knowledge-capital framework combines the assumptions of proximity-concentration and factor proportion hypotheses with the assumption of investment liberalisation.

Having reviewed the mainstream theories on FDI, the next section is to review the empirical studies and the methodology used in these studies on the locational determinants of FDI in conjunction with the framework of Eclectic Paradigm and the New Trade Theory.

3.4 Locational Determinants of FDI

The economic theory of MNEs concentrates on two dimensions of international production: the ownership of assets used in production abroad and the location of such production activities. The spurs for the location of FDI have been explained by the concept of cost minimisation; i.e., a company would choose the least cost location for its production activities abroad (Buckley, 1988). Furthermore, the location choice of FDI is determined by the relative profitability and motives of investing firms (Dunning, 1993). If a location is chosen as the destination of FDI, then from the investor's point of view, it must be more profitable to produce in that location than in others, given the location choice of other investors. If the primary motive is to take the advantage of the location as an export platform, the costs related to production of the goods and transportation of them to the rest of world market become an important factor. On the other hand, if the production of goods and services for a local market is the primary concern, then the market size and market growth of destination country for investment would come into play. Thus, government policies, such as, preferential tax treatment, the time, and

effort needed to obtain government consent and the business climate impact a location's attractiveness to foreign investors.

The components of host country location motives could be broadly classified into two types: first, there are traditional factors, which mainly consists of natural resources, labour in terms of skill and quantity, and proximity to markets, while second, there exists a range of environmental variables, such as, political instability, exchange rates, government protection, which act as a function of political, economic, legal and infrastructural factors of a host country (Dunning, 1979). These aforementioned determinants have been investigated on the basis of countries, industries, and sectors by several studies with firm, industry and country level data. The upshot is the results of these empirical works suggest that there is no consensus on all the important determinants of FDI. In addition, determinants of FDI vary across characteristics of industry, production factor intensity, and nature and source of investment. However, some variables such as market size, labour costs are generally incorporated in the empirical models, while the preference for other less prominent determinants might vary from one empirical model another.

3.4.1 Market Size and Market Growth

The importance of market size as a locational factor in the determination of FDI inflows arises from the hypothesis that larger economies are able to offer opportunities to explore economies of scale, and fast growing markets signals for development potential for MNEs (Agarwal, 1980). Notwithstanding, market size has different implications for FDI inflows in accordance with its motive. For instance, it might be crucially important for FDI stimulated by horizontal motives, while it might offer little incentive for vertical FDI. As far as service

sector is concerned, market size might be the only determinant due to inseparable production of some services, such as, hotels and banks. Furthermore, a high rate of growth of host country market indicates a good development in future, which suggests that a high growth rate of host country would promote FDI inflows.

Host country market size has hitherto been accepted as a significant determinant of FDI flows. Generally, market size has been proxied by either host country absolute GDP and GNP or GDP and GNP per capita.[16] Bandera & White (1968) for USA manufacturing FDI in Europe, Schmitz & Bieri (1972) for FDI in EEC, Swedenborg (1979) for Swedish FDI, Lunn (1980) for USA FDI in the EEC, Dunning (1980) for USA FDI in aggregate and manufacturing sector, Kravis & Lipsey (1982) for USA Multinationals, Schneider & Frey (1985) for 54 less developed countries, Culem (1988) for FDI among six industrialised countries, Papanastassiou & Pearce (1990) for UK manufacturing FDI, Tsai (1994) for both developing and developed economies, and Wang & Swain (1995) for FDI in Chinese and Hungarian manufacturing sector (using GDP growth) prove that market size hypothesis is relevant for FDI.

Along with host country market size, home country GDP and GDP growth have also been incorporated in recent studies using gravity models (Brainard, 1997; Campos & Kinoshita, 2003; Blonigen & Davies, 2004; Mutti & Grubert, 2004).[17] In the gravity models, FDI flows are related to the relative size of the home and host country, the geographical distance along with other country characteristics. Investigating the locational determinants of FDI in emerging countries, Frenkel *et al.,* (2004) find that FDI flows are positive function of home and host country

[16] As an alternative, Lucas (1993) uses private and public consumption.

[17] The gravity models were initially developed to investigate the trade flows and, have been justified theoretically (Evenett & Keller, 2002).

GDP level. Moreover, Lahreche-Revil (2006) reports that home country GDP as well as host country market factors are positively associated with FDI flows in an enlarged EU. Furthermore, Bénassy-Quéré *et al.*, (2007) -using gravity model- confirm that size of investor country as well as host countries have positive impact of FDI flows among 11 OECD countries.

To sum up, host country market size and market growth are expected to have a positive effect on FDI flows.

3.4.2 Physical Distance and Transport Cost

Following the framework of proximity-concentration hypothesis (Brainard, 1993a; Markusen, 1995) physical distance has frequently been used as a proxy for transport costs. Transport costs increase as the geographical distance between home and host country widens, therefore it might induce horizontal FDI. However, physical distance negatively affects the costs of intra-firm trade and co-ordination; therefore it might deter vertical FDI. Renowned interest in gravity models has also contributed to wide use of this variable in empirical studies.

Braunerhjelm & Svensson (1996) find that distance to host country is negatively associated with FDI in manufacturing. Instead of geographical distance, Baier & Bergstrand (2001), and Limao & Venables (2001) use matched trade partner method. According to matched trade partner method, transport cost is calculated as the difference between the data for same trade flow reported by exporting and importing country.[18] The advantage of matched partner method over the

[18] Exporter countries report data for export as free on board (f.o.b), while importer countries report data for same trade flow that include costs, insurance and freight (c.i.f.).The difference give a value equal to transport cost.

geographical distance is the variance in the value of transport cost over time, reflecting transport cost cutback (Baier & Bergstrand, 2001).

While the above scholars prefer trade partner as a proxy, several other examine FDI and physical distance relation. Among them, Waldkirch (2010), for example, using German inward and outward FDI, finds out that distance has a negative effect on FDI. The findings of Frenkel *et al.*, (2004) also confirm the negative correlation between distance and FDI in emerging countries using bilateral FDI flows with a gravity model. At industry level of inward FDI in Poland geographical proximity is also found to be significant determinant of FDI flows for seven out of eight industries and manufacturing sector as a whole (Walkenhorst, 2004). Blonigen & Davies (2004) use gravity model and experience negative impact of geographical distance across host countries in the analysis of USA outbound FDI at industry level. By the same token, Lahreche-Revil (2006) and Bénassy-Quéré *et al.*, (2007) demonstrate the negative impact of geographical distance on FDI. In addition, they incorporate a dummy variable for common language between home and host countries in order to capture the effect of cultural distance. In both studies, having a common language between host and home country is found to promote FDI significantly.

In sum, much of the literature emphasises that physical distance and transport cost influence FDI flows adversely.

3.4.3 Labour Costs

Labour cost comprises perhaps the major factor for the ability of developing countries to attract foreign multinationals to set up manufacturing operations. From a firm standpoint, production cost-minimizing vertical FDI could be stimulated directly by low factor costs.

On the other hand, lower labour wages might also mean lower skill and productivity. Some industries, such as, computing require high-skilled labour, which is often associated with high wages. Therefore the effect of labour costs on FDI might vary with the type of industry. This implies that high-skilled labour associated with high level of wages might attract FDI in some industries instead of deterring it. On the other hand, some studies (Caves 1974; Swedenborg 1979) using real wage as a proxy for the labour cost, show positive association between FDI inflows and real wage. Nevertheless, the findings of Goldsbrough (1979), Saunders (1982), Scheider & Frey (1985) contradict the findings of Caves (1974) and Swedenborg (1979), presenting that higher wage discourage inbound FDI.

In a similar vein, Cushman (1987) seeks to establish a relationship between wages and FDI in a study investigating the USA FDI inflows and outflows. In both cases, host country wages are proved to discourage FDI, whereas host country labour productivity increases FDI outflows. Culem (1988) achieves the results confirming that higher wage is associated with lower US FDI in EEC countries.

Mixed results with respect to the effect of labour costs on FDI also exist. For instance, Edwards (1991) demonstrate insignificant effect of wage on FDI for a cross-section of 58 developing countries. On the other hand, Wheeler & Mody

(1992) report a positive impact of wages on FDI in the electronics industry. O'Sullivan (1993) reports that wages affect FDI inflows negatively in Ireland, lending support to the hypothesis that high wages and FDI are negatively correlated. Investigating the effect of wages on inward FDI in Spain in manufacturing and non-manufacturing sectors, Bajo-Rubio & Sosvilla-Rivero (1994) find negative correlation between wages and FDI inflows in non-manufacturing only. Similarly, Tsai (1994) finds support for the cheap-labour hypothesis, albeit only for some years in his study. Wang and Swain (1995) observe a positive relationship between wages and FDI inflows in Chinese and Hungarian manufacturing sectors. In addition, investigating the locational determinants of USA in the EU, Beer and Cory (1996) demonstrate that relative wages divided by productivity were positively correlated USA FDI in EU. In order to account for labour productivity, Cheng and Kwan (2000) adjust wages costs for the quality of workers or labour productivity; and the authors demonstrate that high wages were negatively associated with the FDI inflows in China. Using the disaggregated data by provinces and municipalities, Coughlin & Segev (2000) also confirm a negative correlation between wages and FDI inflows to China with a strong negative elasticity. Employing a wage differential between the EU and ten CEECs to capture the effect of labour cost on FDI, Resmini (2000) finds that widening wage gap motivates FDI flows from the EU countries to ten CEECs. In a similar study in terms of country coverage, Carstensen & Toubal (2004) examine the effect of relative unit cost of seven CEECs to ten OECD countries on FDI and find that an increase in labour unit cost in these CEECs relative to the OECD countries in the sample impedes FDI flows.

At different manufacturing industries of Poland, Walkenhorst (2004) demonstrates that low relative labour costs corrected by productivity are found to

play an important role in determining FDI flows into almost all of Poland's manufacturing industries by using a gravity model. FDI into South Africa is also correlated negatively in the empirical study of Fedderke & Romm (2006). Using real unit labour cost of destination country, Bellak *et al.*, (2009) also confirm a negative relationship between labour cost and FDI in the context of eight CEECs.

To summarise, studies investigating the relationship between FDI and labour studies are vast in literature. However, the results of these studies are not conclusive to make a bold statement that labour costs and FDI are positively or negatively correlated.

3.4.4 Exchange Rate and Exchange Rate Volatility

In terms of financing FDI, fluctuation of a host country's currency motivates MNEs to raise funds for their activities in order to avoid an exchange risk leading to a potentially high debt servicing and payment. Taking an analytical stance on fluctuations, Cushman (1985) relates FDI decisions to future exchange rate movements with empirical evidence that an expected real appreciation of the home currency increases FDI while the current level of the exchange rate is shown to have no significant impact on FDI.

Since FDI involves transfer of capital, it could also be as a comparison of expected returns on alternative investment decisions. In turn, fluctuations of exchange rate would have an impact on profitability and investment decisions. For instance, an appreciation of host country's currency might induce FDI inflows due to the higher purchasing power of the consumers. On the other hand, depreciation in the real exchange rate of recipient country might increase FDI through reduced cost of capital. Using this imperfect capital market argument,

Froot & Stein (1991) present empirical evidence of increased inward FDI with currency depreciation in US$ with simple regressions using annual US aggregate FDI observations. Stressing the importance of exchange rate volatility with respect to FDI, Campa (1993) finds evidence to support that greater exchange rate uncertainty motivates firms to wait for investment, decreasing current FDI levels. Referring to the implication of exchange rate movements for FDI, Klein & Rosengren (1994) also confirm that exchange rate depreciation of US$ increases inward US FDI using different samples of disaggregated US FDI by host country of FDI. On the other hand, using a stock market index (valued in US$ dollar) proxy for relative corporate wealth affecting exchange rate elasticity, Dewenter (1995) shows there is no significant correlation between bilateral exchange rates in flows of investment broken out by investor country.

Exchange rates have also implications for FDI. Especially, where cost and efficiency are primary concerns, appreciation of host country currency reduces FDI inflows due to lower competitiveness. Hence, a foreign firm facing large exchange rate volatility would choose to produce in local country if it intends to sell in local market, but refrain from doing so if it intends to re-export. Taking this line of research, Goldberg & Kolstad (1995) hypothesise that exchange rate volatility would increase uncertainty for risk-averse MNEs provided that such uncertainty is associated with export demand shocks in the markets they would prefer to serve. They further support their hypothesis with empirical analysis using bilateral data on USA FDI with Canada, Japan, and the UK.

Another study by Bayoumi *et al.* (1996) suggests that when exchange rates are negatively correlated with global returns, countries might benefit from their position as portfolio hedges. The authors conclude that on diversification

grounds, exchange rate of these countries might actually increase their FDI flows.

The impact of currency volatility on FDI has been studied by many scholars, recently. Amuedo-Dorantes & Pozo (2001) report significant negative short and long run impacts of volatility on FDI, whereas Gorg & Wakelin (2002) and Crowley & Lee (2003) reveal only weak relationships between currency volatility and outward FDI.

Bénassy-Quéré *et al.,* (2003) point to a possible reverse causality regarding the relationship between FDI and exchange rate level. In order to avoid reverse causality, the authors add a lagged value of exchange rate in the equation. Lagged real exchange rate is also found to be negatively correlated with FDI, confirming that the appreciation of home country currency versus the host currency motivates FDI from home country to host country. Using the standard deviation of monthly exchange rate, Disdier & Mayer (2004) find a negative effect of exchange volatility on FDI in 19 host countries in their sample.[19]

Kiyota & Urata (2004) also confirm the relationship between exchange rate depreciation of host country and rise in FDI outflows of the Japanese firms in aggregated and disaggregated industries. Desai *et al.,* (2008) suggest that responsiveness of MNEs to exchange rates might differ from that of local firms. The authors present that foreign affiliates increase their investment significantly more than domestic firms in times of currency crises. Approaching the subject from the perspective of transferable assets, Blonigen (2005) suggests that a depreciation of a country's currency would make it easier for foreign firms to

[19] Rose (2000, 2001) and De Nardis *et al*., (2008) use the same proxy for trade equation.

take over the domestic firms, which possess firm-specific assets such know-how and managerial skills.

3.4.5 Taxation and Fiscal Incentives

The effect of taxation and fiscal incentives on FDI and MNEs' investment behaviour has been investigated by several authors the last decade.[20] Much of these studies are motivated by a considerable decline in corporate tax rates in Europe and an increasing share of profits of MNEs earned abroad.[21] Empirical studies investigating the effect of tax on the location of FDI differ mainly from each other in proxy employed for measuring tax burden and type of FDI data (regarding the way FDI is financed e.g. equity flow, reinvested earning, and credits) used.

Early studies such as Hartman (1984) and Slemrod (1990) examine the means of how FDI is financed. Running separate regression for retained earnings FDI from new transfer of FDI and controlling for only host country (USA) tax rate, Hartman (1984) finds that retained earnings FDI are positively associated with host country rate, whereas the relation between new transfer FDI and host country rate is shown to be insignificant. On the other hand, Slemrod (1990) incorporates the system used by the parent country to tackle double taxation and finds no significant response for retained FDI.

Addressing FDI financing issue, Auerbach & Hassett (1993) suggest that the distinction between the different types of FDI is important because the different

[20] For a review see Morisset & Pirnia (1999) and for a detailed empirical review see De Mooij & Ederveren (2003).

[21] Barry (1999) argues that one of the reasons of Ireland's success in attracting FDI is the low rate of corporation profits tax.

subcomponents of FDI flows might respond differently to home and host country taxes. In addition, tax exemption or credit methods applied to those capital flows by host country are likely to have different implications for financial structure of FDI in that specific country.[22] Nevertheless, tax rates fail to give satisfactory information on tax exemptions and thus only partly reflect alterations in investment decisions.

Considering the impact of tax ratios on FDI flows, one could suggest using the tax to GDP ratios. However, these ratios are not easy to interpret since this measure completely ignores tax base. Therefore it bears no importance on the decision making process pertinent to investments. In order to overcome this problem Mendoza *et al.,* (1994) relate pre-and post-tax prices of goods and thereby to measure the distortion for economic decision-making.

The outcome of the above briefed studies suggests that MNEs' investment behaviour is affected by differences either in statutory tax rates between countries triggering profit transfer through manipulation of transfer prices or tax regulations e.g. tax credits and exemptions influencing dividend repatriation of subsidiaries to their parent companies (De Mooij & Ederveen, 2003).

As an alternative to tax rates and GDP ratios as a proxy, Devereux & Griffith (2003) measure the tax burden as a weighted average of the effective marginal tax rate and an adjusted statutory tax rate, which captures the distortion of the location decision resulting from taxes. The disadvantage of this measure is that the computation of this measure is complicated.

[22] For tax incentive practises of individual countries see Tax Incentives and Foreign Direct Investment: a Global Survey (UNCTAD, 2000)

Using statutory tax rates, Carstensen & Farid Toubal (2004) confirm the negative correlation between tax rates (nominal tax rates corrected for the fiscal regime) and FDI in a study for Central and Eastern European countries (CEECs).

Lahreche-Revil (2006) interprets that higher taxes could be the counterpart of high attractiveness. Using a gravity model with some additional variables such as implicit taxation and statutory taxation to investigate the tax-FDI relation within enlarged EU, the author concludes that implicit taxation has a significant effect on FDI within the enlarged EU when tax developments over time are considered. Regarding the effect of statutory tax rates on bilateral dimension of FDI, she reports a significant and robust impact. The other striking point in her study is the finding of less significant effect of taxation on FDI going to new member states of EU than old member states.

In another study, on the tax and FDI issues in the EU, Wolff (2007) confirms that the different subcomponents react differently to taxes using a gravity model for FDI flows among the 25 EU states. His results show that statutory corporate tax rate has no significant impact for total FDI and investment into equity. However, high home country taxes raise the likelihood of firms to re-invest profits abroad, and lower the percentage of debt financed FDI.

There are contradictory results on the studies regarding to the impact of taxation on FDI. For example, Bénassy-Quéré *et al.*, (2007) using a panel of bilateral FDI flows across eleven OECD countries to capture the effect of corporate tax on FDI flows find out that countries with low tax rates fail to receive FDI although higher taxes are expected to discourage new inward FDI. The impact of tax rates on FDI in CEECs is also investigated by Bellak & Leibrecht (2009). The authors

use bilateral effective tax rates instead of statutory tax rates and confirm the importance of tax rate as a deterrent to FDI flows in this country group.

In short, fiscal incentives are widely found out to have a positive impact on FDI flows whereas high level of tax rates might discourage inward FDI.

3.4.6 Trade Barriers and Openness

The existence of tariff and non-tariff barriers could also affect the choices with respect to servicing markets. Some host countries and member countries of regional trade blocs intentionally use tariffs, quotas, and local standards to encourage direct investment. In addition, transport costs could also be considered as a trade barrier influencing decisions on exporting and producing abroad.

The empirical literature of trade barrier on FDI has also been debated widely. Schmitz & Bieri (1972) confirm that trade barriers have a significantly positive effect on FDI. Generally, horizontal FDI is undertaken to circumvent trade barriers. Thus abolition of tariffs might culminate in decreasing horizontal FDI, stimulating vertical FDI, which requires substantial flows of intermediate inputs within a liberal and predictable trade environment. Therefore, vertical FDI should be responsive to the openness (measured mostly by the ratio of exports and imports to GDP) of host country.[23] The empirical literature in this realm is rather diverse in evidence. Schmitz & Bieri (1972) demonstrate a weak positive correlation between openness and FDI. With respect to trade barriers, Lunn (1980) observes a significantly positive correlation between trade barriers and FDI inflows. Kravis & Lipsey (1982) report a strong positive correlation between

[23] Brainard (1997) uses average tariffs instead of ratio of exports or imports to GDP while Wheeler & Moody (1992) include an index covering a broad range of factors besides import/export restrictions.

openness and FDI. On the other hand, using bilateral direct investment flows among industrialised countries, Culem (1988) reports a significantly negative correlation between trade barriers and FDI (accommodating share of tariff rate of host country) and presents a strong positive effect of openness on FDI. The findings of Edwards (1991) reinforce this relation between openness and FDI. On the other hand, Wheeler & Mody (1992) report a strong link between openness and FDI in the manufacturing sector as a whole, albeit with a negative link in the electronics. Also Bajo-Rubio & Rivero (1994), Wang & Swain (1995) achieve similar results as those of Culem (1988) validating the trade barrier-FDI hypothesis. However, Blonigen & Feenstra (1995) find that trade barriers do not play a significant role in attracting FDI. In a similar vein, Beer & Cory (1996) show that the effect of tariffs on FDI from USA in the EU was neither significant nor negative.

With respect to openness and FDI relation, Lee & Mansfield (1996) confirm that openness was positively associated with FDI in manufacturing. Aristotelous & Fountas (1996) and Brainard (1997) show higher average tariffs to be positively correlated with USA FDI.

The findings of Pistoresi (2000) are in line with the previous findings reporting a strong positive effect of openness on FDI. Testing this openness/FDI hypothesis on African countries, Asiedu (2001) report that openness of host country promotes FDI in African countries. Frenkel *et al.*, (2004) using a gravity model to analyse the determinants of FDI in emerging countries confirm that openness is an important factor in explaining allocation of FDI in emerging economies. In a recent study, Fedderke & Romm (2006) incorporate imports and exports as

proxy for openness separately in their models and concludes increased imports lower FDI while increased exports raise FDI.

3.4.7 Infrastructure

Another variable that has been frequently examined in the determinants of FDI is the effects of quality of transportation infrastructure on FDI. Other things being equal, countries with better-developed transportation infrastructures would be more attractive to foreign investors since a good infrastructure enables firms to transport goods, raw materials or components easily. Therefore good infrastructure constitutes an advantage for foreign investors involved in vertical FDI as well as horizontal FDI through the distribution of goods within host country. Moreover, foreign firms that are unfamiliar with regional production condition in developing countries might prefer for developed regions within host country.

The relevance of the infrastructure as a locational determinant of FDI in developing countries is confirmed by several studies. Root & Ahmed (1979) associate FDI flows with commerce-transport-communication. Later, Wheeler & Mody (1992) add the quality of infrastructure to their model and verify the positive relationship between infrastructure in total manufacturing and electronics for USA FDI in developing and developed countries. They also suggest that the quality of infrastructure is the dominant factor for developing economies.

A departure from using common proxies comes from Kumar (1994), who designs a variable called ‘industrial capability’ to capture skilled manpower, the quality of industrial services and infrastructure. In his findings, the corresponding

coefficient for infrastructure indicates a strong and significant positive impact on the location of USA production abroad.

On the other hand, in a more detailed study, Cheng & Kwan (2000) use three different proxies for infrastructure: all roads, high-grade paved roads and railway. Only the first proxy shows a positive relation between infrastructure and FDI in China. Using the length of paved roads divided by the area, Coughlin & Segen (2000) do not find transportation infrastructure to be statistically significant, even though the sign of the coefficient confirms the direction of correlation between infrastructure and FDI. Exploring the differences between the determinants of FDI in developing countries and African countries, Asiedu (2001) uses the number of phone lines available per 100 habitants as a proxy for infrastructure. The results of Asiedu (2001) indicate that a good infrastructure has a positive impact on non-sub- Saharan African countries, but does not have significant impact on sub-Saharan Africa.

In short, previous empirical studies widely find out that infrastructure is an as an important determinant of FDI attraction.

3.4.8 Institutional Determinants

The impact of institutional determinants on FDI flows has been widely examined, especially, during the last decade. That special interest on institutional determinants coincides with the period when capital flows to developing countries have been increasing their share at the expense of those to developed countries in 80s (UNCTAD, 2000). In addition, the availability of large databases in that period such as Institutional Profiles, the Fraser Institute, and the International Country Risk Guide (ICRG) has spurred the studies in this realm.

Acknowledging that trend in FDI flows to developing countries, Wheeler & Mody (1992) suggest that the performance of institutions be incorporated into models explaining the geographical distribution of FDI. The general political, social, and economic environment might also affect firms' perceptions of risk and influence the location of their production operations.[24] In the same way, policies regarding to acquisition, local participation in manufacturing operations, and reinvestment of profits would affect of the method of serving to target markets, too.

Of institutional determinants, political instability is probably the most widely studied one. However, the empirical relationship between political instability and FDI is not very clear. For example, investigating the political risks in developing countries Schneider & Frey (1985), Nigh (1986), Nigh & Schollhammer (1987) and Lecraw (1991) conclude that political risks are a significant deterrent to FDI. Along the lines of uncertainty, Wheeler & Mody (1992) investigate the effect of the various risk factors along with bureaucratic red tape, corruption, political instability. Interestingly, their findings show no significant relation between FDI and the quality of legal system.

On the other hand, Singh & Jun (1995) use a Business Environment Risk Intelligence Index, which include factors such as economic growth as well as socio-political factors like attitude toward foreign investors. The index was significantly positive only in some models. Furthermore, Loree & Guisinger (1995) report that political risks affect FDI negatively.[25]

[24] For a detailed discussion of components of political instability and investment see Alesina & Perotti (1996).

[25] They experienced a negative impact of political instability on FDI in 1982 and no effect in 1977

Hines (1995) & Wei (1997) report contradictory results to those of Wheeler & Mody (1992), showing corruption inversely related to inward FDI. LaPorta *et al.,* (1998) arrives at similar results concluding that risk of repudiation of contracts by government and expropriation and share-holders right effects attracting FDI decisions. Kaufman *et al.,* (1999) report that political instability, violence, government effectiveness, regulatory burden, rule of law and graft pose impediment to inward FDI. With respect to political risk and FDI, Jaspersen *et al.,* (2000) find no relationship between political risk and FDI.

Poor institutions, such as, corruption could bring additional costs to investors, whereas a good governance infrastructure is likely to attract foreign investors with promising productivity prospects (Wei, 2000). Using the ICRG and adding the outward FDI dimension to their analysis, Globerman & Shapiro (2002) employ the first principal governance indicators provided by Kaufmann *et al.,* (1999), which are shown to impact positively both on FDI inflows and outflows, albeit with the latter being significant for relatively large and developed countries. Departing from aforementioned studies in using bilateral data flows instead of aggregate data on inward FDI, Habib & Zurawicki (2002) study the impact of institutional distance on bilateral FDI. Taking a relatively narrow scope of institutional indicators, the authors focus on corruption and find out that the absolute difference of the corruption index between investor and host countries has a negative impact on bilateral FDI.

In a more recent study, Quazi & Mahmud (2006) use an index of Economic Freedom constructed by 50 independent variables with a number of subcategories

including government intervention in the economy and capital flows and FDI.[26] The index is constructed on a scale, where the set of policies conducive to economic freedom vary between one to five, 1 being the highest and 5 the lowest. Their results confirm that countries scoring high in that index are most attractive to FDI. Fedderke & Romm (2006) also confirm negative relation between political risk and FDI.

On the contrary, Egger & Winner (2006, p. 460) argue that corruption might have a positive effect on inward FDI 'if corruption lubricates the wheels of commerce' in the countries where government failures exist prior to investment. The positive relationship between inward FDI and corruption is termed as helping hand for inward FDI as opposed to grabbing hand view, which states that bribery is costly to firms and deters FDI. Empirically, using ICRG corruption index, Sayek (2007) also finds out support for helping hand hypothesis.

The reason why FDI is sensitive to the quality of domestic institutions of host country is often attributed to the nature of FDI Bénassy-Quéré *et al.,* (2007). Assessing the recent literature, the authors identify multicollinearity between GDP per capita and institutions. Bénassy-Quéré *et al.,* (2007) take a wider approach in identifying institutional indicators and list a considerable number of indicators. The authors reach the conclusion that bureaucracy, corruption, information, banking sector and legal institutions are also important determinants of inward FDI. In addition, weak capital concentration, and employment

[26] Quazi and Mahmud (2006) use a dummy variable to capture the effect of political instability for Sri Lanka in the model, resulting in negative correlation between political instability and FDI going to that country.

protection are shown to reduce inward FDI, while institutional distance tends to reduce bilateral FDI.

3.4.9 Economic Integration with EU and FDI

Economic integration with the EU is generally associated with the disappearing discriminatory trade or non-trade barriers after becoming a member of the EU. Yannapoulos (1992) indicates that offensive import-substituting investment would be undertaken especially in sectors where market-entry barriers have been substantial prior to removing trade and non-trade barriers, such as in banking and insurance sectors. Moreover, as a result of removing trade and non-trade barriers, MNEs are thought to move location of production to the least cost location within EU countries. Cantwell (1992) shows that over the past three decades, a substantial proportion of investment that EU countries (then EC) received was directed to the restructuring and relocation of existing activities.

Dunning (1993) also points to the relocation of existing investment and the replacement of trade with local production within the EU. He suggests that economic integration affects the balance between hierarchical costs and market imperfections in two ways.

First, by removing tariff and non-tariff barriers, economic integration reduces location specific structural distortion, and by opening up competition it might also help to reduce ownership structural distortions.

Second, by lowering intra-regional transfer costs; economic integration might aid horizontal and vertical specialisation. Dunning (1993) also propose that due to raising demand and lowering the production costs in the region, MNEs might replace their exports to the region by producing inside it. On the other hand,

Brulhart & Torstensson (1996) suggest that intra-FDI within the EU might ultimately be lower than expected; initially, it could be high due to rise in restructuring, but when all production has moved to lower costs locations FDI would stop flowing.

Integration of the CEECs into the EU in the late 90s offered opportunities to assess the ability of these new low cost locations to attract FDI. For instance, Di Mauro *et al.,* (1999) focusing on the CEECs find no evidence that FDI flows to those countries are likely to show a different pattern in the aftermath of accession to the EU.

While Yannapoulos (1992), Dunning (1993), and Brulhart & Torstensson (1996) explain the changing pattern of intra-FDI within the EU, Bjorvatn (2001) cites the reasons why the EU might look more attractive for the MNEs outside the EU. The author argues that there are three reasons why regional integration agreements should increase FDI into an integrated area. First, a reduction in intra-regional transaction costs increases the market size of the region. Second, regional integration sometimes involves an increase in trade barriers to the outside world. Because of a tariff jumping policy argument, since, such a policy could be expected to drive more investments into the region. Third, many agreements feature explicit dispute resolution mechanism, if effective, these should stimulate both FDI and trade. However, if imported intermediates are really important in a foreign production, FDI might decrease due to the increasing costs of trade from third parties. Balasubramanyam *et al.*, (2002) challenge the arguments brought by Bjorvatn (2001). Relating the trade literature to FDI, the authors arrive at the conclusion that the variance in FDI is explained

by the economic features of both home and host countries rather than regional integration.

Contrary to the results of Balasubramanyam *et al.,* (2002), Buch *et al.,* (2001) present that Spain and Portugal attracted more FDI prior to the full membership of the EC in 1986 than they would in the absence of accession to the EC process. These findings also lend some support to the belief that investment flows are responsive to transitional period before policy changes are fully realised. In another research, by assigning a dummy variable with respect to the progress towards EU membership, Bevan & Estrin (2004) report that accession prospects increase FDI inflow to CEECs.[27] In addition to the conventional variables, such as, market size and cost factors, Clausing & Dorobantu (2005) accommodate regional dummy variables to examine the effect of EU candidacy on expected direct investment flows to CEECs. Their results indicate that announcements regarding the accession process have significant and quantitatively important effects on FDI in the countries in concern.

3.5 Substitution and Complementary Effects of FDI on Trade

Existing empirical studies investigating FDI-trade relationship have used data at firm, industry, and country-level data with different estimation techniques and provided mixed results. For instance, Lipsey & Weiss (1984) analyse trade and subsidiary sales using cross-sectional firm data by utilising size of parent company and host country income. They confirm the complimentary relationship between USA MNEs' production in foreign soil and their exports to foreign

[27] Bevan & Estrin (2004) assign values from 1 to 3 for the countries that were likely to begin membership negotiations with the EU, 3 denoting the likeliness to start the negotiations soon whereas 1 presents low chance for countries being invited for the negotiations at that time.

market. Similarly, Blomstrom *et al*., (1989) using trade equations on US and Swedish firm-level data arrive at the same conclusions as Lipsey & Weiss (1984).

Even though firm-level data used in the aforementioned studies allows the analysis at a more disaggregate level, the use of cross-section data makes it impractical to investigate the relationship between multinational activity and trade over time. Head & Ries (1997) and Blonigen (2001) employ firm-level panel data in their studies. Head & Ries (1997) find a positive relation between subsidiaries sales and exports, while Blonigen (2001) reveals linkages between trade and FDI in form of importing inputs from home country. His results indicate that there is substitution and complementary effects at product level. Taking the disaggregating further, Swenson (2004) analyses the effect of FDI on trade at the product and industry in the overall manufacturing sector in USA. Her findings confirm the complementary at the high level of overall manufacturing, while substitution effect becomes visible when USA imports are matched to disaggregated FDI at product level.

The advantage of using panel data as Egger (2005) suggests is that it allows to track the relationship between FDI and trade over time since it makes the use of the information available in every variation over time and cross-section unit.

At the aggregate country or industry level, there is also some empirical evidence correlating multinational activity to trade, positively. Furthermore, the appearance of few studies in the last decade using export and import equation has enriched the trade-FDI debate. This strand of literature is based on the estimation of augmented export and import equations motivated by recent theoretical studies suggesting the same exogenous factors to determine trade and MNEs activities.

In this respect, Lin (1995) finds a positive long-run relationship between FDI and exports. Furthermore, Pfaffermayr (1996) analyses outward FDI and exports with a simultaneous equation system using time series and cross-sectional industry level data from Austrian manufacturing sector. His findings report a significant complementary relationship between FDI and exports. On the other hand, Pain & Wakelin (1998) find evidence of heterogeneity in the relationship between FDI and exports in their analysis using an augmented export demand model and a panel data set. Their results suggest that in general, outward FDI has a negative effect on trade shares, while inward FDI has a positive one. Contrary to these findings, Barrel & Pain (1999) report a negative long-run relationship between exports and the stock of net FDI. Using affiliate sales instead of FDI stocks, Clausing (2000) reports that affiliate sales and export sales are positively associated at the aggregate and country or industry level.

3.6 Empirical Studies on the Determinants of FDI in Turkey

To date, few studies have investigated the determinants of FDI in Turkey. Drawing on questionnaires and interviews, Erdilek (1982) finds that most of FDI inflows into Turkey are motivated by the rapid expected growth in market size and high expected rate of return in supplying primarily to the Turkish market. Moreover, the bureaucratic and political obstacles and discriminatory policies towards foreign firms by the Turkish government deter FDI in Turkey according the findings of Erdilek (1982).

Tatoglu & Glaister (2000), Coskun (1996) find overlapping results with that of Erdilek (1982). Tatoglu & Glaister (2000) find that the highest-ranked motives for FDI in Turkey are principally concerned with market development and relative competitive positions in the new markets. Moreover, they link the choice

of Turkey as a location of FDI to the market attractiveness. The findings of Halicioglu (2001) also confirm that the market size is an important determinant of FDI. Furthermore, his results show that the integration process of the Turkish economy with the EU has a positive impact on Turkey's FDI inflows.

The literature on Turkey has so far confined to only time series analyses and survey methods. In addition, the existent studies do not include the effects of corporate income tax, investment liberalisation and Turkey's integration into the EU. As a result, an update of the previous studies is needed. Thus, this thesis aims to fill these gaps in the literature.

CHAPTER 4

4.0 CONCEPTUAL FRAMEWORK AND METHODOLOGY

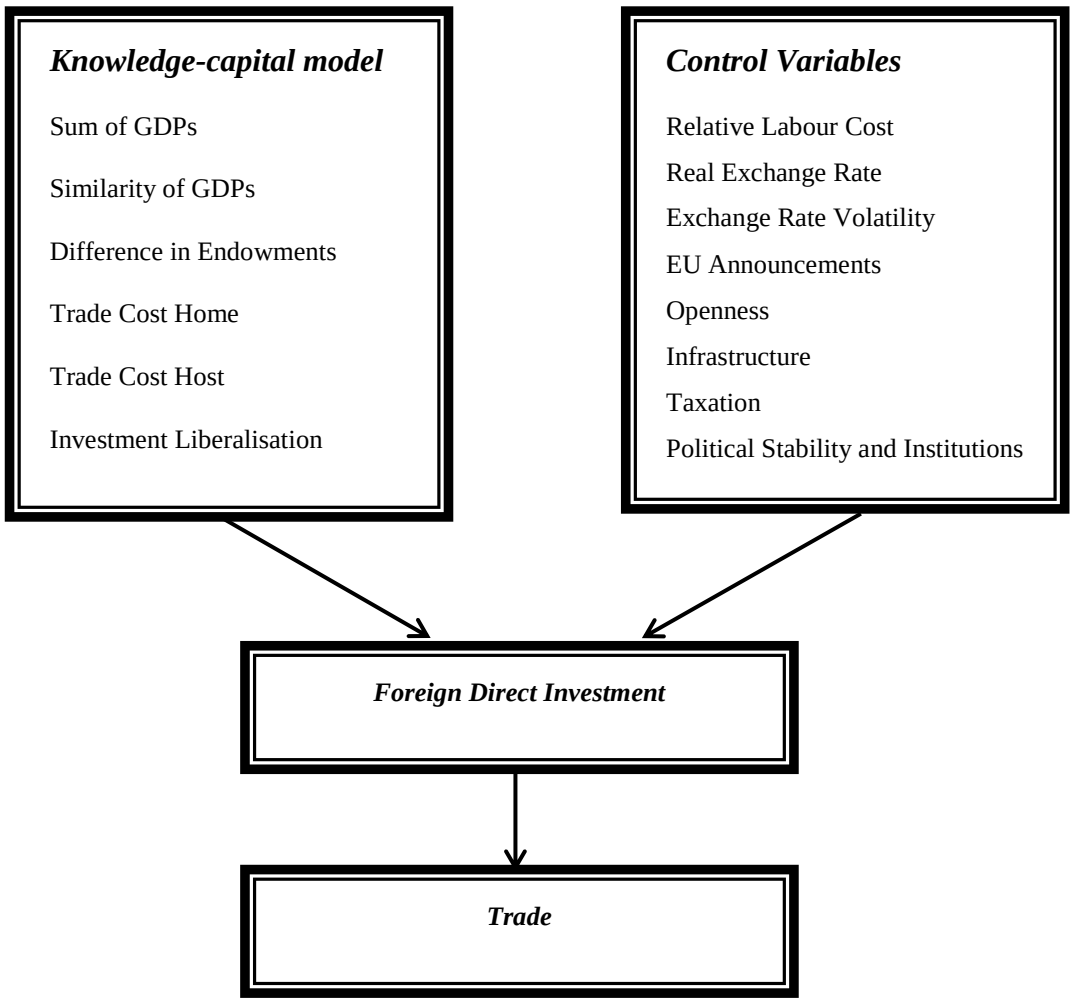
4.1 Conceptual Framework and Hypotheses

Trends in the last two and half decades indicate that FDI is mostly observed between developed countries with similar capital endowments (Markusen, 2001). Furthermore, FDI in developing countries is concentrated in China, Brazil and Turkey with a large market size. Consequently, the responsiveness of FDI to large developing markets and two-way FDI between developed countries lead to empirical investigation of the observed patterns in FDI. Several studies such as Brainard (1993a), and Carr *et al*., (2001) using a knowledge-capital model find that FDI is mostly in a horizontal nature, meaning that MNEs are motivated by market access.

FDI from nineteen home countries to Turkey shows similarities to the trends identified by Markusen (1998). FDI from these sources surged to record levels between 2002 and 2007 (OECD, 2008). Over the same period, Turkey accelerated its speed to close the gap with home countries in terms of GDP and GDP per capita (see sections 2.2. for a discussion). Hence, the growing domestic market and convergence in national income with home countries may have led to an increase in FDI in a horizontal nature. The discussion in Chapter 2 indicates that Turkey has attracted a considerable amount of FDI into the labour intensive sectors such as automotive, which is characterised by fragmenting production to exploit the low cost labour in labour-abundant countries. Given that the responsiveness of FDI to market size and low cost labour (Chapter 3) in Turkey, a framework seeking to explain determinants of FDI in Turkey should account for horizontal as well as vertical investment motives.

This study uses a knowledge-capital model similar to Markusen & Maskus (2002) and Carr *et al.,* (2001) as drawn from the studies of Markusen (1995) & Markusen (2001). The knowledge-capital model combines horizontal and vertical investment motives in a single framework. This study follows a similar strategy to those of Egger & Winner (2006) and Gast & Hermann (2008) that augmented the knowledge-capital model with control variables. The choice of control variables in this study is motivated by the empirical literature discussed in Chapter 3.

Figure 4-1 Conceptual Framework



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.[28] 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.

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

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 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 H7 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;

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

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 4.1 summarises the hypotheses on FDI:

Table 4.1 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)	+

> **Hypothesis 7 (H7)** *FDI in host country would replace or increase exports from home to host country if proximity or factors proportions dominate the location decision of MNEs.*

The factor proportions hypothesis suggests that MNEs would locate different stages of production in different countries to take advantage of differences in factor cost differences (Markusen, 1984; Helpman, 1984; Helpman & Krugman 1985; Ethier & Horn, 1990). For instance, skilled labour intensive of production stages would be located in country abundant with skilled labour. Given the needs for inputs from home country for production in host country, vertical investment is likely to increase exports from home to host country.

On the other hand, the proximity-concentration hypothesis (Brainard, 1993a) suggests that MNEs would invest in host country to minimise cost of exporting. Hence, high cost of exporting would induce MNEs to replace exports from home to host country with production in host country.

4.2 Sample Data and Dependent Variables

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 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*).[29]

Nominal aggregate merchandise exports (f.o.b.) values are obtained through Direction of Trade Statistics of IMF. Then nominal values are deflated by export price indexes taken from World Economic Outlook (OECD, 1982). Some studies use export price deflators or export unit values from IMF. However, export price deflators are not available for the all countries in the sample and export unit values exhibit a great deal of discrepancy from actual price deflators (IMF Statistics Department, 2009a). Disaggregated data for merchandise goods of exports (f.o.b.) according to Broad Economic Category (BEC) is not available; therefore aggregate merchandise exports (*lnEX*) are used as dependent variable.

4.3 Methodology

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;

[29] 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.

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

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* 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.

I specify a second model in the spirit of (Helpman, 1987) to test hypotheses H7 in an augmented gravity model with real exchange rate (*REER*) (Bergstrand, 1985) Customs Union Dummy (*CUD*) and FDI.

$$lnEX_{iht} = \gamma + \delta_1 lnSum_{iht} + \delta_2 lnSim_{iht} + \delta_3 lnPERCD_{iht} + \delta_4 OTRC_{iht} + \delta_5 REER_{iht} + \delta_6 CUD_{iht} + \delta_7 lnFDIN_{iht} + \theta_{ih} + \lambda_t + \varepsilon iht \quad (3)$$

where subscripts *i*, *h* and *t* stand for home country *i*, Turkey and time respectively. $lnEX_{iht}$ is the log of exports from home country *i* to 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 *h* at time *t*, $OTRC_{it}$ is the trade cost of exports from home country *i* to Turkey

at time *t*; $REER_{iht}$ is the real exchange rate between home country *i* and Turkey at time *t*, CUD_{iht} is the Customs Union dummy to capture the effect of CU between home country *i* and Turkey at time *t*, *lnFDIN* is the log of outward stocks of home country *i* in Turkey at time *t*, $\theta_{OECDTUR}$ captures the unobserved country pair specific effects between home country *i* and Turkey and λ_t control for time fixed effects and ε_{iht} is the error term.

Equations (2) and (3) are gravity models in terms of variables such as market size of two countries and trade cost between two countries. The gravity model is widely used in recent empirical studies analysing determinants of bilateral trade and capital flows (direct and indirect).[30] The crude specification of the model incorporates supply factors of exporter and demand factors of importer country along with trade enhancing (such as free trade agreements and openness) or impeding determinants (transport cost). Population and GDPs of exporter and importer countries are used in these models to measure the propensity to export or import of a country. In addition, the geographical and cultural measures of bilateral proximity are used as proxies to control for transport costs, impeding trade flows. Hence, the amount of trade between two countries is assumed to go in the same direction as their sizes increase and to decrease in the cost of transport in the gravity model. The theoretical basis of gravity model is extended to include various assumptions such as product differentiation (Anderson, 1979) monopolistic competition (Bergstrand, 1989) and differentiated product with increasing returns to scale (Helpman &Krugman, 1985).

The differences in these models explain the different specifications and the results of empirical explanations. Furthermore, the crude specification of the

[30] The gravity modelling in international trade flows was first developed by Tinbergen (1962)Pöyhönen (1963) independently.

model is refined and augmented with new variables (Bergstrand, 1985; Helpman, 1987; Wei, 1996).[31] Inclusion of geography and trade into the theory of MNEs extends the application of the gravity model to explain bilateral FDI flows. The theoretical models developed by Markusen & Venables (1995, 1996), Markusen *et al*., (1996) and Brainard (1997) employ the country characteristics, such as, economic size and distance as a measure of transport costs in explaining the geographical distribution of trade and FDI flows. The theoretical models (Markusen & Venables 1995, 1996; Markusen *et al*., 1996; Brainard 1997) point to the fact that the development of FDI over the last three decades shares some common facets with that of trade in responding to same country characteristics. For instance, trade and FDI have become more intense between countries with similar relatively high income levels; therefore the gravity model might also be helpful in explaining the geographical allocation of FDI. This common feature of trade and FDI has stimulated numerous empirical studies, which aim to explain the spatial distribution of FDI (Eaton & Tamura, 1994; Brenton, 1996; Brainard, 1997) in bilateral country context using the gravity model. In addition, a number of studies (Brenton *et al.*, 1999; Di Mauro, 1999; Gopinath and Echeverria, 2004; Francois *et al*., 2007) analyse the trade-FDI relationship within gravity models.

[31] The performance of the gravity models were further improved with the econometric specifications by Mátyás, (1997) and (1998), Cheng & Wall, (2005), Breuss & Egger, (1999).

4.4 Econometric Models

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

$$\varepsilon_{iht} = \mu_{ih} + v_{iht}\,, \qquad (4)$$

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 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.

4.4.1 Fixed Effects Model

Fixed effects model deal with unobserved heterogeneity by removing individual effect along with any time-invariant variables through a transformation. For a given observation with an intercept varying across units, it could be written as;

$$y_{it} = \beta_k x_{it} + \varphi z_i + u_i + e_{it} \,, \qquad (5)$$

where x_{it} stands for variables that vary over individuals and time, β is the coefficient on x_{it} and z_i is time-invariant variables with the coefficient φ, and u_i is individual effect, while e_{it} is the disturbance term (Baum, 2006 and Wooldridge 2002). The assumptions are;

$$E(e_{it}|x_i, u_i) \,, \qquad (6)$$

for each t, the expected value of the disturbance term, given the explanatory variables in all time periods and individual effects is zero.

$$Var(e_{it}|x_i, u_i) = Var(e_{it}) = \sigma_t^2 \text{ for all t=1, ……T.} \quad (7)$$

the variance of the disturbance term, conditional on variables, x_{it} ,and individual effect, u_i, is constant.

$$\text{For all } t \neq s, Cov(e_{it}, e_{is}|x_i, u_i) = 0, \quad (8)$$

the disturbance term is uncorrelated (conditional on all explanatory variables)

$$E(e_{it}|u_i, x_i) \sim N(0, \sigma_e^2), \quad (9)$$

conditional on x_i and u_i, the e_{it} is independent and identically distributed with zero mean and variance σ^2.

The other assumption is that sample is random from the cross section and each explanatory variable changes over time. In order to take u_i out from the equation (6), the panel averages could be removed from each side of (6).

If $\bar{y}_{it} = (1/T)\sum_{t=1}^{T} y_{it}, \bar{x}_{it} = (1/T)\sum_{t=1}^{T} x_{it}), \bar{\varepsilon}_{it} = (1/T)\sum_{t=1}^{T} \varepsilon_{it}$. as panel averages ($z_i$ and $u_{i)}$ are removed from each side;

$$y_{it} - \bar{y}_{it} = (x_{it} - \bar{x}_{it})\beta + (z_i - z_i)\varphi + u_i - u_i + e_{it} - \bar{e}_{eit}\,, \quad (10)$$

which implies that;

$$\tilde{y}_{it} = (\tilde{x}_{it})\beta + \tilde{e}_{it} \quad (11)$$

The equation above implies that Ordinary Least Squares (OLS) on the within-transformed data would generate consistent estimates of β (fixed effects estimator) and this transformation also removes the z_i. The explanatory power of

this model depends on the within variation of dependent and independent variables; therefore any characteristic, which does not vary over time for each variable cannot be included. If the transformation is applied to the equation (3);

Finally, I obtain:

$$\widetilde{lnFDIN}_{\iota ht} = \beta_1 \widetilde{lnSum}_{\iota ht} + \beta_2 \widetilde{lnSim}_{\iota ht} + \beta_3 \widetilde{lnPERCD}_{\iota ht} + \beta_4 \widetilde{SKRD}_{\iota ht} + \beta_5 \widetilde{OTRC}_{\iota t} + \beta_6 \widetilde{TTRC}_{ht} + \beta_7 \widetilde{INVL}_{\iota ht} + \widetilde{v_{\iota ht}} \quad (12)$$

4.4.2 Random Effects Model

The model could be written as in fixed models (with the assumption that unobserved effect u_i has zero mean by adding an intercept);

$$y_{it} = \beta_0 + \beta_k x_{it} + \varphi z_i + u_i + e_{it} \quad (13)$$

The model above becomes a random effects model, if the following assumption is added;

$Cov(x_{it}, u_i) = 0$, t=1,2 ……..T; i=1,2…….,k , stating that unobserved effect u_i is uncorrelated with each explanatory variables. Random effects model add u_i to e_{it}, which is defined as the composite error term and the model could be written as;

$$y_{it} = \beta_k x_{it} + \varphi z_i + v_{it} , \quad (14)$$

$$v_{it} = u_i + e_{it} \quad (15)$$

Since u_i in the composite error term in each time period, the v_{it} are serially correlated and under random effects assumptions,

$$Corr(v_{it}, v_{is}) = \sigma_u^2/(\sigma_u^2 + \sigma_e^2) \qquad t \neq s, \tag{16}$$

where σ_u^2 = var(u_i)and σ_ε^2 = Var (e_{it}).

The serial correlation in disturbance term could be substantial. In order to deal with this correlation, Generalised Least Squares (GLS) could be used. A transformation that eliminates serial correlation could be used (Wooldridge, 2002) and defined as;

$$\lambda = 1 - [\sigma_e^2/(\sigma_e^2 + T\sigma_u^2)]^{1/2} \ , \tag{17}$$

which is between 0 and 1. In turn the transformed equation becomes,

$$y_{it} - \lambda\bar{y}_i = \beta_0(1-\lambda) + \beta_k(x_{itk} - \lambda\bar{x}_{ik}) + \varphi(z_i - \bar{z}_i) + (v_{it} - \lambda\bar{v}_i) \tag{18}$$

where the over bar denotes the time averages as in fixed effects model. As could be seen from the transformed equation above, the random effect transformation subtracts a fraction of time average, whereas fixed effects estimator subtracts entire time averages from the variables. In addition, random effects model could include time-invariant variables. The parameter λ is estimated and defined as (Wooldridge, 2002);

$$\hat{\lambda} = 1 - \{1/[1 + T(\hat{\sigma}_u^2/\hat{\sigma}_e^2)]\}^{1/2} \ , \tag{19}$$

where $\hat{\sigma}_u^2$ and $\hat{\sigma}_\varepsilon^2$ is a consistent estimator of σ_ϵ^2 The feasible GLS estimator that uses $\hat{\lambda}$ in place of λ is called the random effects estimator (Wooldridge, 2002). $\hat{\lambda}$ floats between 0 and 1; and when it is close to 1, random effects model estimates would be close to fixed effects estimator due the weight of subtraction from the variables.

As a result, if the transformation is applied to the equation (3);

$$lnFDIN_{iht} - \overline{\lambda lnFDIN_{ih}} = \beta_1(lnSum_{iht} - \lambda\overline{lnSum_{ih}}) + \beta_2(lnSim_{iht} - \lambda\overline{lnSim_{ih}}) + \beta_3(lnPERCD_{iht} - \lambda\overline{lnPERCD_{ih}}) + \beta_4(SKRD_{iht} - \lambda\overline{SKRD_{ih}}) + \beta_5(OTRC_i - \lambda\overline{OTRC_{ih}}) + \beta_6(TTRC_h - \lambda\overline{TTRC_{ih}}) + \beta_7(INVL_{iht} - \lambda\overline{INVL_{ih}}) + (\mu_{ih} - \lambda\mu_{ih}) + (v_{iht} - \lambda\bar{v}_{ih}) \quad (20)$$

4.4.3 Two-stage Least Squares (2SLS)

The equation to estimate the relationship between FDI and trade could be written as;

$$lnEX_{iht} = \gamma + \delta_1 lnSum_{iht} + \delta_2 lnSim_{iht} + \delta_3 lnPERCD_{iht} + \delta_4 OTRC_{iht} + \delta_5 REER_{iht} + \delta_6 CU_{iht} + \delta_7 lnFDIN_{iht} + \theta_{ih} + \lambda_t + \varepsilon_{iht} \quad (21)$$

The simultaneity between trade and FDI is reported in the literature by several studies, such as, De Sousa & Lochard (2004) and Mitze *et al.,* (2008). In other words, the variable $lnFDI_{iht}$ is correlated with the error term and this correlation violates the consistency assumption of OLS;

$$\text{Cov } (lnFDI_{iht,,} \varepsilon_{iht}) \neq 0 \quad (22)$$

Ignoring the endogeneity of FDI leads to the inconsistency and bias in standard OLS estimator. To account for this potential bias, two methods are used in the literature-using the lagged value of FDI (Pain & Wakelin, 1998) or using a 2SLS method (De Sousa & Lochard, 2004). Frankel (1997) argues that using lagged variable does not ensure causality; therefore I use 2SLS method to account for potential bias caused by the endogeneity of FDI.

In order to identify the endogeneity, Wu-Hausman F and Durbin-Wu-Hausman tests are used. It is vital to check the endogeneity of variables before using instrumental variables. In the absence of endogeneity, 2SLS method estimation is not reliable.

The main problem with using 2SLS method of estimation is to find suitable instruments (z) that are highly correlated with endogenous variable (*lnFDI*) and not correlated with the error term in the equation;

$$\text{Cov}\,(lnFDI_{iht}, z) \neq 0 \text{ and } \text{Cov}\,(z, \varepsilon_{iht}) = 0 \qquad (23)$$

Sargan (1988) test statistics is generally used to detect the correlation between instrumental variables and error term. Weak correlation between instrumental variables and endogenous variables lead to the problem of identification of equations. Cragg-Donald (1993) and Kleinbergen-Paap (2006) statistics are the tools that are widely used to recognise the weak identification of instruments. Furthermore, Stock & Yogo (2005) produced critical values to measure the relative bias of 2SLS method of estimation to OLS.

Policy variables provided by the ICRG are the main resources that studies Ghatak & Halicioglu (2007), and Aminian *et al.,* (2008) use as instrumental variables for FDI. Policy variables are thought to affect FDI but not relate to trade. In this regard, I use an index for corruption (*CORR*), law and order (*LAOR*) provided by ICRG and (*INVL*) defined as bilateral investment treaties ratified. The choice of instrumental variables in the literature is arbitrary and there is no consensus on a set of variables that are widely used. The literature on FDI suggests that FDI is responsive to corruption, law and order, and investment liberalisation.

First stage of 2SLS method is to regress the endogenous variable (*lnFDIN*) on the exogenous variables in equation (21) along with the instrumental variables;

$$lnFDIN_{iht} = \gamma + \pi_1 lnSum_{iht} + \pi_2 lnSim_{iht} + \pi_3 lnPERCD_{iht} + \pi_4 OTRC_{iht} + \pi_5 RER_{iht} + \pi_6 CU_{iht} + \pi_7 lnFDI_{iht} + \pi_8 CORR_{ht} + \pi_9 LAOR_{ht} + \pi_{10} INVL_{iht} + \theta_{ih} + \lambda_t + v_{iht} \quad (24)$$

and the identification of equation requires the coefficient estimates of the instrumental variables to be jointly and statistically significant. Hence, the endogenous variable (*lnFDIN*) is stated in equation (24) as a linear combination of exogenous variables. Since the variables in the equation above are assumed to be uncorrelated with ε_{iht} (i.e. exogenous), linear combination of the exogenous variables could serve as a valid instrumental variable.

In the second stage, fitted values of $\widehat{lnFDIN}_{\imath ht}$ replaces *lnFDI* in equation (21); the equation for estimation takes the form of;

$$lnEX_{iht} = \gamma + \alpha_2 lnSum_{iht} + \alpha_3 lnSim_{iht} + \alpha_4 lnPERCD_{iht} + \alpha_5 OTRC_{iht} + \alpha_6 RER_{iht} + \alpha_7 CU_{iht} + \alpha_8 \widehat{lnFDIN}_{\imath ht} + \theta_{ih} + \lambda_t + \varepsilon_{iht} \quad (25)$$

4.5 Control Variables

In the spirit of existing literature discussed in the Chapter 3, I also specify seven control variables and I augment the equation (2) with:

$$lnFDIN_{iht} = \alpha_i + \beta_1 lnSum_{iht} + \beta_2 lnSim_{iht} + \beta_3 lnPERCD_{iht} + \beta_4 SKRD_{iht} + \beta_5 OTRC_i + \beta_6 TTRC_h + \beta_7 INVL_{iht} + X_{iht} + W_{ht} + \varepsilon_{iht} \quad (26)$$

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}).

4.5.1 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:

$$RELAB_{iht} = \frac{ULC_{ht}}{ULC_{it}} \qquad (27)$$

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

4.5.2 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:

$$REER_{iht} = \frac{E_{iht}.P_{it}}{P_{ht}} \qquad (28)$$

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*).[32] 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;

$$ERV = \sqrt{\frac{\sum_{m=1}^{12}(d_m - \bar{d})^2}{12-1}} \qquad (29)$$

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.

4.5.3 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.[33] 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.

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

[33] See section 2.2.2 for a brief discussion on the developments in political factors for further information.

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.

4.5.4 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.[34] Data provided 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 summarised in Chapter 3 correlates openness of a host country positively to the amount of FDI, which a

[34] 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 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.

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.

4.5.5 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 electricity production (*ELC*).[35] *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

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

infrastructure index (*INFRAI*) using principal components analysis (PCA). High correlations among these proxies make it difficult to use them together in the regressions.[36] 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.[37] Infrastructure is predicted to be positively correlated with FDI inwards.

4.5.6 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*) (see 3.4.5 for discussion), 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):

$$TAX_{iht} = TAX_{iht} - TAX_{it} \qquad (30)$$

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.

[36] Table A3.1 in Appendices presents correlations among these proxies.

[37] Details of the computation of the infrastructure index are given in Appendices A3.1.

Corporate income tax rates are obtained from KPGM and Tax Database of OECD. In the light of the related literature reviewed in Chapter 3, corporate tax differential is expected to negatively affect FDI.

4.5.7 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 4.2 summarises the definitions and expected signs of control variables.

Table 4.2 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	+
MIL	Institutions	index	+

CHAPTER 5

5.0 EMPIRICAL RESULTS: FINDINGS AND DISCUSSIONS

Previous chapters aimed at developing a conceptual framework and presented data and methodology to be used in this empirical part of the thesis. Consequently, this chapter presents the empirical analyses, the results of the econometric models used to investigate the determinants of FDI in Turkey. Finally, a discussion on the findings is presented at the end of the chapter.

5.1 Descriptive Statistics and Correlation Matrix

Table 5.1 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.

Table 5.1 Descriptive Statistics

Variables	Mean	Standard Deviation	Minimum	Maximum	Observations
FDIN	1.5662	0.9118	0.2183	3.8245	299
EX	1.7020	1.3951	-2.3653	5.3351	493
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
CUD	0.2729	0.4458	0	1	513

An inspection of Table 5.1 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.

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 value of exports (*EX*) of home countries to Turkey is lower than the sum of national incomes (*SUM*) on average. This finding is not consistent with the trends observed in other studies with large country samples (Helpman, 1987). Fifth, 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 5.2 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 5.2 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	CU
ln FDIN	0.0509	0.2457*	0.5537*	0.3564*	0.3217*	0.2436*	-0.0843	-0.1212†	-0.0668	0.2069*
ln SUM	0.0416	0.0478	0.6029*	0.2244*	0.1780*	0.1385*	-0.0782‡	-0.0310	-0.0626	0.0492
ln SIM	0.0274	0.0847	-0.4586*	0.0456	-0.0591	0.0299	-0.0146	-0.0025	-0.0121	0.1693*
SKRD	-0.0234	0.2224†	0.2547*	0.3366†	0.0244	0.3736*	-0.2049*	-0.4805*	-0.2300*	0.3211*
PERCD	-0.0103	-0.0030	0.2171*	0.1249*	0.1793*	0.0451	-0.0336	0.0065	0.0004	0.1172*
OTRC	0.1259†	-0.0693	-0.2058*	0.1472*	-0.0398	0.0858‡	-0.0694	-0.0159	-0.0582	-0.1399*
TTRC	-0.0312	-0.0255	-0.0739‡	-0.0398	-0.0712	-0.0169	0.0875‡	0.0530	0.0785‡	-0.0515
INVL	0.1791*	0.2522*	0.3076*	0.5484*	0.1997*	0.3833*	-0.1885*	-0.0022	-0.2093*	0.4367*
RELAB	-0.2126*	-0.0917†	-0.2208*	-0.0799‡	-0.4010*	-0.0276	0.1004†	0.1834*	0.1856*	-0.1607*
REER	-0.0581	-0.2895†	-0.0413	-0.4748†	0.0627	-0.5153†	0.2240†	0.3051†	0.1732†	-0.1338†
ERV		0.0429	0.0198	0.2596†	0.0390	-0.0728	0.0211	0.1452†	-0.0002	0.0628
EUNEG			0.1287†	0.5666†	0.1399†	0.3374†	-0.0962†	-0.1734†	-0.0285	0.4682†
OPEN				0.1675†	0.5243†	0.1374†	-0.0738	-0.0675	-0.0816‡	0.2886†
INFRAI					0.1320†	0.7042†	-0.3170†	-0.2065†	-0.2850†	0.6117†
TAX						0.1901†	-0.1316†	0.0394	-0.3071†	0.2710†
GOVSTA							-0.2775†	-0.2733†	-0.5560†	0.5210†
CORR								0.5817†	0.5886†	-0.3900†
BUR									0.3983†	-0.1756†
MILINP										-0.3635†
CU										

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

5.2 Regression Results

5.2.1 The Determinants of FDI

Table 5.3 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 percent 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).[38]

[38] 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 5.3 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 $\mu_{ih}=0$		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%

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

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.[39]

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 &

[39]Appendices A4.1.1 and A5.1.1 show that VIF value for infrastructure index (*INFRAI*) is near 6. Also, the correlation matrix exhibits high correlation between *INFRAI* and the institutional variable *GOVSTA*. Consequently, *INFRAI* is removed from the regression in models (III) to (V). The results after the exclusion of *INFRAI* significantly improve.

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.[40] 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).**

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

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.

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.[41] 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.[42]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 (*INFRAI*), the coefficient estimates of institutional variables show the expected signs in models (III) to (V).

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

[42] VIF for the residuals (*REST*) is close to 8; therefore the residuals (*REST*) are not included in the regressions (See Appendices 6.2)

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.

5.2.2 Substitution and Complementary Effects of FDI on Trade

Table 5.4 presents the results of regression models (VI) to (VII) using exports (*lnEx*) as the dependent variable. Appendices A9 and A10 show the regression outputs from STATA. Pooled data and the OLS estimator are used for the regression. Breusch-Pagan-Cook-Weisberg (BP CW) heteroskedasticity and W.A. tests show that there are heteroskedasticity and autocorrelation problems. In order to overcome these problems, robust and clustered standard errors are used. As shown in Table 5.4, the R-squared for the models VI and VII indicate that the variables in the regression explain 97 per cent of variation in *lnEX* in both models. Furthermore, there is significant country pair and time specific effects as the F tests indicate in Table 5.4. The null hypothesis of joint insignificance is rejected at the %1 level as the F-test for country dummies and year dummies indicate.

SUM and *SIM* are included separately to prevent multicollinerity. VIF is used to check for multicollinearity among the variables. The VIF values of variables are below 5 (See appendices A9.1 and A10.1). Hence, multicollinearity is not present

in the estimations. The F-test for the joint significance test indicates that the variables in both models are jointly significant at the 1 % level.

Table 5.4 The Impact of FDI on Export: OLS Estimates with Robust and Clustered Standard Errors

Variables	Model VI	Model VII
CONS	-25.8900	-6.5772*
	(10.9347)	(1.2007)
lnSUM	1.3471‡	
	(0.7378)	
lnSIM		-0.9899
		(0.6585)
lnPERCD	0.7285*	0.8521*
	(0.1355)	(0.1891)
OTRC	-0.2428	-0.2482
	(0.1856)	(0.1696)
REER	0.0004	0.0004
	(0.0024)	(0.0024)
CUD	0.2929	0.2584
	(0.1752)	(0.1663)
lnFDIN	-0.0218	-0.0251
	(0.0445)	(0.0489)
F test for Country pair dummies	483.89*	796.08*
F test for Year dummies	380000*	7100000*
F test for joint sig.	262.95*	252.10*
BP CW test	7.86	13.59*
W.A. test	19.90	20.17*
R-squared	97%	97%

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

As shown in Table 5.4, only the coefficient estimate for PERCD, $\widehat{\alpha_4}$, is significant. The standard OLS procedure does not account for simultaneity between *lnFDIN* and *lnEX*. Therefore the OLS estimator could lead to some variables not being significant or having unpredicted signs. In order to overcome the potential endogeneity problem of the *lnFDIN* variable, instrumental variable (IV) in other words, 2SLS method of estimation (ivreg2 command by Baum *et al.*, 2002) is used.

Table 5.5 The impact of FDI on Export: IV estimates

Variables	Model VIII	Model IX
CONS	-36.5847*	-15.5345*
	(4.4607)	(2.4993)
lnSUM	1.9768*	
	(0.3011)	
lnSIM		-2.3096*
		(0.5551)
lnPERCD	0.7655*	1.0502*
	(0.1311)	(0.1852)
OTRC	-0.1317*	-0.4411*
	(0.0855)	(0.1357)
REER	-0.0020	-0.0056†
	(0.0017)	(0.0025)
CUD	0.3306*	0.3217*
	(0.0626)	(0.0987)
lnFDIN	0.3682*	0.8924*
	(0.0998)	(0.1557)
Chi-square for country pair dummies	1179.01*	508.96*
Chi-square test for Year dummies	122.01*	78.32*
Wu-Hausman F Test	16.6898*	90.7887*
Durbin-Wu-Hausman Chi-sq Test	18.7020*	78.9140*
Sargan Test	1.464	0.353
Anderson-Rubin Wald test	9.43*	33.35*
Stock-Wright LM test	20.96*	84.87*
Pagan Hall heteroskedasticity test	36.694	21.342
Cragg Donald Wald F statistic	19.81*	13.50*
Stock-Yogo weak ID test critical values (5% maximal IV relative bias)		13.91
Stock-Yogo weak ID test critical values (10% maximal IV relative bias)		9.08

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

Table 5.5 presents the results for regression models (VIII) to (IX) using 2SLS method with the instrumental variables. Appendices A11-A12 show the regression outputs from STATA. Of the instrumental variables, *SEATOR* and *LAOR* are dropped in model VIII and *SEATOR* is dropped in the model IX due to collinearity

As Wu-Hausman F Test and Durbin-Wu-Hausman test in Table 5.5 indicate that the exogeneity of the variable *lnFDIN* is clearly rejected. Hence, the simultaneity leads to the inconsistency in the OLS estimator. Sargan test is used to check the validity of the instrumental variables -*CORR*, *INVL* and *LAOR*, Sargan test is used. As the Sargan test in Table 5.5 indicates, the null hypothesis that the instruments are valid instruments is not rejected for both models. In other words, the instruments are not correlated with the error term and the choice of instruments is appropriate. The instruments for the models VIII and IX appear to be highly correlated with FDI. The F tests of excluded instruments are 19.81 and 13.50 for the models VIII and IX, respectively. Staiger & Stock (1997) suggests that F tests for instruments below 10 point to weak instruments. Moreover, the Anderson-Rubin Wald test and Stock-Wright LM test reject the null hypothesis of the insignificance of the endogenous regressor (*lnFDI*) at the 1% level and indicate the endogenous regressor is relevant.

Overall, Crag-Donald F statistic is just below the Stock and Yogo 5% critical value for the model IX. Hence, the instruments are strong and lead to relatively small biases in 2SLS estimator compared to the OLS estimator. Due to the two instruments dropped from the model VIII, the critical values for the model VIII are not computed.

Furthermore, the null hypothesis that disturbance is homeskedastic is not rejected for both models VII and IX using Pagan-Hall general statistics. Hence, heteroskedasticity is not a problem in the estimations. Moreover, as the Chi-square tests for country pair in Table 5.5 show, there are significant country pair and time effects.

Lastly, all the coefficient estimates are statistically significant and carry expected signs except for the variable *SIM*.

As shown in Table 5.5, the sum of national incomes is positively associated with exports as the coefficient estimate for *SUM*, $\widehat{\alpha_2}$, is significantly positive at the 1% level. On average, if the sum of national incomes (*SUM*) increases by 1 percentage point, exports would increase by 1.9 percentage points, other things being constant. In contrast to the predictions, similarity of incomes (*SIM*) is negatively related to exports. On average, if similarity of income (*SIM*) increases by 1 percentage point, exports would decrease by 2.3 percentage points. Probably, year dummies capture the cyclical effects in the similarity of income (SIM). Per capita difference captures the inter-industry trade, and *PERCD* is positively related to exports. The coefficient estimate for *PERCD*, $\widehat{\alpha_4}$, is significant at the 5% level, suggesting that an increase of *PERCD* by 1 percentage point leads to an increase of exports by 0.7 to 1.05 percentage points.

Moreover, the trade cost of export (*OTRC*) is negatively related to exports, as the coefficient estimate for *OTRC*, $\widehat{\alpha_5}$, is significant at the 1% level. On average, an increase of *OTRC* by 1 percentage point leads to a decrease of exports by around 0.13 to 0.4 percentage points.

In addition, real exchange rate is negatively related to exports as the coefficient estimates for *REER*, $\widehat{\alpha_7}$, is significant at the 5 % level. The magnitude of the effect is quite small. A depreciation in the Turkish currency by 1 percentage point leads to a decrease in exports of 0.005 percentage points.

Furthermore, Customs Union is positively associated with exports and the coefficient estimate for CUD, $\widehat{\alpha_6}$, is significant at the 1% level. On average,

signatory home countries to CU with Turkey is predicted to export to Turkey about %37.9 to 39.1 % more than non-signatory home countries, other things being constant.[43]

Lastly, the major interest of the variable *lnFDIN* is positively related to exports as the coefficient estimate for lnFDIN, $\widehat{\alpha_8}$, is significantly positive at the 10% level. On average, an increase of FDI by 1 percentage point leads to an increase in *lnEX* of 0.36 to 0.89 percentage points, other things being constant. The empirical evidence is consistent with the effect of factor location on FDI (**H7**), suggesting that factor proportion dominate the location decisions of FDI. The empirical results lend support to the complementary relationship between outward FDI and exports, and confirm the findings of Lipsey & Weiss (1984), Blomstrom *et al.*, (1989), Lin (1995), Head & Ries (1997), Pfaffermayr (1996) and Clausing (2000).

5.2.3 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.

[43] The same formula is used for the interpretation of CUD as for those of INVL and EUNEG.

Given the large proportion of FDI motivated by market access, the results are of no surprise. These findings are also in line with the trends in identified in Chapter 2. 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. This finding signifies the small proportion of manufacturing in total FDI stocks in Turkey as Figure 2.8 displays.

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 results with respect to the prospect of EU membership reinforce descriptive evidence provided in Chapter 2. Indeed, 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.[44] 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-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 5.3 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 (See Appendix, A2).

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

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 (See Chapter 2).

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.

The empirical results regarding the impact of FDI on exports indicate that FDI acts as a catalyst for aggregate exports from home countries to Turkey. Aggregate exports include capital, intermediate, and consumption goods. Since disaggregated export data is not available for these goods, the empirical results cannot identify the impact of FDI on each export group. Customs Union treaty with the EU is an important factor for exports. A rise in real exchange rate signifies the appreciation of home country currency against Turkish currency, resulting in a decrease in exports. Hence, exports decrease with the depreciation of Turkish currency. Comparing Table 5.3 to Table 5.5 reveals some important patterns of FDI and Exports.

First, although both exports and FDI respond to the sum of national incomes, exports are more responsive than FDI as the results indicate.

Second, a rise in the cost of export has bigger impact on FDI than exports.

Third, exports increase in per capita difference more than FDI. Last, there is not much difference between the impacts of real exchange rate on FDI and Exports.

5.2.4 Public Policy Implications

The public policy implications of the empirical results are six-fold.

First, the empirical results in Table 5.3 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 5.3 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 5.3 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 5.3 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.

Fifth, given the positive relationship between imports and inward FDI indicated by the empirical results shown in Table 5.3, an economic policy engineered to liberalise trade might increase the likelihood of receiving FDI in Turkey.

Finally, the empirical results in Table 5.3 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.

CHAPTER 6

6.0 SUMMARY AND 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. In particular, this thesis seeks answers to the following questions:

What are the determinants of FDI in Turkey?

How does FDI affect the imports of Turkey from the countries that it receives FDI?

Does the prospect of EU membership have impact on the inward FDI in Turkey?

Is inward FDI in Turkey in horizontal or vertical nature?

Theories identify various determinants of FDI. The OLI framework of Dunning (1979; 1980) relates the involvement of multinationals in FDI to the combination of ownership, location and internalisation advantages. Based on ownership advantages and location advantages, knowledge-capital framework (Markusen 1995; 1998) associates FDI with market sizes of host and home countries, trade costs, firm and plant level scale economies and investment liberalisation.

Empirical studies further enrich the literature on FDI by identifying the factors that affect FDI. Among them are labour costs, exchange rate and exchange rate volatility, taxation, regional integration, openness to trade, infrastructure, government stability, corruption, the quality of bureaucracy and military in politics.

Previous works on the determinants of FDI in Turkey (Erdilek, 1982; Coskun, 1996; Tatoglu & Glaister (2000); Halicioglu (2001) and Sayek (2007) suggest that FDI inflows into Turkey are mainly motivated by accessing to the Turkish market. In addition, FDI is negatively related to bureaucratic quality, political instability, low labour cost and exchange rate volatility. Furthermore, FDI increases in the anticipation of the EU membership.

Descriptive data indicates that FDI increase with a rise in market size, an improvement in political stability, and the anticipation of EU membership. The responsiveness of FDI to the process of integration with the EU shows similarities to the development of FDI in CEECs countries prior to full membership of the EU.

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 thesis 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. The analyses of the effects of FDI on trade confirm the complementary relationship between the two, suggesting the dominance of intermediate goods in trade.

The contribution of this thesis to the existing literature is fivefold.

First, this thesis tests the power of knowledge-capital framework in explaining FDI with various control variables. The results indicate the robustness of the knowledge-capital model to additional variables with longer time dimension than previous studies.

Second, this thesis utilises a unique disaggregated data for FDI at country level. Third, this study is the first to examine the effect of bilateral exchange rate, exchange rate volatility and the start of membership negotiations with the EU on FDI, specially, for Turkey.

The empirical evidence presented by this study contradicts the results of previous studies using aggregate data for exchange rate and exchange rate volatility.

Fourth, this thesis contributes to the policy debate on FDI in Turkey in the areas of infrastructure, investment liberalisation, education, political stability, openness to trade and integration with the EU. Fifth, the study further contributes to the literature on the link between bilateral investment liberalisation and FDI.

6.1 Limitations of Study

Due to lack of quality data, the sample is limited to nineteen OECD countries that report outward FDI stock in Turkey. An extension of data set could be achieved by including inward FDI data reported by Turkey. However, there is a considerable inconsistency between the datasets provided by the OECD and Turkey. Hence, a larger dataset in terms of country coverage is sacrificed for the sake of consistency. As a result of dataset choice, inferences from the results are specific to the determinants of FDI in Turkey received from the OECD countries.

The stock data in the publication of OECD International Direct Investment Statistics are compiled from statistical sources of each country. FDI stock data from Austria, Canada, Denmark, Finland, France, Germany, Hungary, Norway, Sweden, Switzerland, the UK and the USA are based on company surveys, whereas FDI data from Greece, Poland and Spain are based on the reports of commercial banks for

international transactions.[45] On the other hand, FDI stock data for Italy, South Korea and Japan (until 1995) are calculated as cumulative FDI flows. Netherlands use foreign transactions to calculate FDI data. Furthermore, the definition of FDI differs between countries. For an overseas investment to qualify as FDI, the ownership threshold is 10% in Austria, Canada, Denmark, Finland, France, Germany (until 1989, it was 25%; from 1990 to 1998 it was 20%), Greece (after 1998, until 1998 there was no threshold), Hungary, Italy, and South Korea and Norway, Poland, Spain, Sweden (after 1997), Switzerland, the UK (before 1997, it was 20%) and the USA. There is no minimum threshold for Japan and Netherlands.

Furthermore, the measurement of FDI stocks also differs between countries. FDI stocks are measured in market value in Finland and Italy but in book values in France, Norway, the UK and the USA. Hence, these differences in the definition and measurement of FDI stocks results in the approximation of FDI data, which is the best data available.

Other variables come from IMF, UNESCO, OECD, World Bank, United Nations, Central Bank of Turkey, The Undersecretariat of Treasury (Turkey), Environment and Energy Statistics of the Turkish Statistical Institute, The Statistics of the General Directorate of Highways of Turkey, The Statistics of the Automotive Manufacturers Association of Turkey and International Country Risk Guide.

Another limitation of this study is proxy for the dependent variables, namely FDI and exports. The literature suggests that multinational sales instead of FDI stocks or flows are the preferable proxy for FDI. However, data for multinational sales in

[45] For Switzerland, FDI data is based on surveys that cover the firms, which have a direct investment position of more than 10 million Swiss francs.

Turkey are not comprehensive to conduct an empirical analysis between 1982 and 2007. Similar problems are faced in finding a proxy for exports. Disaggregated export data (f.o.b.) according to Broad Economic Classification (BEC) are not available for the time period used in this study. Constructing such a dataset from various resources would have hindered the progress of this research. Thus, aggregate export data is used.

The other limitation involves time constraint. Due to limited time allocated for collecting data and long process to obtain access to databases, alternative proxies used for some variables. For instance, bilateral investment treaties is used for investment rather than investment cost. Moreover, it takes long time for the central banks and the OECD to provide revised data for FDI. Therefore, the time-dimension of dataset for this study is up to the year, 2007. Furthermore, unavailability of accurate data and time constraints limited the analysis of trade-FDI to only exports, excluding the impact of inward FDI on the imports of home countries.

6.2 Areas for Further Research

While this study extends the literature on FDI in the context of Turkey, two areas need further investigation. One is that there is no evidence found in this study for the cost of exporting back to home countries. Furthermore, recent trends show that increasing FDI stocks in Turkey has been followed by the boom in exports of Turkey to non-EU and non-OECD countries. Therefore, it is necessary to investigate whether FDI in Turkey affects the exports of Turkey to third countries. The other is that there is a scope for using disaggregated FDI data at industry level and multinational sales instead of stocks in future. At the moment, FDI data at industry level and multinational sales are inadequate in coverage to conduct an extensive

econometric analysis. However, very recent data published by the OECD and Eurostat are encouraging in this realm.

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APPENDICES

A.1 Data Sources

FDI	International Direct Investment Statistics (OECD, 2008), Eurostat (2008), the Central Bank of Netherlands, Statistics of Canada and Japan External Trade Organisation
Nominal Exports	Direction of Trade Statistics (IMF, 2008)
Export Price Index	World Economic Outlook (OECD, 2008)
Number of Students	UNESCO (2008) and OECD (2009)
GDP and Population	World Development Indicators (World Bank, 2008)
GDP Deflator	United Nations Database (2009)
Bilateral Investment Treaties	The Undersecretariat of Treasury (Turkey)
Unit Labour Cost	OECD.Stat Extracts (2009)
Annual Nominal Exchange Rates	International Financial Statistics (IMF, 2008)
Conversion Rates for ECU	European Central Bank (2009)
Consumer Price Index	International Financial Statistics (IMF, 2008)
Monthly Nominal Exchange Rates	Central Bank of Republic of Turkey (2009)

Telephones per 100 habitants	World Development Indicators (World Bank, 2008)
Annual Electricity Production	Environment and Energy Statistics of the Turkish Statistical Institute
Roads	The Statistics of the General Directorate of Highways of Turkey
Commercial Vehicles	The Statistics of the Automotive Manufacturers Association of Turkey
Corporate Income Tax	KPMG (several editions) and Tax Database of OECD (2008)
Political Stability, Corruption, Military in Politics, Bureaucracy	International Country Risk Guide (2008)

A.2 OECD Countries in the Sample

EU Countries	Accession Year to the EU	Non-EU Countries
Austria	1995	Canada
Denmark	1973	Japan
Finland	1995	South Korea
France	1952	Norway
Germany	1952	Switzerland
Greece	1981	U.S.A.
Hungary	2004	
Italy	1952	
Netherlands	1952	
Poland	2004	
Spain	1986	
Sweden	1995	
United Kingdom	1973	

A.3 Ratified BITs between Turkey and other OECD countries in the sample

Countries	Year of BIT
Austria	1992
Canada	-
Denmark	1992
Finland	1995
France	-
Germany	1965
Greece	2001
Hungary	1995
Italy	2004
Japan	1993
Netherlands	1989
Norway	-
Poland	-
South Korea	1994
Spain	1998
Sweden	1998
Switzerland	1990
United Kingdom	1996
United States of America	1990

A.4 PCA Analysis for Infrastructure

Table A.4.1 Correlation Matrix of the Proxies for Infrastructure

	TEL	COMVEH	ELEC	ROADS
TEL	1.00			
COMVEH	0.74	1.00		
ELEC	0.91	0.94	1.00	
ROADS	0.79	0.85	0.87	1.00

Source: Own computation.

Table A.4.2 Eigen Values and Variance Explained by Principal Components

Principal components	Eigen values	% of variance	Cumulative variance
1	3.565	89.1	89.1
2	0.262	6.57	95.7
3	0.167	4.20	99,9
4	0.003	0.1	100.0

Source: Own computation.

The Eigen values and corresponding variance of these components are presented in Table A3.2 above. The test suggested by Kaiser (1960) is generally applied in order to identify which factors are meaningful. The test says that only factors or principal components with an eigen value one or greater are meaningful. Table A3.2 displays

that only the first component has an eigen value larger than one and explains nearly 90 % of the total variance. Consequently, the first principal component could serve as the composite index representing the combined variance of four proxies for infrastructure. The factor loadings for the corresponding proxies are given in Table A3.3 below.

Table A.4.3 Factor Loadings for the Infrastructure Variables

Variable	Factor loadings
TEL	0.9145
COMVEH	0.9408
ELEC	0.9891
ROADS	0.9307

Source: Own computation.

A.5 Regression Output of STATA for Model (I)

A.5.1 Variance Inflation Factors

Variable	VIF	1/VIF
INFRAI	5.61	0.178385
GOVSTA	3.91	0.255766
CORR	3.08	0.324875
L.REER	2.95	0.338507
MILINP	2.61	0.383189
OPEN	2.60	0.385056
BUR	2.41	0.414499
lnSUM	2.29	0.437026
TAX	2.29	0.437263
EUNEG	1.75	0.570607
ERV	1.58	0.633283
RELAB	1.37	0.730839
Mean VIF	2.70	

A.5.2 Fixed Effects Results

Fixed-effects (within) regression — Number of obs = 282
Group variable: i — Number of groups = 19

R-sq: within = 0.6059 — Obs per group: min = 3
between = 0.2911 — avg = 14.8
overall = 0.0231 — max = 24

F(12,251) = 32.15
corr(u_i, Xb) = -0.8038 — Prob > F = 0.0000

lnFDIN	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSUM	-.7324541	.5636164	-1.30	0.195	-1.842474	.3775659
RELAB	.3951541	.2388869	1.65	0.099	-.0753241	.8656323
REER						
L1.	.0045362	.0025004	1.81	0.071	-.0003881	.0094606
ERV	-2.928893	2.632775	-1.11	0.267	-8.114039	2.256253
EUNEG	.0658475	.1022094	0.64	0.520	-.1354498	.2671447
OPEN	.0167424	.0085968	1.95	0.053	-.0001886	.0336734
INFRAI	.7803868	.1454021	5.37	0.000	.4940231	1.066751
TAX	-.4113068	.5887422	-0.70	0.485	-1.570811	.7481975
GOVSTA	-.0579169	.0257841	-2.25	0.026	-.1086975	-.0071362
CORR	.0856729	.0729623	1.17	0.241	-.0580234	.2293691
BUR	.0792644	.1065658	0.74	0.458	-.1306127	.2891414
MILINP	-.0855001	.0386987	-2.21	0.028	-.1617157	-.0092845
_cons	10.85527	7.715828	1.41	0.161	-4.340747	26.05128
sigma_u	1.3313386					
sigma_e	.40032832					
rho	.91707938	(fraction of variance due to u_i)				

F test that all u_i=0: F(18, 251) = 19.26 — Prob > F = 0.0000

A.5.3 Modified Wald Test for Groupwise Heteroskedasticity

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (19)  =    331.32
Prob>chi2 =    0.0000
```

A.5.4 Random Effects Results

```
Random-effects GLS regression                   Number of obs      =       282
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.5985                         Obs per group: min =         3
       between = 0.5246                                        avg =      14.8
       overall = 0.5802                                        max =        24

Random effects u_i ~ Gaussian                   Wald chi2(12)      =    396.54
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

lnFDIN	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnSUM	.4635066	.1502715	3.08	0.002	.1689799	.7580334
RELAB	.3533307	.2286524	1.55	0.122	-.0948197	.8014812
REER						
L1.	.0026548	.0022989	1.15	0.248	-.0018509	.0071606
ERV	-1.761765	2.556259	-0.69	0.491	-6.77194	3.24841
EUNEG	.0955654	.1001797	0.95	0.340	-.1007833	.2919141
OPEN	.0222532	.0072508	3.07	0.002	.0080419	.0364644
INFRAI	.4948701	.0700037	7.07	0.000	.3576653	.6320748
TAX	-.2297003	.5705967	-0.40	0.687	-1.348049	.8886486
GOVSTA	-.0483094	.0252447	-1.91	0.056	-.0977882	.0011694
CORR	.0919439	.0719766	1.28	0.201	-.0491276	.2330154
BUR	.0286742	.1029925	0.28	0.781	-.1731875	.2305358
MILINP	-.0689479	.0380124	-1.81	0.070	-.143451	.0055551
_cons	-5.565757	2.066561	-2.69	0.007	-9.616142	-1.515371
sigma_u	.57926522					
sigma_e	.40032832					
rho	.6767664	(fraction of variance due to u_i)				

A.5.5 Hausman Test

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnSUM	-.7324541	.4635066	-1.195961	.5432144
RELAB	.3951541	.3533307	.0418234	.0691739
L.REER	.0045362	.0026548	.0018814	.0009833
ERV	-2.928893	-1.761765	-1.167128	.6301158
EUNEG	.0658475	.0955654	-.0297179	.0202675
OPEN	.0167424	.0222532	-.0055108	.0046185
INFRAI	.7803868	.4948701	.2855168	.1274412
TAX	-.4113068	-.2297003	-.1816065	.1450406
GOVSTA	-.0579169	-.0483094	-.0096075	.005246
CORR	.0856729	.0919439	-.006271	.0119524
BUR	.0792644	.0286742	.0505902	.0273642
MILINP	-.0855001	-.0689479	-.0165522	.0072557

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 6.87
Prob>chi2 = 0.8658

A.5.6 Breusch and Pagan Lagrangian Multiplier Test

Breusch and Pagan Lagrangian multiplier test for random effects

lnFDIN[i,t] = Xb + u[i] + e[i,t]

Estimated results:

	Var	sd = sqrt(Var)
lnFDIN	.826834	.9093041
e	.1602628	.4003283
u	.3355482	.5792652

Test: Var(u) = 0
chi2(1) = 634.72
Prob > chi2 = 0.0000

A.5.7 Wooldridge Autocorrelation Test for Autocorrelation in Panel Data

Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
F(1, 18) = 40.553
Prob > F = 0.0000

A.5.8 Random Effects Results with Robust and Clustered Standard Errors

```
Random-effects GLS regression                   Number of obs      =       282
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.5985                         Obs per group: min =         3
       between = 0.5246                                        avg =      14.8
       overall = 0.5802                                        max =        24

Random effects u_i ~ Gaussian                   Wald chi2(12)      =    455.83
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                                                (Std. Err. adjusted for clustering on i)
------------------------------------------------------------------------------
             |               Robust
      lnFDIN |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lnSUM |   .4635066   .1263507     3.67   0.000     .2158637    .7111496
       RELAB |   .3533307   .2074026     1.70   0.088    -.0531708    .7598323
        REER |
         L1. |   .0026548   .0025014     1.06   0.289    -.0022478    .0075575
         ERV |  -1.761765   2.527767    -0.70   0.486    -6.716097    3.192568
       EUNEG |   .0955654    .117247     0.82   0.415    -.1342345    .3253653
        OPEN |   .0222532   .0055775     3.99   0.000     .0113214     .033185
      INFRAI |   .4948701   .0949206     5.21   0.000     .3088291    .6809111
         TAX |  -.2297003    .541396    -0.42   0.671    -1.290817    .8314163
      GOVSTA |  -.0483094   .0295915    -1.63   0.103    -.1063077    .0096889
        CORR |   .0919439   .0598536     1.54   0.125     -.025367    .2092548
         BUR |   .0286742   .0809376     0.35   0.723    -.1299607     .187309
      MILINP |  -.0689479   .0426404    -1.62   0.106    -.1525215    .0146256
       _cons |  -5.565757   1.773664    -3.14   0.002    -9.042074   -2.08944
-------------+----------------------------------------------------------------
     sigma_u |  .57926522
     sigma_e |  .40032832
         rho |  .6767664   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

A.6 Regression Output of STATA for Model (II)

A.6.1 Variance Inflation Factors

Variable	VIF	1/VIF
INFRAI	5.86	0.170570
GOVSTA	3.91	0.255703
CORR	2.96	0.337448
L.REER	2.70	0.370145
MILINP	2.61	0.383642
TAX	2.39	0.419169
BUR	2.33	0.429200
OPEN	2.31	0.432490
lnSIM	2.02	0.494768
EUNEG	1.75	0.571940
ERV	1.57	0.635786
RELAB	1.39	0.720494
Mean VIF	2.65	

A.6.2 Fixed Effects Results

R-sq: within = 0.6114
between = 0.1268
overall = 0.0049

Obs per group: min = 3
avg = 14.8
max = 24

F(12,251) = 32.91
Prob > F = 0.0000

corr(u_i, Xb) = -0.7879

lnFDIN	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSIM	1.1485	.5002311	2.30	0.023	.1633142	2.133685
RELAB	.2575505	.2401889	1.07	0.285	-.2154919	.7305929
REER						
L1.	.0032066	.0023512	1.36	0.174	-.0014239	.0078371
ERV	-2.080633	2.555495	-0.81	0.416	-7.113579	2.952312
EUNEG	.1175722	.1009955	1.16	0.245	-.0813344	.3164789
OPEN	.0153095	.0085409	1.79	0.074	-.0015115	.0321305
INFRAI	.5410536	.0729302	7.42	0.000	.3974204	.6846868
TAX	-.279596	.5858708	-0.48	0.634	-1.433445	.8742534
GOVSTA	-.0485588	.0251973	-1.93	0.055	-.0981839	.0010663
CORR	.0951833	.0723371	1.32	0.189	-.0472818	.2376484
BUR	-.0048808	.1060738	-0.05	0.963	-.213789	.2040273
MILINP	-.0655364	.0385899	-1.70	0.091	-.1415378	.0104649
_cons	2.516118	.8556734	2.94	0.004	.8309031	4.201332
sigma_u	1.2428162					
sigma_e	.39752033					
rho	.90718838	(fraction of variance due to u_i)				

F test that all u_i=0: F(18, 251) = 26.32 Prob > F = 0.0000

A.6.3 Modified Wald Test for Groupwise Heteroskedasticity

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (19)  =     328.91
Prob>chi2 =      0.0000
```

A.6.4 Random Effects Results

```
Random-effects GLS regression                   Number of obs      =       282
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.5970                         Obs per group: min =         3
       between = 0.2331                                        avg =      14.8
       overall = 0.4377                                        max =        24

Random effects u_i ~ Gaussian                   Wald chi2(12)      =    375.13
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

lnFDIN	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnSIM	-.2564104	.210356	-1.22	0.223	-.6687005	.1558797
RELAB	.4184953	.2324498	1.80	0.072	-.037098	.8740885
REER						
L1.	.002896	.0023459	1.23	0.217	-.001702	.0074939
ERV	-2.186925	2.598193	-0.84	0.400	-7.279289	2.905439
EUNEG	.0709635	.1019083	0.70	0.486	-.128773	.2707
OPEN	.0275625	.0071055	3.88	0.000	.013636	.041489
INFRAI	.5943739	.069226	8.59	0.000	.4586934	.7300544
TAX	-.1733743	.5795959	-0.30	0.765	-1.309361	.9626129
GOVSTA	-.0541721	.0256215	-2.11	0.034	-.1043893	-.0039548
CORR	.079362	.0731056	1.09	0.278	-.0639224	.2226464
BUR	.0660801	.1044751	0.63	0.527	-.1386873	.2708476
MILINP	-.0700201	.0388212	-1.80	0.071	-.1461082	.006068
_cons	.3158076	.5373701	0.59	0.557	-.7374185	1.369034
sigma_u	.55230045					
sigma_e	.39752033					
rho	.65874178	(fraction of variance due to u_i)				

A.6.5 Hausman Test

```
Note: the rank of the differenced variance matrix (11) does not equal the number of coefficients being tested (12); be
      sure this is what you expect, or there may be problems computing the test.  Examine the output of your
      estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are on
      a similar scale.
```

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnSIM	1.1485	-.2564104	1.40491	.4660387
RELAB	.2575505	.4184953	-.1609448	.0790085
L.REER	.0032066	.002896	.0003107	.0005217
ERV	-2.080633	-2.186925	.1062915	.2692988
EUNEG	.1175722	.0709635	.0466087	.0164854
OPEN	.0153095	.0275625	-.012253	.0050722
INFRAI	.5410536	.5943739	-.0533203	.0276561
TAX	-.279596	-.1733743	-.1062216	.1506344
GOVSTA	-.0485588	-.0541721	.0056133	.0026243
CORR	.0951833	.079362	.0158213	.0110749
BUR	-.0048808	.0660801	-.0709609	.0289945
MILINP	-.0655364	-.0700201	.0044837	.0069869

```
                b = consistent under Ho and Ha; obtained from xtreg
     B = inconsistent under Ha, efficient under Ho; obtained from xtreg

 Test:  Ho:  difference in coefficients not systematic

              chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                       =       22.79
            Prob>chi2 =      0.0189
```

A.6.6 Wooldridge Autocorrelation Test for Autocorrelation in Panel Data

```
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
   F(  1,      18) =     35.520
         Prob > F =      0.0000
```

A.6.7 Fixed Effects Results with Robust and Clustered Standard Errors

```
Fixed-effects (within) regression               Number of obs      =       282
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.6114                         Obs per group: min =         3
       between = 0.1268                                        avg =      14.8
       overall = 0.0049                                        max =        24

                                                F(12,18)           =     21.12
corr(u_i, Xb)  = -0.7879                        Prob > F           =    0.0000

                                              (Std. Err. adjusted for 19 clusters in i)
------------------------------------------------------------------------------
             |               Robust
      lnFDIN |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lnSIM |      1.1485   .9222299     1.25   0.229    -.7890336    3.086033
      RELAB  |      .2575505  .3349685     0.77   0.452    -.4461923    .9612933
        REER |
         L1. |      .0032066  .0030727     1.04   0.310     -.003249    .0096622
         ERV |     -2.080633  2.402859    -0.87   0.398    -7.128853    2.967586
      EUNEG  |      .1175722  .1548212     0.76   0.457    -.2076951    .4428396
        OPEN |      .0153095  .0116669     1.31   0.206    -.0092017    .0398208
      INFRAI |      .5410536  .1400477     3.86   0.001     .2468243     .835283
         TAX |     -.279596   .8217605    -0.34   0.738    -2.006051    1.446859
      GOVSTA |     -.0485588  .0327593    -1.48   0.156    -.1173835    .0202659
        CORR |      .0951833  .0538514     1.77   0.094    -.0179543    .2083209
         BUR |     -.0048808  .1569355    -0.03   0.976    -.3345901    .3248285
      MILINP |     -.0655364  .0590359    -1.11   0.282    -.1895662    .0584934
       _cons |      2.516118  1.217354     2.07   0.053    -.0414481    5.073684
-------------+----------------------------------------------------------------
     sigma_u |  1.2428162
     sigma_e |  .39752033
         rho |  .90718838   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

.

A.7 Regression Output of STATA for Model (III)

A.7.1 Variance Inflation Factors

Variable	VIF	1/VIF
BUR	3.22	0.310149
OPEN	3.11	0.321201
CORR	2.85	0.351168
lnSUM	2.69	0.371293
TAX	2.52	0.396805
L.REER	2.38	0.420786
MILINP	2.34	0.428173
GOVSTA	2.20	0.454136
SKRD	2.13	0.468489
EUNEG	1.44	0.693259
RELAB	1.38	0.722822
lnPERCD	1.27	0.787748
ERV	1.14	0.873855
Mean VIF	2.21	

A.7.2 Variance Inflation Factors with the variable REST

Variable	VIF	1/VIF
REST	7.50	0.133261
GOVSTA	3.92	0.255352
CORR	3.41	0.292874
BUR	3.23	0.309684
L.REER	3.14	0.318648
MILINP	2.85	0.351067
ERV	1.89	0.529349
SKRD	1.80	0.556079
EUNEG	1.77	0.564384
TAX	1.66	0.601300
lnSUM	1.65	0.604575
RELAB	1.37	0.730462
lnPERCD	1.24	0.809603
Mean VIF	2.73	

A.7.3 Fixed Effects Results

```
Fixed-effects (within) regression               Number of obs      =       274
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.5420                         Obs per group: min =         3
       between = 0.4415                                        avg =      14.4
       overall = 0.3987                                        max =        24

                                                F(13,242)          =     22.03
corr(u_i, Xb)  = -0.9282                        Prob > F           =    0.0000
```

lnFDIN	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSUM	2.011179	.34139	5.89	0.000	1.338704	2.683654
SKRD	.013324	.0060123	2.22	0.028	.0014808	.0251671
lnPERCD	-.3430459	.2394085	-1.43	0.153	-.8146363	.1285445
RELAB	.0693323	.2553289	0.27	0.786	-.4336184	.572283
REER						
L1.	-.0027101	.0023252	-1.17	0.245	-.0072904	.0018701
ERV	3.210851	2.552738	1.26	0.210	-1.81757	8.239273
EUNEG	.2358201	.1031249	2.29	0.023	.0326831	.438957
OPEN	.0178786	.0099036	1.81	0.072	-.0016297	.0373869
TAX	.2203686	.6445437	0.34	0.733	-1.049263	1.490001
GOVSTA	.0028333	.0251227	0.11	0.910	-.0466537	.0523203
CORR	-.0250221	.0825718	-0.30	0.762	-.1876733	.1376292
BUR	.1474954	.1391787	1.06	0.290	-.126661	.4216517
MILINP	-.0079314	.0402588	-0.20	0.844	-.0872338	.071371
_cons	-23.59837	4.008089	-5.89	0.000	-31.49356	-15.70317
sigma_u	1.4312608					
sigma_e	.42319161					
rho	.91960349	(fraction of variance due to u_i)				

F test that all u_i=0: F(18, 242) = 15.03 Prob > F = 0.0000

A.7.4 Modified Wald Test for Groupwise Heteroskedasticity

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (19)  =     426.85
Prob>chi2 =     0.0000
```

A.7.5 Random Effects Results

```
Random-effects GLS regression                   Number of obs      =       274
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.5037                         Obs per group: min =         3
       between = 0.6659                                        avg =      14.4
       overall = 0.5758                                        max =        24

Random effects u_i ~ Gaussian                   Wald chi2(13)      =    288.29
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

lnFDIN	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnSUM	.4832065	.102852	4.70	0.000	.2816203	.6847926
SKRD	.0098582	.0054758	1.80	0.072	-.0008742	.0205906
lnPERCD	.1932215	.0761465	2.54	0.011	.0439772	.3424658
RELAB	.0662333	.2417763	0.27	0.784	-.4076395	.5401062
REER						
L1.	-.0052375	.0022064	-2.37	0.018	-.0095619	-.000913
ERV	7.178166	2.456377	2.92	0.003	2.363756	11.99258
EUNEG	.3900409	.1019911	3.82	0.000	.190142	.5899399
OPEN	.0175069	.0068449	2.56	0.011	.0040912	.0309227
TAX	.7575313	.6461398	1.17	0.241	-.5088795	2.023942
GOVSTA	.062318	.0222118	2.81	0.005	.0187835	.1058524
CORR	-.1301854	.0772336	-1.69	0.092	-.2815604	.0211896
BUR	.1789007	.1367309	1.31	0.191	-.089087	.4468884
MILINP	.039001	.0405481	0.96	0.336	-.0404718	.1184738
_cons	-7.713357	1.504665	-5.13	0.000	-10.66245	-4.764267
sigma_u	.28876919					
sigma_e	.42319161					
rho	.31769289	(fraction of variance due to u_i)				

A.7.6 Hausman Test

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnSUM	2.011179	.4832065	1.527972	.3255282
SKRD	.013324	.0098582	.0034658	.0024827
lnPERCD	-.3430459	.1932215	-.5362674	.226976
RELAB	.0693323	.0662333	.003099	.0820796
L.REER	-.0027101	-.0052375	.0025273	.0007337
ERV	3.210851	7.178166	-3.967315	.6947549
EUNEG	.2358201	.3900409	-.1542209	.0152495
OPEN	.0178786	.0175069	.0003717	.0071574
TAX	.2203686	.7575313	-.5371627	.
GOVSTA	.0028333	.062318	-.0594847	.0117381
CORR	-.0250221	-.1301854	.1051633	.0292076
BUR	.1474954	.1789007	-.0314053	.0259878
MILINP	-.0079314	.039001	-.0469324	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(13) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 14.24
Prob>chi2 = 0.3574
(V_b-V_B is not positive definite)

.

A.7.7 Breusch and Pagan Lagrangian Multiplier Test

```
Breusch and Pagan Lagrangian multiplier test for random effects

        lnFDIN[i,t] = Xb + u[i] + e[i,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                   lnFDIN |     .84341       .9183736
                        e |    .1790911       .4231916
                        u |    .0833876       .2887692

        Test:   Var(u) = 0
                                  chi2(1) =   387.62
                               Prob > chi2 =   0.0000
```

A.7.8 Wooldridge Autocorrelation Test for Autocorrelation in Panel Data

```
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      18) =     44.237
          Prob > F =     0.0000
```

A.7.9 Random Effects Results with Robust and Clustered Standard Errors

```
Random-effects GLS regression                   Number of obs      =       274
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.5037                         Obs per group: min =         3
       between = 0.6659                                        avg =      14.4
       overall = 0.5758                                        max =        24

Random effects u_i ~ Gaussian                   Wald chi2(13)      =    444.25
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                                                (Std. Err. adjusted for clustering on i)
------------------------------------------------------------------------------
             |               Robust
      lnFDIN |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lnSUM |   .4832065    .08571     5.64   0.000     .315218    .651195
        SKRD |   .0098582    .007287    1.35   0.176    -.0044241   .0241405
     lnPERCD |   .1932215    .0922473   2.09   0.036     .01242     .374023
       RELAB |   .0662333    .2037467   0.33   0.745    -.3331028   .4655694
        REER |
          L1. |  -.0052375   .0023013  -2.28   0.023    -.0097479  -.000727
         ERV |   7.178166   2.080513    3.45   0.001     3.100436   11.2559
       EUNEG |   .3900409   .1309865    2.98   0.003     .1333122   .6467697
        OPEN |   .0175069   .0056961    3.07   0.002     .0063427   .0286711
         TAX |   .7575313   .6088199    1.24   0.213    -.4357339   1.950796
      GOVSTA |    .062318   .0208046    3.00   0.003     .0215417   .1030942
        CORR |  -.1301854   .0692527   -1.88   0.060    -.2659181   .0055473
         BUR |   .1789007   .1328479    1.35   0.178    -.0814764   .4392777
      MILINP |    .039001   .0427369    0.91   0.361    -.0447618   .1227639
       _cons |  -7.713357   1.380788   -5.59   0.000    -10.41965  -5.007062
-------------+----------------------------------------------------------------
     sigma_u |  .28876919
     sigma_e |  .42319161
         rho |  .31769289   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

A.8 Regression Output of STATA for Model (IV)

A.8.1 Variance Inflation Factors

Variable	VIF	1/VIF
OPEN	3.19	0.313465
CORR	2.72	0.367011
TAX	2.52	0.397140
L.REER	2.47	0.404790
BUR	2.43	0.410903
lnSUM	2.41	0.415523
MILINP	2.37	0.421580
GOVSTA	2.22	0.450590
EUNEG	1.52	0.659391
OTRC	1.44	0.696556
RELAB	1.37	0.728090
lnPERCD	1.26	0.796106
ERV	1.20	0.836489
TTRC	1.15	0.867710
Mean VIF	2.02	

A.8.2 Fixed Effects Results

Fixed-effects (within) regression — Number of obs = 281
Group variable: i — Number of groups = 19

R-sq: within = 0.5817 — Obs per group: min = 3
between = 0.5222 — avg = 14.8
overall = 0.4325 — max = 24

F(14,248) = 24.63
corr(u_i, Xb) = -0.9329 — Prob > F = 0.0000

lnFDIN	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSUM	1.863882	.3296272	5.65	0.000	1.214656	2.513108
lnPERCD	.0066047	.2221347	0.03	0.976	-.4309065	.4441158
OTRC	.4927617	.1451022	3.40	0.001	.206972	.7785515
TTRC	-.0332815	.1360715	-0.24	0.807	-.3012846	.2347217
RELAB	.3220257	.2494596	1.29	0.198	-.1693039	.8133553
REER						
L1.	-.001012	.0022565	-0.45	0.654	-.0054564	.0034323
ERV	2.017232	2.495563	0.81	0.420	-2.897968	6.932432
EUNEG	.3121553	.1046037	2.98	0.003	.1061304	.5181802
OPEN	.0319877	.0089712	3.57	0.000	.0143182	.0496573
TAX	-.1323123	.610067	-0.22	0.828	-1.333885	1.069261
GOVSTA	.0012967	.0242516	0.05	0.957	-.0464686	.049062
CORR	.043862	.0758674	0.58	0.564	-.1055646	.1932886
BUR	.0060856	.1110959	0.05	0.956	-.2127262	.2248975
MILINP	-.0307798	.0387083	-0.80	0.427	-.1070188	.0454592
_cons	-25.41638	3.810315	-6.67	0.000	-32.92109	-17.91168
sigma_u	1.4018552					
sigma_e	.41469707					
rho	.91953212	(fraction of variance due to u_i)				

F test that all u_i=0: F(18, 248) = 15.68 — Prob > F = 0.0000

A.8.3 Modified Wald Test for Groupwise Heteroskedasticity

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (19) = **239.75**
Prob>chi2 = **0.0000**

A.8.4 Random Effects Results

Random-effects GLS regression — Number of obs = **281**
Group variable: **i** — Number of groups = **19**

R-sq: within = **0.5508** — Obs per group: min = **3**
between = **0.6438** — avg = **14.8**
overall = **0.5649** — max = **24**

Random effects u_i ~ **Gaussian** — Wald chi2(**14**) = **326.89**
corr(u_i, X) = **0** (assumed) — Prob > chi2 = **0.0000**

lnFDIN	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnSUM	.5392157	.1335264	4.04	0.000	.2775088	.8009226
lnPERCD	.2339232	.1000656	2.34	0.019	.0377983	.4300481
OTRC	.5730587	.1452178	3.95	0.000	.288437	.8576804
TTRC	.0197628	.1321283	0.15	0.881	-.239204	.2787295
RELAB	.2334387	.2417594	0.97	0.334	-.240401	.7072784
REER						
L1.	-.003841	.0021533	-1.78	0.074	-.0080614	.0003794
ERV	6.144451	2.384956	2.58	0.010	1.470022	10.81888
EUNEG	.4859748	.100295	4.85	0.000	.2894001	.6825495
OPEN	.0277188	.0074442	3.72	0.000	.0131285	.0423092
TAX	.0751412	.6026576	0.12	0.901	-1.106046	1.256328
GOVSTA	.0606171	.0212378	2.85	0.004	.0189916	.1022425
CORR	-.0899021	.0718698	-1.25	0.211	-.2307644	.0509602
BUR	.1198028	.1101532	1.09	0.277	-.0960935	.3356992
MILINP	.010738	.0388444	0.28	0.782	-.0653955	.0868716
_cons	-9.493738	1.784517	-5.32	0.000	-12.99133	-5.996148
sigma_u	.44496559					
sigma_e	.41469707					
rho	.53516617	(fraction of variance due to u_i)				

A.8.5 Hausman Test

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnSUM	1.863882	.5392157	1.324666	.3013715
lnPERCD	.0066047	.2339232	-.2273186	.1983198
OTRC	.4927617	.5730587	-.0802969	.
TTRC	-.0332815	.0197628	-.0530442	.0325201
RELAB	.3220257	.2334387	.0885869	.061502
L.REER	-.001012	-.003841	.0028289	.0006746
ERV	2.017232	6.144451	-4.127219	.7347229
EUNEG	.3121553	.4859748	-.1738195	.0297126
OPEN	.0319877	.0277188	.0042689	.0050067
TAX	-.1323123	.0751412	-.2074535	.0947922
GOVSTA	.0012967	.0606171	-.0593203	.0117086
CORR	.043862	-.0899021	.133764	.0243021
BUR	.0060856	.1198028	-.1137172	.014442
MILINP	-.0307798	.010738	-.0415178	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 17.41
Prob>chi2 = 0.2348
(V_b-V_B is not positive definite)

A.8.6 Breusch and Pagan Lagrangian Multiplier Test

Breusch and Pagan Lagrangian multiplier test for random effects

lnFDIN[i,t] = Xb + u[i] + e[i,t]

Estimated results:

	Var	sd = sqrt(Var)
lnFDIN	.8246539	.9081046
e	.1719737	.4146971
u	.1979944	.4449656

Test: Var(u) = 0
chi2(1) = 406.50
Prob > chi2 = 0.0000

A.8.7 Wooldridge Autocorrelation Test for Autocorrelation in Panel Data

Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
F(1, 18) = 40.626
Prob > F = 0.0000

A.8.8 Random Effects Results with Robust and Clustered Standard Errors

```
Random-effects GLS regression                   Number of obs      =       281
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.5508                         Obs per group: min =         3
       between = 0.6438                                        avg =      14.8
       overall = 0.5649                                        max =        24

Random effects u_i ~ Gaussian                   Wald chi2(14)      =    435.04
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                                               (Std. Err. adjusted for clustering on i)
------------------------------------------------------------------------------
             |               Robust
      lnFDIN |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lnSUM |   .5392157   .1135575     4.75   0.000      .316647    .7617844
     lnPERCD |   .2339232   .1032516     2.27   0.023     .0315538    .4362927
        OTRC |   .5730587   .1302111     4.40   0.000     .3178496    .8282678
        TTRC |   .0197628   .1276414     0.15   0.877    -.2304097    .2699352
       RELAB |   .2334387   .2168167     1.08   0.282    -.1915142    .6583917
        REER |
          L1. |  -.003841   .0022018    -1.74   0.081    -.0081565    .0004745
         ERV |   6.144451   2.067252     2.97   0.003     2.092712    10.19619
       EUNEG |   .4859748    .125315     3.88   0.000      .240362    .7315876
        OPEN |   .0277188   .0058262     4.76   0.000     .0162996    .0391381
         TAX |   .0751412   .5352152     0.14   0.888    -.9738613    1.124144
      GOVSTA |   .0606171     .02033     2.98   0.003      .020771    .1004631
        CORR |  -.0899021   .0628074    -1.43   0.152    -.2130023    .0331982
         BUR |   .1198028   .0944943     1.27   0.205    -.0654026    .3050082
      MILINP |    .010738   .0397399     0.27   0.787    -.0671507    .0886267
       _cons |  -9.493738   1.515668    -6.26   0.000    -12.46439   -6.523084
-------------+----------------------------------------------------------------
     sigma_u |  .44496559
     sigma_e |  .41469707
         rho |  .53516617   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

A.9 Regression Output of STATA for Model (V)

A.9.1 Variance Inflation Factors

Variable	VIF	1/VIF
OPEN	3.24	0.308482
CORR	2.84	0.351581
BUR	2.70	0.369884
L.REER	2.54	0.393133
TAX	2.53	0.394799
lnSUM	2.49	0.401932
MILINP	2.33	0.428712
GOVSTA	2.27	0.440768
EUNEG	1.50	0.665481
RELAB	1.48	0.677721
INVL	1.40	0.713589
OTRC	1.39	0.721609
lnPERCD	1.32	0.760010
ERV	1.18	0.849769
Mean VIF	2.09	

A.9.2 Fixed Effects Results

```
Fixed-effects (within) regression               Number of obs      =       281
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.5818                         Obs per group: min =         3
       between = 0.5211                                        avg =      14.8
       overall = 0.4347                                        max =        24

                                                F(14,248)          =     24.64
corr(u_i, Xb)  = -0.9293                        Prob > F           =    0.0000
```

lnFDIN	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSUM	1.816186	.3543622	5.13	0.000	1.118243	2.51413
lnPERCD	-.0090926	.2146106	-0.04	0.966	-.4317844	.4135993
OTRC	.4969361	.14281	3.48	0.001	.2156609	.7782113
INVL	.0342458	.1076016	0.32	0.751	-.1776837	.2461753
RELAB	.3246712	.248168	1.31	0.192	-.1641145	.8134569
REER						
L1.	-.0010355	.0022581	-0.46	0.647	-.005483	.0034121
ERV	2.004654	2.494822	0.80	0.422	-2.909088	6.918395
EUNEG	.3182198	.1037421	3.07	0.002	.1138918	.5225477
OPEN	.0323747	.0088888	3.64	0.000	.0148675	.0498819
TAX	-.1136383	.6111917	-0.19	0.853	-1.317427	1.09015
GOVSTA	.0008236	.024303	0.03	0.973	-.0470431	.0486902
CORR	.0472319	.0758456	0.62	0.534	-.1021517	.1966155
BUR	-.0037486	.1152767	-0.03	0.974	-.2307949	.2232976
MILINP	-.0301432	.0388306	-0.78	0.438	-.106623	.0463367
_cons	-24.65631	4.204693	-5.86	0.000	-32.93778	-16.37485
sigma_u	1.360994					
sigma_e	.41466242					
rho	.91505745	(fraction of variance due to u_i)				

F test that all u_i=0: F(18, 248) = 17.02 Prob > F = 0.0000

A.9.3 Modified Wald Test for Groupwise Heteroskedasticity

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (19)  =     236.02
Prob>chi2 =     0.0000
```

A.9.4 Random Effects Results

```
Random-effects GLS regression                   Number of obs      =       281
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.5647                         Obs per group: min =         3
       between = 0.6255                                        avg =      14.8
       overall = 0.5448                                        max =        24

Random effects u_i ~ Gaussian                   Wald chi2(14)      =    337.89
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

lnFDIN	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnSUM	.7278219	.186672	3.90	0.000	.3619515	1.093692
lnPERCD	.2036854	.134867	1.51	0.131	-.0606491	.46802
OTRC	.5421109	.1408645	3.85	0.000	.2660215	.8182003
INVL	.1704658	.0980573	1.74	0.082	-.021723	.3626545
RELAB	.2407268	.2408195	1.00	0.317	-.2312708	.7127244
REER						
L1.	-.0031448	.0021523	-1.46	0.144	-.0073632	.0010736
ERV	4.854241	2.371105	2.05	0.041	.2069598	9.501522
EUNEG	.440807	.0986503	4.47	0.000	.2474561	.634158
OPEN	.0283278	.0080573	3.52	0.000	.0125358	.0441199
TAX	.0760029	.5984818	0.13	0.899	-1.097	1.249006
GOVSTA	.0397107	.0220633	1.80	0.072	-.0035326	.0829541
CORR	-.03867	.0722357	-0.54	0.592	-.1802492	.1029093
BUR	.0380102	.1140809	0.33	0.739	-.1855843	.2616046
MILINP	.003091	.0378234	0.08	0.935	-.0710415	.0772234
_cons	-11.65667	2.40322	-4.85	0.000	-16.36689	-6.946444
sigma_u	.74240378					
sigma_e	.41466242					
rho	.76221415	(fraction of variance due to u_i)				

A.9.5 Hausman Test

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnSUM	1.816186	.7278219	1.088364	.3012078
lnPERCD	-.0090926	.2036854	-.212778	.1669389
OTRC	.4969361	.5421109	-.0451748	.0234924
INVL	.0342458	.1704658	-.13622	.0443043
RELAB	.3246712	.2407268	.0839444	.0599444
L.REER	-.0010355	-.0031448	.0021093	.0006831
ERV	2.004654	4.854241	-2.849587	.7758853
EUNEG	.3182198	.440807	-.1225873	.0321022
OPEN	.0323747	.0283278	.0040469	.0037538
TAX	-.1136383	.0760029	-.1896412	.123995
GOVSTA	.0008236	.0397107	-.0388871	.0101905
CORR	.0472319	-.03867	.0859019	.0231206
BUR	-.0037486	.0380102	-.0417588	.0165614
MILINP	-.0301432	.003091	-.0332341	.0087869

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 14.16
Prob>chi2 = 0.4381
(V_b-V_B is not positive definite)

A.9.6 Breusch and Pagan Lagrangian Multiplier Test

Breusch and Pagan Lagrangian multiplier test for random effects

lnFDIN[i,t] = Xb + u[i] + e[i,t]

Estimated results:

	Var	sd = sqrt(Var)
lnFDIN	.8246539	.9081046
e	.1719449	.4146624
u	.5511634	.7424038

Test: Var(u) = 0
chi2(1) = 592.71
Prob > chi2 = 0.0000

.

A.9.7 Wooldridge Autocorrelation Test for Autocorrelation in Panel Data

```
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      18) =     42.270
           Prob > F =      0.0000
```

A.9.8 Random Effects Results with Robust and Clustered Standard Errors

```
Random-effects GLS regression                   Number of obs      =       281
Group variable: i                               Number of groups   =        19

R-sq:  within  = 0.5647                         Obs per group: min =         3
       between = 0.6255                                        avg =      14.8
       overall = 0.5448                                        max =        24

Random effects u_i ~ Gaussian                   Wald chi2(14)      =    413.72
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                                    (Std. Err. adjusted for clustering on i)
```

lnFDIN	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnSUM	.7278219	.1716668	4.24	0.000	.3913612	1.064283
lnPERCD	.2036854	.1413811	1.44	0.150	-.0734165	.4807873
OTRC	.5421109	.122674	4.42	0.000	.3016743	.7825474
INVL	.1704658	.102579	1.66	0.097	-.0305853	.3715168
RELAB	.2407268	.2196497	1.10	0.273	-.1897787	.6712323
REER						
L1.	-.0031448	.0021999	-1.43	0.153	-.0074565	.0011669
ERV	4.854241	2.012876	2.41	0.016	.909076	8.799406
EUNEG	.440807	.1204712	3.66	0.000	.2046879	.6769262
OPEN	.0283278	.0067071	4.22	0.000	.0151821	.0414735
TAX	.0760029	.5616543	0.14	0.892	-1.024819	1.176825
GOVSTA	.0397107	.0198344	2.00	0.045	.0008361	.0785853
CORR	-.03867	.0599191	-0.65	0.519	-.1561093	.0787693
BUR	.0380102	.0988207	0.38	0.701	-.1556748	.2316951
MILINP	.003091	.0390978	0.08	0.937	-.0735394	.0797213
_cons	-11.65667	2.200845	-5.30	0.000	-15.97025	-7.343092
sigma_u	.74240378					
sigma_e	.41466242					
rho	.76221415	(fraction of variance due to u_i)				

A.10 Regression Output of STATA for Model (VI)

A.10.1 Variance Inflation Factors

Variable	VIF	1/VIF
lnSUM	2.08	0.479649
lnFDIN	1.98	0.505635
CUD	1.43	0.701570
REER	1.37	0.729859
lnPERCD	1.19	0.838758
OTRC	1.18	0.850916
Mean VIF	1.54	

A.10.2 OLS Estimates

Source	SS	df	MS		
Model	414.137913	49	8.45179415	Number of obs =	295
Residual	12.273585	245	.050096265	F(49, 245) =	168.71
				Prob > F =	0.0000
				R-squared =	0.9712
				Adj R-squared =	0.9655
Total	426.411498	294	1.45037925	Root MSE =	.22382

lnEX	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSUM	1.347179	.3211179	4.20	0.000	.714675	1.979683
lnPERCD	.7285891	.1164922	6.25	0.000	.4991351	.9580432
OTRC	-.2428391	.0753718	-3.22	0.001	-.3912986	-.0943796
REER	.0004474	.0017038	0.26	0.793	-.0029086	.0038034
CUD	.2929451	.0570611	5.13	0.000	.1805522	.4053381
lnFDIN	-.0218888	.036283	-0.60	0.547	-.0933551	.0495776
D1982	.0727571	.2243086	0.32	0.746	-.3690621	.5145763
D1983	(dropped)					
D1984	.0683788	.1903018	0.36	0.720	-.3064574	.4432151
D1985	.0722033	.1910406	0.38	0.706	-.3040882	.4484948
D1986	.2159857	.1906393	1.13	0.258	-.1595153	.5914868
D1987	.4413194	.1933302	2.28	0.023	.0605182	.8221206
D1988	.2141195	.192403	1.11	0.267	-.1648555	.5930945
D1989	.1372884	.1904036	0.72	0.472	-.2377485	.5123253
D1990	.5546847	.1928705	2.88	0.004	.1747888	.9345806
D1991	.4867969	.1942048	2.51	0.013	.1042728	.8693209
D1992	.5547397	.1995393	2.78	0.006	.1617084	.9477711
D1993	.6723695	.2059727	3.26	0.001	.2666663	1.078073
D1994	.2983154	.2080849	1.43	0.153	-.1115481	.7081789
D1995	.5765487	.2130236	2.71	0.007	.1569574	.9961401
D1996	.6132204	.2246679	2.73	0.007	.1706935	1.055747
D1997	.7670666	.2299245	3.34	0.001	.3141858	1.219947
D1998	.6443437	.235654	2.73	0.007	.1801774	1.10851
D1999	.4619874	.2356606	1.96	0.051	-.0021919	.9261666
D2000	.5794768	.2499316	2.32	0.021	.0871881	1.071766
D2001	.215858	.2390423	0.90	0.367	-.2549821	.6866981
D2002	.5012669	.2474211	2.03	0.044	.013923	.9886108
D2003	.7362458	.2578232	2.86	0.005	.228413	1.244079
D2004	.9443807	.2733201	3.46	0.001	.4060237	1.482738
D2005	1.025095	.2874358	3.57	0.000	.4589346	1.591256
D2006	1.098904	.3037727	3.62	0.000	.5005647	1.697243
D2007	1.177381	.3194034	3.69	0.000	.5482537	1.806508
DAustria	2.212871	.9798631	2.26	0.025	.282841	4.142902
DCanada	.4589638	.7283024	0.63	0.529	-.9755691	1.893497
DDenmark	1.172143	1.009937	1.16	0.247	-.8171244	3.161411
DFinland	2.034661	1.028823	1.98	0.049	.0081958	4.061127
DFrance	2.273439	.5630509	4.04	0.000	1.164401	3.382477
DGermany	2.843727	.4614259	6.16	0.000	1.934859	3.752594
DGreece	2.230902	.9637522	2.31	0.021	.3326049	4.129199
DHungary	4.329032	1.007095	4.30	0.000	2.345363	6.3127
DItaly	3.037571	.5991839	5.07	0.000	1.857363	4.21778
DJapan	-.3637251	.222133	-1.64	0.103	-.8012593	.073809
DKorea	3.068392	.7841955	3.91	0.000	1.523767	4.613018
DNetherlands	2.800106	.8617281	3.25	0.001	1.102765	4.497446
DNorway	1.140795	1.027072	1.11	0.268	-.882222	3.163812
DPoland	4.156867	.9036968	4.60	0.000	2.37686	5.936873
DSpain	2.745714	.7461073	3.68	0.000	1.276111	4.215317
DSweden	1.969872	.9381335	2.10	0.037	.1220359	3.817708
DSwitzerland	2.690137	.9569147	2.81	0.005	.8053083	4.574967
DUK	1.990136	.5399261	3.69	0.000	.9266465	3.053625
DUSA	(dropped)					
_cons	-25.89003	4.582359	-5.65	0.000	-34.91587	-16.86418

A.10.3 Hetereoskedasticity Test

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnEX

         chi2(1)      =    7.86
         Prob > chi2  =   0.0051
```

A.10.4 OLS Estimates with Robust Standard Errors

```
Linear regression                                      Number of obs =     295
                                                       F( 49,   245) =  262.95
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.9712
                                                       Root MSE      =  .22382
```

lnEX	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSUM	1.347179	.3196986	4.21	0.000	.7174707	1.976887
lnPERCD	.7285891	.0995316	7.32	0.000	.5325423	.9246359
OTRC	-.2428391	.0805794	-3.01	0.003	-.4015559	-.0841223
REER	.0004474	.0016603	0.27	0.788	-.0028229	.0037177
CUD	.2929451	.0654904	4.47	0.000	.1639491	.4219412
lnFDIN	-.0218888	.0359802	-0.61	0.544	-.0927588	.0489813
D1982	.0727571	.2038231	0.36	0.721	-.328712	.4742263
D1983	(dropped)					
D1984	.0683788	.1663932	0.41	0.681	-.2593649	.3961225
D1985	.0722033	.1401864	0.52	0.607	-.203921	.3483275
D1986	.2159857	.129558	1.67	0.097	-.0392039	.4711753
D1987	.4413194	.1188059	3.71	0.000	.2073081	.6753307
D1988	.2141195	.1582833	1.35	0.177	-.0976501	.5258892
D1989	.1372884	.1405142	0.98	0.330	-.1394816	.4140583
D1990	.5546847	.12898	4.30	0.000	.3006335	.8087359
D1991	.4867969	.1368057	3.56	0.000	.2173316	.7562622
D1992	.5547397	.1380814	4.02	0.000	.2827617	.8267178
D1993	.6723695	.155441	4.33	0.000	.3661983	.9785407
D1994	.2983154	.1674857	1.78	0.076	-.0315801	.6282109
D1995	.5765487	.1649583	3.50	0.001	.2516314	.901466
D1996	.6132204	.1752817	3.50	0.001	.267969	.9584717
D1997	.7670666	.1854594	4.14	0.000	.4017683	1.132365
D1998	.6443437	.1933987	3.33	0.001	.2634074	1.02528
D1999	.4619874	.2049258	2.25	0.025	.0583463	.8656284
D2000	.5794768	.2173532	2.67	0.008	.1513576	1.007596
D2001	.215858	.2084912	1.04	0.302	-.1948059	.6265219
D2002	.5012669	.2148332	2.33	0.020	.0781112	.9244226
D2003	.7362458	.2287666	3.22	0.001	.2856455	1.186846
D2004	.9443807	.2472697	3.82	0.000	.4573352	1.431426
D2005	1.025095	.2639057	3.88	0.000	.5052816	1.544909
D2006	1.098904	.2824104	3.89	0.000	.5426419	1.655166
D2007	1.177381	.3033463	3.88	0.000	.5798812	1.77488
DAustria	2.212871	.9747626	2.27	0.024	.2928876	4.132855
DCanada	.4589638	.7279022	0.63	0.529	-.9747807	1.892708
DDenmark	1.172143	.999227	1.17	0.242	-.7960281	3.140315
DFinland	2.034661	1.020664	1.99	0.047	.0242656	4.045057
DFrance	2.273439	.5699986	3.99	0.000	1.150716	3.396161
DGermany	2.843727	.4685211	6.07	0.000	1.920884	3.76657
DGreece	2.230902	.9772493	2.28	0.023	.3060197	4.155784
DHungary	4.329032	1.062624	4.07	0.000	2.235988	6.422076
DItaly	3.037571	.6039133	5.03	0.000	1.848047	4.227096
DJapan	-.3637251	.216269	-1.68	0.094	-.7897088	.0622585
DKorea	3.068392	.8063741	3.81	0.000	1.480082	4.656702
DNetherlands	2.800106	.8619543	3.25	0.001	1.10232	4.497892
DNorway	1.140795	1.015272	1.12	0.262	-.8589808	3.140571
DPoland	4.156867	.9751861	4.26	0.000	2.236048	6.077685
DSpain	2.745714	.7487443	3.67	0.000	1.270917	4.220511
DSweden	1.969872	.9254199	2.13	0.034	.1470779	3.792666
DSwitzerland	2.690137	.9432299	2.85	0.005	.8322632	4.548012
DUK	1.990136	.5446473	3.65	0.000	.9173471	3.062924
DUSA	(dropped)					
_cons	-25.89003	4.806612	-5.39	0.000	-35.35758	-16.42247

A.10.5 Wooldridge Autocorrelation Test

```
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      18) =     19.900
           Prob > F =      0.0003
```

A.10.6 OLS Estimates with Robust and Clustered Standard Errors

```
Linear regression                               Number of obs =     295
                                                F( 17,     18) =       .
                                                Prob > F      =       .
                                                R-squared     =  0.9712
                                                Root MSE      =  .22382

                                   (Std. Err. adjusted for 19 clusters in i)
------------------------------------------------------------------------------
             |               Robust
       lnEX |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+----------------------------------------------------------------
       lnSUM |   1.347179   .7378715     1.83   0.085    -.2030316    2.89739
     lnPERCD |   .7285891   .1355069     5.38   0.000     .4438997    1.013279
        OTRC |  -.2428391    .185612    -1.31   0.207    -.6327954    .1471172
        REER |   .0004474   .0024795     0.18   0.859    -.0047618    .0056566
         CUD |   .2929451   .1752729     1.67   0.112    -.0752895    .6611798
      lnFDIN |  -.0218888   .0445704    -0.49   0.629    -.1155277    .0717502
       D1982 |   .0727571   .1045184     0.70   0.495    -.1468279    .2923422
       D1983 |  (dropped)
       D1984 |   .0683788   .1039563     0.66   0.519    -.1500253    .2867829
       D1985 |   .0722033   .1009425     0.72   0.484     -.139869    .2842755
       D1986 |   .2159857   .1481891     1.46   0.162     -.095348    .5273195
       D1987 |   .4413194    .157447     2.80   0.012     .1105356    .7721032
       D1988 |   .2141195    .186177     1.15   0.265    -.1770239     .605263
       D1989 |   .1372884   .1556178     0.88   0.389    -.1896524    .4642292
       D1990 |   .5546847   .1827941     3.03   0.007     .1706485    .9387209
       D1991 |   .4867969   .1942326     2.51   0.022     .0787294    .8948644
       D1992 |   .5547397   .2008575     2.76   0.013     .1327538    .9767257
       D1993 |   .6723695   .2495763     2.69   0.015     .1480291     1.19671
       D1994 |   .2983154    .252667     1.18   0.253    -.2325182    .8291491
       D1995 |   .5765487   .2825562     2.04   0.056    -.0170798    1.170177
       D1996 |   .6132204   .3474487     1.76   0.095    -.1167422    1.343183
       D1997 |   .7670666   .3819668     2.01   0.060    -.0354158    1.569549
       D1998 |   .6443437   .4038388     1.60   0.128    -.2040901    1.492777
       D1999 |   .4619874   .4150285     1.11   0.280    -.4099551     1.33393
       D2000 |   .5794768   .4431318     1.31   0.207    -.3515085    1.510462
       D2001 |    .215858   .4255892     0.51   0.618    -.6782718    1.109988
       D2002 |   .5012669   .4493958     1.12   0.279    -.4428788    1.445412
       D2003 |   .7362458   .4850594     1.52   0.146    -.2828262    1.755318
       D2004 |   .9443807   .5265628     1.79   0.090    -.1618867    2.050648
       D2005 |   1.025095   .5567078     1.84   0.082    -.1445047    2.194695
       D2006 |   1.098904   .5824357     1.89   0.075     -.124748    2.322556
       D2007 |   1.177381   .6231106     1.89   0.075    -.1317261    2.486487
    DAustria |   2.212871   2.209814     1.00   0.330    -2.429775    6.855518
     DCanada |   .4589638   1.658752     0.28   0.785    -3.025945    3.943872
    DDenmark |   1.172143   2.266734     0.52   0.611    -3.590088    5.934375
    DFinland |   2.034661   2.310107     0.88   0.390    -2.818694    6.888017
     DFrance |   2.273439   1.286053     1.77   0.094    -.4284586    4.975336
    DGermany |   2.843727   1.063937     2.67   0.016     .6084775    5.078976
     DGreece |   2.230902   2.212003     1.01   0.327    -2.416345    6.878148
    DHungary |   4.329032   2.327675     1.86   0.079    -.5612328    9.219296
      DItaly |   3.037571    1.38106     2.20   0.041     .1360724    5.939071
      DJapan |  -.3637251   .4491491    -0.81   0.429    -1.307352    .5799022
      DKorea |   3.068392   1.822997     1.68   0.110    -.7615827    6.898367
DNetherlands |   2.800106   1.984537     1.41   0.175    -1.369251    6.969462
     DNorway |   1.140795   2.300633     0.50   0.626    -3.692655    5.974245
     DPoland |   4.156867   2.081142     2.00   0.061    -.2154499    8.529183
      DSpain |   2.745714   1.685161     1.63   0.121    -.7946773    6.286105
     DSweden |   1.969872   2.116904     0.93   0.364    -2.477579    6.417323
DSwitzerland |   2.690137   2.156702     1.25   0.228    -1.840925     7.2212
        DUK |   1.990136    1.23219     1.62   0.124    -.5985987    4.57887
       DUSA |  (dropped)
      _cons |  -25.89003   10.93475    -2.37   0.029    -48.86309   -2.916963
------------------------------------------------------------------------------
```

A.10.7 F Test for Year Dummies

```
( 1)  D1982 = 0
( 2)  D1984 = 0
( 3)  D1985 = 0
( 4)  D1986 = 0
( 5)  D1987 = 0
( 6)  D1988 = 0
( 7)  D1989 = 0
( 8)  D1990 = 0
( 9)  D1991 = 0
(10)  D1992 = 0
(11)  D1993 = 0
(12)  D1994 = 0
(13)  D1995 = 0
(14)  D1996 = 0
(15)  D1997 = 0
(16)  D1998 = 0
(17)  D1999 = 0
(18)  D2000 = 0
(19)  D2001 = 0
(20)  D2002 = 0
(21)  D2003 = 0
(22)  D2004 = 0
(23)  D2005 = 0
(24)  D2006 = 0
(25)  D2007 = 0
      Constraint 7 dropped
      Constraint 8 dropped
      Constraint 10 dropped
      Constraint 16 dropped
      Constraint 18 dropped
      Constraint 22 dropped
      Constraint 24 dropped

      F( 18,    18) =  483.89
           Prob > F =    0.0000
```

A.10.8 F Test for Country Pair Dummies

```
( 1)  DAustria = 0
( 2)  DCanada = 0
( 3)  DDenmark = 0
( 4)  DFinland = 0
( 5)  DFrance = 0
( 6)  DGermany = 0
( 7)  DGreece = 0
( 8)  DHungary = 0
( 9)  DItaly = 0
(10)  DJapan = 0
(11)  DKorea = 0
(12)  DNetherlands = 0
(13)  DNorway = 0
(14)  DPoland = 0
(15)  DSpain = 0
(16)  DSweden = 0
(17)  DSwitzerland = 0
(18)  DUK = 0

      F( 18,    18) = 3.8e+06
           Prob > F =    0.0000
```

A.11 Regression Output of STATA for Model (VII)

A.11.1 Variance Inflation Factors

Variable	VIF	1/VIF
lnFDIN	1.52	0.656658
lnSIM	1.49	0.672308
CUD	1.42	0.703336
REER	1.31	0.760522
lnPERCD	1.18	0.848555
OTRC	1.16	0.862540
Mean VIF	1.35	

A.11.2 OLS Estimates

Source	SS	df	MS
Model	413.876957	49	8.44646851
Residual	12.5345413	245	.051161393
Total	426.411498	294	1.45037925

Number of obs = 295
F(49, 245) = 165.09
Prob > F = 0.0000
R-squared = 0.9706
Adj R-squared = 0.9647
Root MSE = .22619

lnEX	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSIM	-.9899727	.2842064	-3.48	0.001	-1.549772	-.430173
lnPERCD	.8521781	.1084992	7.85	0.000	.6384679	1.065888
OTRC	-.2482287	.076349	-3.25	0.001	-.3986128	-.0978446
REER	.0004331	.0017237	0.25	0.802	-.0029621	.0038282
CUD	.2584491	.0576879	4.48	0.000	.1448215	.3720766
lnFDIN	-.0251079	.0367096	-0.68	0.495	-.0974146	.0471987
D1982	.0189345	.2266222	0.08	0.933	-.4274418	.4653108
D1983	(dropped)					
D1984	.152634	.1920844	0.79	0.428	-.2257135	.5309814
D1985	.2093364	.1918744	1.09	0.276	-.1685974	.5872702
D1986	.4309148	.1925728	2.24	0.026	.0516053	.8102243
D1987	.7444821	.1942987	3.83	0.000	.3617731	1.127191
D1988	.5403043	.1913288	2.82	0.005	.1634452	.9171634
D1989	.4801094	.1861068	2.58	0.010	.113536	.8466828
D1990	.9886392	.184687	5.35	0.000	.6248624	1.352416
D1991	.941655	.1850322	5.09	0.000	.5771982	1.306112
D1992	1.057709	.1871376	5.65	0.000	.689105	1.426313
D1993	1.252992	.1901503	6.59	0.000	.8784546	1.62753
D1994	.8491971	.1967854	4.32	0.000	.4615901	1.236804
D1995	1.20089	.1957333	6.14	0.000	.8153552	1.586425
D1996	1.327317	.201078	6.60	0.000	.9312547	1.723379
D1997	1.552053	.1998737	7.77	0.000	1.158363	1.945743
D1998	1.471637	.1951183	7.54	0.000	1.087313	1.85596
D1999	1.263964	.1986562	6.36	0.000	.8726725	1.655256
D2000	1.450897	.2044418	7.10	0.000	1.048209	1.853585
D2001	1.042275	.2017885	5.17	0.000	.6448139	1.439737
D2002	1.379768	.2041841	6.76	0.000	.9775875	1.781948
D2003	1.665821	.2073129	8.04	0.000	1.257478	2.074164
D2004	1.962814	.2118931	9.26	0.000	1.545449	2.380179
D2005	2.114083	.2169199	9.75	0.000	1.686818	2.541349
D2006	2.260633	.2223595	10.17	0.000	1.822653	2.698614
D2007	2.386759	.2342965	10.19	0.000	1.925266	2.848251
DAustria	-2.290199	.4115374	-5.56	0.000	-3.100801	-1.479596
DCanada	-3.249218	.3974166	-8.18	0.000	-4.032008	-2.466429
DDenmark	-3.521895	.434124	-8.11	0.000	-4.376987	-2.666804
DFinland	-2.833071	.3979738	-7.12	0.000	-3.616958	-2.049185
DFrance	-1.097136	.3994412	-2.75	0.006	-1.883913	-.3103595
DGermany	-.3704758	.4214847	-0.88	0.380	-1.200672	.4597201
DGreece	-2.355265	.3433615	-6.86	0.000	-3.031582	-1.678948
DHungary	-.9278421	.2008027	-4.62	0.000	-1.323362	-.5323223
DItaly	-.3895267	.3768821	-1.03	0.302	-1.131869	.3528157
DJapan	-3.28618	.5741274	-5.72	0.000	-4.417035	-2.155325
DKorea	-.7375672	.2778087	-2.65	0.008	-1.284765	-.1903692
DNetherlands	-1.261561	.413594	-3.05	0.003	-2.076215	-.4469077
DNorway	-3.569256	.4560795	-7.83	0.000	-4.467593	-2.670919
DPoland	(dropped)					
DSpain	-.9343399	.3552496	-2.63	0.009	-1.634073	-.2346069
DSweden	-2.392137	.4404042	-5.43	0.000	-3.259599	-1.524676
DSwitzerland	-1.72282	.4609045	-3.74	0.000	-2.630661	-.814979
DUK	-1.355407	.4174213	-3.25	0.001	-2.177599	-.5332147
DUSA	-2.660531	.6860555	-3.88	0.000	-4.01185	-1.309211
_cons	-6.577262	.6760613	-9.73	0.000	-7.908895	-5.245628

A.11.3 Heteroskedasticity Test

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnEX

         chi2(1)      =    13.59
         Prob > chi2  =   0.0002
```

A.11.4 OLS Estimates with Robust Standard Errors

```
Linear regression                               Number of obs =     295
                                                F( 49,   245) =  252.10
                                                Prob > F      =  0.0000
                                                R-squared     =  0.9706
                                                Root MSE      =  .22619
```

lnEX	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSIM	-.9899727	.295092	-3.35	0.001	-1.571214	-.4087318
lnPERCD	.8521781	.1486034	5.73	0.000	.5594748	1.144881
OTRC	-.2482287	.0801728	-3.10	0.002	-.4061445	-.0903129
REER	.0004331	.0016467	0.26	0.793	-.0028104	.0036765
CUD	.2584491	.0651394	3.97	0.000	.1301444	.3867538
lnFDIN	-.0251079	.0368551	-0.68	0.496	-.0977013	.0474854
D1982	.0189345	.181699	0.10	0.917	-.338957	.376826
D1983	(dropped)					
D1984	.152634	.1575293	0.97	0.334	-.1576505	.4629184
D1985	.2093364	.1268452	1.65	0.100	-.0405098	.4591826
D1986	.4309148	.1205385	3.57	0.000	.1934909	.6683387
D1987	.7444821	.1088251	6.84	0.000	.5301299	.9588343
D1988	.5403043	.1449304	3.73	0.000	.2548357	.8257729
D1989	.4801094	.1318112	3.64	0.000	.2204818	.7397371
D1990	.9886392	.1035476	9.55	0.000	.784682	1.192596
D1991	.941655	.1134104	8.30	0.000	.7182712	1.165039
D1992	1.057709	.1117963	9.46	0.000	.8375044	1.277913
D1993	1.252992	.123964	10.11	0.000	1.008821	1.497163
D1994	.8491971	.1405384	6.04	0.000	.5723796	1.126015
D1995	1.20089	.1328201	9.04	0.000	.9392751	1.462505
D1996	1.327317	.1340562	9.90	0.000	1.063267	1.591366
D1997	1.552053	.1373919	11.30	0.000	1.281433	1.822673
D1998	1.471637	.1363235	10.80	0.000	1.203121	1.740152
D1999	1.263964	.1486433	8.50	0.000	.9711826	1.556746
D2000	1.450897	.1534485	9.46	0.000	1.148651	1.753144
D2001	1.042275	.1462769	7.13	0.000	.7541547	1.330396
D2002	1.379768	.1568484	8.80	0.000	1.070824	1.688711
D2003	1.665821	.1675972	9.94	0.000	1.335706	1.995936
D2004	1.962814	.1705743	11.51	0.000	1.626835	2.298793
D2005	2.114083	.1780526	11.87	0.000	1.763374	2.464792
D2006	2.260633	.1901133	11.89	0.000	1.886168	2.635098
D2007	2.386759	.2042503	11.69	0.000	1.984448	2.78907
DAustria	-2.290199	.5527903	-4.14	0.000	-3.379026	-1.201371
DCanada	-3.249218	.5392648	-6.03	0.000	-4.311405	-2.187032
DDenmark	-3.521895	.5873259	-6.00	0.000	-4.678748	-2.365043
DFinland	-2.833071	.5402513	-5.24	0.000	-3.897201	-1.768942
DFrance	-1.097136	.5267788	-2.08	0.038	-2.134729	-.0595433
DGermany	-.3704758	.5398916	-0.69	0.493	-1.433897	.6929453
DGreece	-2.355265	.4559858	-5.17	0.000	-3.253417	-1.457112
DHungary	-.9278421	.2364174	-3.92	0.000	-1.393512	-.4621721
DItaly	-.3895267	.5027204	-0.77	0.439	-1.379732	.6006787
DJapan	-3.28618	.6889647	-4.77	0.000	-4.643229	-1.92913
DKorea	-.7375672	.3838323	-1.92	0.056	-1.493599	.0184649
DNetherlands	-1.261561	.550517	-2.29	0.023	-2.345911	-.1772113
DNorway	-3.569256	.623172	-5.73	0.000	-4.796714	-2.341798
DPoland	(dropped)					
DSpain	-.9343399	.4505441	-2.07	0.039	-1.821774	-.0469061
DSweden	-2.392137	.5805918	-4.12	0.000	-3.535726	-1.248549
DSwitzerland	-1.72282	.6197182	-2.78	0.006	-2.943475	-.5021645
DUK	-1.355407	.5412675	-2.50	0.013	-2.421538	-.2892756
DUSA	-2.660531	.7796618	-3.41	0.001	-4.196226	-1.124836
_cons	-6.577262	.9178647	-7.17	0.000	-8.385174	-4.769349

A.11.5 Wooldridge Autocorrelation Test

```
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      18) =     20.178
           Prob > F =      0.0003
```

A.11.6 OLS Estimates with Robust and Clustered Standard Errors

```
Linear regression                               Number of obs =     295
                                                F( 17,    18) =       .
                                                Prob > F      =       .
                                                R-squared     =  0.9706
                                                Root MSE      =  .22619

                                   (Std. Err. adjusted for 19 clusters in i)
```

lnEX	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSIM	-.9899727	.6585487	-1.50	0.150	-2.373532	.3935867
lnPERCD	.8521781	.1891128	4.51	0.000	.4548669	1.249489
OTRC	-.2482287	.169662	-1.46	0.161	-.6046754	.108218
REER	.0004331	.0024523	0.18	0.862	-.0047191	.0055853
CUD	.2584491	.1663261	1.55	0.138	-.0909891	.6078873
lnFDIN	-.0251079	.048955	-0.51	0.614	-.1279586	.0777427
D1982	.0189345	.0988572	0.19	0.850	-.1887567	.2266257
D1983	(dropped)					
D1984	.152634	.1225079	1.25	0.229	-.1047455	.4100134
D1985	.2093364	.0899161	2.33	0.032	.0204297	.398243
D1986	.4309148	.1012468	4.26	0.000	.2182031	.6436265
D1987	.7444821	.1395066	5.34	0.000	.4513896	1.037575
D1988	.5403043	.1604043	3.37	0.003	.2033073	.8773012
D1989	.4801094	.141665	3.39	0.003	.1824822	.7777366
D1990	.9886392	.1403878	7.04	0.000	.6936953	1.283583
D1991	.941655	.146785	6.42	0.000	.6332713	1.250039
D1992	1.057709	.1512946	6.99	0.000	.7398507	1.375567
D1993	1.252992	.1667239	7.52	0.000	.9027185	1.603266
D1994	.8491971	.1869131	4.54	0.000	.4565074	1.241887
D1995	1.20089	.196836	6.10	0.000	.7873529	1.614427
D1996	1.327317	.2100099	6.32	0.000	.8861023	1.768531
D1997	1.552053	.2143937	7.24	0.000	1.101628	2.002477
D1998	1.471637	.2068623	7.11	0.000	1.037035	1.906238
D1999	1.263964	.1987421	6.36	0.000	.8464228	1.681506
D2000	1.450897	.2289544	6.34	0.000	.9698817	1.931913
D2001	1.042275	.2130556	4.89	0.000	.5946622	1.489889
D2002	1.379768	.2414743	5.71	0.000	.8724491	1.887086
D2003	1.665821	.2608491	6.39	0.000	1.117797	2.213845
D2004	1.962814	.2848767	6.89	0.000	1.36431	2.561318
D2005	2.114083	.3087205	6.85	0.000	1.465486	2.762681
D2006	2.260633	.3178954	7.11	0.000	1.59276	2.928507
D2007	2.386759	.3421568	6.98	0.000	1.667914	3.105604
DAustria	-2.290199	.6722189	-3.41	0.003	-3.702478	-.8779192
DCanada	-3.249218	.7226917	-4.50	0.000	-4.767537	-1.7309
DDenmark	-3.521895	.7024766	-5.01	0.000	-4.997744	-2.046047
DFinland	-2.833071	.6439364	-4.40	0.000	-4.185932	-1.480211
DFrance	-1.097136	.715165	-1.53	0.142	-2.599642	.4053695
DGermany	-.3704758	.8101551	-0.46	0.653	-2.072549	1.331597
DGreece	-2.355265	.5148591	-4.57	0.000	-3.436943	-1.273586
DHungary	-.9278421	.4022765	-2.31	0.033	-1.772994	-.0826904
DItaly	-.3895267	.659038	-0.59	0.562	-1.774114	.9950609
DJapan	-3.28618	1.271885	-2.58	0.019	-5.958312	-.6140481
DKorea	-.7375672	.4775245	-1.54	0.140	-1.740809	.2656745
DNetherlands	-1.261561	.6865908	-1.84	0.083	-2.704035	.1809126
DNorway	-3.569256	.7918284	-4.51	0.000	-5.232826	-1.905686
DPoland	(dropped)					
DSpain	-.9343399	.51062	-1.83	0.084	-2.007113	.1384329
DSweden	-2.392137	.6988776	-3.42	0.003	-3.860425	-.92385
DSwitzerland	-1.72282	.8129117	-2.12	0.048	-3.430684	-.0149557
DUK	-1.355407	.7703335	-1.76	0.095	-2.973818	.2630037
DUSA	-2.660531	1.559807	-1.71	0.105	-5.937563	.6165021
_cons	-6.577262	1.200763	-5.48	0.000	-9.09997	-4.054553

A.11.7 F Test for Year Dummies

```
( 1)  D1982 = 0
( 2)  D1984 = 0
( 3)  D1985 = 0
( 4)  D1986 = 0
( 5)  D1987 = 0
( 6)  D1988 = 0
( 7)  D1989 = 0
( 8)  D1990 = 0
( 9)  D1991 = 0
(10)  D1992 = 0
(11)  D1993 = 0
(12)  D1994 = 0
(13)  D1995 = 0
(14)  D1996 = 0
(15)  D1997 = 0
(16)  D1998 = 0
(17)  D1999 = 0
(18)  D2000 = 0
(19)  D2001 = 0
(20)  D2002 = 0
(21)  D2003 = 0
(22)  D2004 = 0
(23)  D2005 = 0
(24)  D2006 = 0
(25)  D2007 = 0
      Constraint 7 dropped
      Constraint 8 dropped
      Constraint 10 dropped
      Constraint 16 dropped
      Constraint 18 dropped
      Constraint 22 dropped
      Constraint 24 dropped

      F( 18,    18) =  796.08
           Prob > F =    0.0000
```

A.11.8 F Test for Country Pair Dummies

```
( 1)  DAustria = 0
( 2)  DCanada = 0
( 3)  DDenmark = 0
( 4)  DFinland = 0
( 5)  DFrance = 0
( 6)  DGermany = 0
( 7)  DGreece = 0
( 8)  DHungary = 0
( 9)  DItaly = 0
(10)  DJapan = 0
(11)  DKorea = 0
(12)  DNetherlands = 0
(13)  DNorway = 0
(14)  DSpain = 0
(15)  DSweden = 0
(16)  DSwitzerland = 0
(17)  DUK = 0
(18)  DUSA = 0

      F( 18,    18) = 7.1e+06
           Prob > F =    0.0000
```

A.12 Regression Output of STATA for Model (VIII)

A.12.1 IV Estimates First Stage

```
Warning - collinearities detected
Vars dropped:       D1982 D1983 D2003 D2007 DUSA seatrulpart lawnordericrg

First-stage regressions
-----------------------

First-stage regression of lnFDIN:

OLS estimation
--------------

Estimates efficient for homoskedasticity only
Statistics consistent for homoskedasticity only

                                                      Number of obs =       291
                                                      F( 47,   243) =     28.02
                                                      Prob > F      =    0.0000
Total (centered) SS     =  242.0377472                Centered R2   =    0.8442
Total (uncentered) SS   =  974.5737651                Uncentered R2 =    0.9613
Residual SS             =  37.69822474                Root MSE      =     .3939
```

lnFDIN	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSUM	-1.469055	.5652172	-2.60	0.010	-2.582405	-.3557043
lnPERCD	-.0918848	.205243	-0.45	0.655	-.4961672	.3123976
OTRC	.1991242	.1320676	1.51	0.133	-.0610192	.4592675
REER	.0066783	.0030425	2.20	0.029	.0006853	.0126714
CUD	-.1337745	.1007464	-1.33	0.185	-.3322222	.0646731
D1984	-6.894	.9296771	-7.42	0.000	-8.725254	-5.062746
D1985	-7.03903	.9115026	-7.72	0.000	-8.834484	-5.243575
D1986	-7.045559	.9333263	-7.55	0.000	-8.884001	-5.207116
D1987	-6.87386	.9275068	-7.41	0.000	-8.700839	-5.046881
D1988	-6.746923	.9211198	-7.32	0.000	-8.561321	-4.932525
D1989	-.2370523	.3237612	-0.73	0.465	-.8747889	.4006842
D1990	.7120808	.3906364	1.82	0.070	-.0573848	1.481546
D1991	-2.08666	.2785442	-7.49	0.000	-2.635329	-1.537991
D1992	-13.10606	1.951747	-6.72	0.000	-16.95057	-9.261564
D1993	-12.88605	1.926652	-6.69	0.000	-16.68111	-9.090976
D1994	-13.14498	1.984536	-6.62	0.000	-17.05406	-9.235887
D1995	-10.6542	1.584089	-6.73	0.000	-13.7745	-7.533901
D1996	1.330524	.3973915	3.35	0.001	.5477524	2.113296
D1997	1.523401	.4079143	3.73	0.000	.7199021	2.3269
D1998	1.707109	.4218977	4.05	0.000	.8760655	2.538152
D1999	1.803049	.4195572	4.30	0.000	.9766165	2.629482
D2000	-1.948665	.2756831	-7.07	0.000	-2.491698	-1.405631
D2001	-3.949527	.5803814	-6.81	0.000	-5.092747	-2.806306
D2002	2.04706	.4251095	4.82	0.000	1.20969	2.88443
D2004	-.9752768	.1665483	-5.86	0.000	-1.303339	-.6472142
D2005	-.7940519	.1490787	-5.33	0.000	-1.087703	-.5004005
D2006	-.3907363	.141789	-2.76	0.006	-.6700285	-.111444
DAustria	-6.57436	1.70043	-3.87	0.000	-9.923824	-3.224896
DCanada	-5.020101	1.258171	-3.99	0.000	-7.498414	-2.541788
DDenmark	-6.462147	1.757485	-3.68	0.000	-9.923996	-3.000299
DFinland	-7.073166	1.782623	-3.97	0.000	-10.58453	-3.561801
DFrance	-3.382136	.9833502	-3.44	0.001	-5.319114	-1.445158
DGermany	-2.496212	.8177922	-3.05	0.003	-4.107078	-.8853457
DGreece	-6.36557	1.675849	-3.80	0.000	-9.666614	-3.064526
DHungary	-8.135805	1.724816	-4.72	0.000	-11.5333	-4.738306
DItaly	-3.553559	1.047048	-3.39	0.001	-5.616008	-1.491111
DJapan	-1.516095	.3848248	-3.94	0.000	-2.274113	-.7580765
DKorea	-5.874121	1.350477	-4.35	0.000	-8.534256	-3.213985
DNetherlands	-4.62403	1.513775	-3.05	0.003	-7.605825	-1.642234
DNorway	-6.971982	1.775752	-3.93	0.000	-10.46981	-3.47415
DPoland	-7.367677	1.539779	-4.78	0.000	-10.4007	-4.334659
DSpain	-5.05106	1.295913	-3.90	0.000	-7.603717	-2.498404
DSweden	-5.245328	1.64389	-3.19	0.002	-8.483421	-2.007235
DSwitzerland	-5.425602	1.67353	-3.24	0.001	-8.722079	-2.129126
DUK	-2.850355	.9482676	-3.01	0.003	-4.718228	-.9824815
CORR	7.010459	1.12888	6.21	0.000	4.78682	9.234098
INVL	-.1381475	.1051689	-1.31	0.190	-.3453064	.0690115
_cons	10.63164	7.342683	1.45	0.149	-3.831791	25.09507

```
Included instruments: lnSUM lnPERCD OTRC REER CUD D1984 D1985 D1986 D1987 D1988
                      D1989 D1990 D1991 D1992 D1993 D1994 D1995 D1996 D1997
                      D1998 D1999 D2000 D2001 D2002 D2004 D2005 D2006 DAustria
                      DCanada DDenmark DFinland DFrance DGermany DGreece
                      DHungary DItaly DJapan DKorea DNetherlands DNorway DPoland
                      DSpain DSweden DSwitzerland DUK CORR INVL
------------------------------------------------------------------------------
F test of excluded instruments:
  F(  2,   243) =    19.81
  Prob > F      =   0.0000
Angrist-Pischke multivariate F test of excluded instruments:
  F(  2,   243) =    19.81
  Prob > F      =   0.0000
```

Summary results for first-stage regressions

Variable	F(2, 243)	P-val	(Underid) AP Chi-sq(2)	P-val	(Weak id) AP F(2, 243)
lnFDIN	19.81	0.0000	47.45	0.0000	19.81

Stock-Yogo weak ID test critical values for single endogenous regressor:

10% maximal IV size	19.93
15% maximal IV size	11.59
20% maximal IV size	8.75
25% maximal IV size	7.25

Source: Stock-Yogo (2005). Reproduced by permission.

Underidentification test
Ho: matrix of reduced form coefficients has rank=K1-1 (underidentified)
Ha: matrix has rank=K1 (identified)
Anderson canon. corr. LM statistic Chi-sq(2)=**40.79** P-val=**0.0000**

Weak identification test
Ho: equation is weakly identified
Cragg-Donald Wald F statistic **19.81**

Stock-Yogo weak ID test critical values for K1=1 and L1=2:

10% maximal IV size	19.93
15% maximal IV size	11.59
20% maximal IV size	8.75
25% maximal IV size	7.25

Source: Stock-Yogo (2005). Reproduced by permission.

Weak-instrument-robust inference
Tests of joint significance of endogenous regressors B1 in main equation
Ho: B1=0 and orthogonality conditions are valid

Anderson-Rubin Wald test	F(2,243)=	9.43	P-val=**0.0001**
Anderson-Rubin Wald test	Chi-sq(2)=	22.58	P-val=**0.0000**
Stock-Wright LM S statistic	Chi-sq(2)=	20.96	P-val=**0.0000**

Number of observations	N =	291
Number of regressors	K =	47
Number of endogenous regressors	K1 =	1
Number of instruments	L =	48
Number of excluded instruments	L1 =	2

A.12.2 IV Estimates Second Stage

```
IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics consistent for homoskedasticity only

                                                      Number of obs =       291
                                                      F( 46,   244) =    123.27
                                                      Prob > F      =    0.0000
Total (centered) SS     =  426.2449822                Centered R2   =    0.9582
Total (uncentered) SS   =  1942.882173                Uncentered R2 =    0.9908
Residual SS             =  17.82539835                Root MSE      =     .2475

------------------------------------------------------------------------------
         lnEX |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
       lnFDIN |   .3682979   .0998294     3.69   0.000     .1726358    .56396
        lnSUM |   1.976821    .301146     6.56   0.000     1.386586    2.567056
      lnPERCD |   .7655754   .1311095     5.84   0.000     .5086055    1.022545
         OTRC |  -.3174621   .0855485    -3.71   0.000     -.485134   -.1497902
         REER |  -.0020566   .0017352    -1.19   0.236    -.0054575    .0013443
          CUD |    .330675   .0626225     5.28   0.000     .2079371    .4534129
        D1984 |   .1861815   .2513682     0.74   0.459    -.3064912    .6788541
        D1985 |   .2469231   .2585076     0.96   0.339    -.2597425    .7535887
        D1986 |   .3869005   .2445707     1.58   0.114    -.0924493    .8662503
        D1987 |   .5417699   .2288322     2.37   0.018     .0932671    .9902728
        D1988 |   .2673244   .2170206     1.23   0.218    -.1580282    .6926771
        D1989 |   .1630771    .210664     0.77   0.439    -.2498167    .5759709
        D1990 |   .4460786   .1890883     2.36   0.018     .0754724    .8166848
        D1991 |   .3265693   .1788088     1.83   0.068    -.0238895     .677028
        D1992 |   .3692491   .1743894     2.12   0.034     .0274522     .711046
        D1993 |   .4103186   .1643379     2.50   0.013     .0882222     .732415
        D1994 |   .1316476   .1763478     0.75   0.455    -.2139878     .477283
        D1995 |   .3543166   .1669457     2.12   0.034     .0271091    .6815241
        D1996 |   .2855274   .1504568     1.90   0.058    -.0093624    .5804172
        D1997 |    .363193   .1352502     2.69   0.007     .0981074    .6282786
        D1998 |   .1676932   .1219336     1.38   0.169    -.0712923    .4066787
        D1999 |  -.0522944   .1135309    -0.46   0.645    -.2748109    .1702222
        D2000 |  -.0698347   .0962518    -0.73   0.468    -.2584847    .1188153
        D2001 |  -.3382006   .1042621    -3.24   0.001    -.5425506   -.1338507
        D2002 |  -.1142019   .0970447    -1.18   0.239    -.3044061    .0760022
        D2004 |    .141979   .0776759     1.83   0.068    -.010263     .294221
        D2005 |   .1512823   .0780188     1.94   0.052    -.0016317    .3041963
        D2006 |   .0646307   .0758041     0.85   0.394    -.0839426    .213204
     DAustria |   4.967581   .9016413     5.51   0.000     3.200397    6.734766
      DCanada |   2.500523   .6686606     3.74   0.000     1.189972    3.811073
     DDenmark |   3.889733   .9299136     4.18   0.000     2.067136     5.71233
     DFinland |   4.994255   .9482846     5.27   0.000     3.135652    6.852859
      DFrance |   3.669059   .5159337     7.11   0.000     2.657847     4.68027
     DGermany |   3.949921   .4254061     9.29   0.000      3.11614    4.783702
      DGreece |    4.91181   .8837802     5.56   0.000     3.179632    6.643987
     DHungary |   7.710709   .9438253     8.17   0.000     5.860845    9.560572
       DItaly |    4.52635    .547103     8.27   0.000     3.454048    5.598652
       DJapan |   .2707832   .2177257     1.24   0.214    -.1559512    .6975177
       DKorea |   5.515204   .7311169     7.54   0.000     4.082242    6.948167
  DNetherlands |   4.781571   .7943063     6.02   0.000     3.224759    6.338383
      DNorway |   4.001355   .9446818     4.24   0.000     2.149813    5.852898
      DPoland |   7.168816   .8728531     8.21   0.000     5.458056    8.879577
       DSpain |   4.868524    .67729     7.19   0.000      3.54106    6.195988
      DSweden |   4.206414   .8739822     4.81   0.000     2.493441    5.919388
 DSwitzerland |   4.982013   .8797742     5.66   0.000     3.257687    6.706338
         DUK |   3.208734   .5049952     6.35   0.000     2.218962    4.198507
       _cons |  -36.58472   4.460704    -8.20   0.000    -45.32754   -27.8419
------------------------------------------------------------------------------
Underidentification test (Anderson canon. corr. LM statistic):          40.795
                                                   Chi-sq(2) P-val =    0.0000
------------------------------------------------------------------------------
Weak identification test (Cragg-Donald Wald F statistic):               19.810
Stock-Yogo weak ID test critical values: 10% maximal IV size            19.93
                                         15% maximal IV size            11.59
                                         20% maximal IV size             8.75
                                         25% maximal IV size             7.25
Source: Stock-Yogo (2005).  Reproduced by permission.
------------------------------------------------------------------------------
Sargan statistic (overidentification test of all instruments):           1.464
                                                   Chi-sq(1) P-val =    0.2262
------------------------------------------------------------------------------
Instrumented:         lnFDIN
Included instruments: lnSUM lnPERCD OTRC REER CUD D1984 D1985 D1986 D1987 D1988
                      D1989 D1990 D1991 D1992 D1993 D1994 D1995 D1996 D1997
                      D1998 D1999 D2000 D2001 D2002 D2004 D2005 D2006 DAustria
                      DCanada DDenmark DFinland DFrance DGermany DGreece
                      DHungary DItaly DJapan DKorea DNetherlands DNorway DPoland
                      DSpain DSweden DSwitzerland DUK
Excluded instruments: CORR INVL
Dropped collinear:    D1982 D1983 D2003 D2007 DUSA seatrulpart lawnordericrg
------------------------------------------------------------------------------
```

A.12.3 Pagan-Hall Heteroskedasticity Test

```
IV heteroskedasticity test(s) using levels of IVs only
Ho: Disturbance is homoskedastic
    Pagan-Hall general test statistic   :  36.694  Chi-sq(47) P-value = 0.8604
```

A.12.4 Wu-Hausman F Test and Durbin-Wu-Hausman Chi-square test

```
Tests of endogeneity of: lnFDIN
H0: Regressor is exogenous
    Wu-Hausman F test:                 16.68982  F(1,243)    P-value = 0.00006
    Durbin-Wu-Hausman chi-sq test:     18.70208  Chi-sq(1)   P-value = 0.00002
```

A.12.5 Chi-square Test for Year Dummies

```
 ( 1)  D1984 = 0
 ( 2)  D1985 = 0
 ( 3)  D1986 = 0
 ( 4)  D1987 = 0
 ( 5)  D1988 = 0
 ( 6)  D1989 = 0
 ( 7)  D1990 = 0
 ( 8)  D1991 = 0
 ( 9)  D1992 = 0
 (10)  D1993 = 0
 (11)  D1994 = 0
 (12)  D1995 = 0
 (13)  D1996 = 0
 (14)  D1997 = 0
 (15)  D1998 = 0
 (16)  D1999 = 0
 (17)  D2000 = 0
 (18)  D2001 = 0
 (19)  D2002 = 0
 (20)  D2004 = 0
 (21)  D2005 = 0
 (22)  D2006 = 0

           chi2( 22) =  122.01
         Prob > chi2 =    0.0000

.
```

A.12.6 Chi-square Test for Country Pair Dummies

```
( 1)  DAustria = 0
( 2)  DCanada = 0
( 3)  DDenmark = 0
( 4)  DFinland = 0
( 5)  DFrance = 0
( 6)  DGermany = 0
( 7)  DGreece = 0
( 8)  DHungary = 0
( 9)  DItaly = 0
(10)  DJapan = 0
(11)  DKorea = 0
(12)  DNetherlands = 0
(13)  DNorway = 0
(14)  DPoland = 0
(15)  DSpain = 0
(16)  DSweden = 0
(17)  DSwitzerland = 0
(18)  DUK = 0

          chi2( 18) = 1179.01
        Prob > chi2 =    0.0000
```

A.13 Regression Output of STATA for Model (IX)

A.13.1 IV Estimates First Stage

```
Warning - collinearities detected
Vars dropped:       D1982 D1983 D2002 D2003 D2007 DUSA seatrulpart

First-stage regressions
-----------------------

First-stage regression of lnFDIN:

OLS estimation
--------------

Estimates efficient for homoskedasticity only
Statistics consistent for homoskedasticity only

                                                      Number of obs =       291
                                                      F( 47,   243) =     28.13
                                                      Prob > F      =    0.0000
Total (centered) SS     =  242.0377472                Centered R2   =    0.8447
Total (uncentered) SS   =  974.5737651                Uncentered R2 =    0.9614
Residual SS             =  37.57847676                Root MSE      =     .3932
```

lnFDIN	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnSIM	1.347657	.4904263	2.75	0.006	.3816276	2.313686
lnPERCD	-.1964429	.1886358	-1.04	0.299	-.5680129	.1751272
OTRC	.2114753	.1320916	1.60	0.111	-.0487154	.471666
REER	.0068432	.0030406	2.25	0.025	.0008539	.0128325
CUD	-.0928083	.1010801	-0.92	0.359	-.2919133	.1062967
D1984	4.698876	1.917058	2.45	0.015	.9227033	8.475049
D1985	4.495315	1.918206	2.34	0.020	.7168807	8.273749
D1986	4.386659	1.902785	2.31	0.022	.6386017	8.134716
D1987	4.453096	1.898312	2.35	0.020	.7138493	8.192342
D1988	4.557034	1.89522	2.40	0.017	.8238773	8.29019
D1989	3.995611	1.316875	3.03	0.003	1.401665	6.589556
D1990	7.070063	2.024516	3.49	0.001	3.082223	11.0579
D1991	7.574218	2.314419	3.27	0.001	3.015336	12.1331
D1992	2.172443	1.699665	1.28	0.202	-1.175514	5.5204
D1993	2.960516	1.865122	1.59	0.114	-.7133532	6.634386
D1994	2.731626	1.852822	1.47	0.142	-.9180144	6.381267
D1995	.2393809	1.075462	0.22	0.824	-1.879037	2.357798
D1996	-2.177593	.51218	-4.25	0.000	-3.186472	-1.168714
D1997	-.4206145	.1646262	-2.55	0.011	-.744891	-.096338
D1998	-.2784573	.1526659	-1.82	0.069	-.5791747	.0222601
D1999	2.478254	.679183	3.65	0.000	1.140417	3.816091
D2000	1.465638	.6161594	2.38	0.018	.2519425	2.679333
D2001	1.376153	.7559163	1.82	0.070	-.1128314	2.865138
D2004	-.762716	.1527434	-4.99	0.000	-1.063586	-.461846
D2005	-.6598713	.1433854	-4.60	0.000	-.9423083	-.3774343
D2006	-.3367608	.1409904	-2.39	0.018	-.6144801	-.0590416
DAustria	-5.164705	1.100259	-4.69	0.000	-7.331968	-2.997443
DCanada	-4.416638	.9763521	-4.52	0.000	-6.339831	-2.493444
DDenmark	-4.827917	1.073302	-4.50	0.000	-6.94208	-2.713754
DFinland	-5.219987	1.019308	-5.12	0.000	-7.227794	-3.212179
DFrance	-3.050287	.8145733	-3.74	0.000	-4.654812	-1.445761
DGermany	-2.249957	.6881206	-3.27	0.001	-3.605399	-.8945147
DGreece	-4.812087	1.036932	-4.64	0.000	-6.854609	-2.769564
DHungary	-5.642002	.8790536	-6.42	0.000	-7.373539	-3.910464
DItaly	-3.178973	.8597926	-3.70	0.000	-4.872571	-1.485376
DJapan	-1.396677	.3258235	-4.29	0.000	-2.038476	-.7548785
DKorea	-5.166086	1.034703	-4.99	0.000	-7.204218	-3.127955
DNetherlands	-3.685758	1.094278	-3.37	0.001	-5.841238	-1.530277
DNorway	-5.345541	1.094047	-4.89	0.000	-7.500567	-3.190516
DPoland	-6.216271	1.135588	-5.47	0.000	-8.453124	-3.979419
DSpain	-4.473054	1.029499	-4.34	0.000	-6.500934	-2.445174
DSweden	-3.981696	1.102086	-3.61	0.000	-6.152556	-1.810835
DSwitzerland	-4.118783	1.11171	-3.70	0.000	-6.308602	-1.928965
DUK	-2.523549	.781022	-3.23	0.001	-4.061986	-.9851115
lawnorderi~g	3.948959	1.03302	3.82	0.000	1.914143	5.983775
CORR	-1.767159	.9562866	-1.85	0.066	-3.650828	.1165095
INVL	-.1487357	.1046914	-1.42	0.157	-.3549541	.0574827
_cons	-4.211457	3.271025	-1.29	0.199	-10.65464	2.231724

```
Included instruments: lnSIM lnPERCD OTRC REER CUD D1984 D1985 D1986 D1987 D1988
                      D1989 D1990 D1991 D1992 D1993 D1994 D1995 D1996 D1997
                      D1998 D1999 D2000 D2001 D2004 D2005 D2006 DAustria DCanada
                      DDenmark DFinland DFrance DGermany DGreece DHungary DItaly
                      DJapan DKorea DNetherlands DNorway DPoland DSpain DSweden
                      DSwitzerland DUK lawnordericrg CORR INVL
------------------------------------------------------------------------------
F test of excluded instruments:
  F(  3,   243) =    13.50
  Prob > F      =   0.0000
Angrist-Pischke multivariate F test of excluded instruments:
  F(  3,   243) =    13.50
  Prob > F      =   0.0000
```

Summary results for first-stage regressions

			(Underid)		(Weak id)
Variable	F(3, 243)	P-val	AP Chi-sq(3)	P-val	AP F(3, 24
lnFDIN	13.50	0.0000	48.50	0.0000	13.50

Stock-Yogo weak ID test critical values for single endogenous regressor:

5% maximal IV relative bias	13.91
10% maximal IV relative bias	9.08
20% maximal IV relative bias	6.46
30% maximal IV relative bias	5.39
10% maximal IV size	22.30
15% maximal IV size	12.83
20% maximal IV size	9.54
25% maximal IV size	7.80

Source: Stock-Yogo (2005). Reproduced by permission.

Underidentification test
Ho: matrix of reduced form coefficients has rank=K1-1 (underidentified)
Ha: matrix has rank=K1 (identified)
Anderson canon. corr. LM statistic Chi-sq(3)=**41.57** P-val=**0.0000**

Weak identification test
Ho: equation is weakly identified
Cragg-Donald Wald F statistic **13.50**

Stock-Yogo weak ID test critical values for K1=1 and L1=3:

5% maximal IV relative bias	13.91
10% maximal IV relative bias	9.08
20% maximal IV relative bias	6.46
30% maximal IV relative bias	5.39
10% maximal IV size	22.30
15% maximal IV size	12.83
20% maximal IV size	9.54
25% maximal IV size	7.80

Source: Stock-Yogo (2005). Reproduced by permission.

Weak-instrument-robust inference
Tests of joint significance of endogenous regressors B1 in main equation
Ho: B1=0 and orthogonality conditions are valid
Anderson-Rubin Wald test F(3,243)= 33.35 P-val=**0.0000**
Anderson-Rubin Wald test Chi-sq(3)= 119.81 P-val=**0.0000**
Stock-Wright LM S statistic Chi-sq(3)= 84.87 P-val=**0.0000**

Number of observations	N =	291
Number of regressors	K =	46
Number of endogenous regressors	K1 =	1
Number of instruments	L =	48
Number of excluded instruments	L1 =	3

A.13.2 IV Estimates Second Stage

```
IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics consistent for homoskedasticity only

                                                      Number of obs =      291
                                                      F( 45,   245) =    50.96
                                                      Prob > F      =   0.0000
Total (centered) SS     =  426.2449822                Centered R2   =   0.8963
Total (uncentered) SS   =  1942.882173                Uncentered R2 =   0.9772
Residual SS             =  44.22050752                Root MSE      =    .3898

------------------------------------------------------------------------------
         lnEX |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
       lnFDIN |   .8924776   .1557664     5.73   0.000      .587181    1.197774
        lnSIM |  -2.309627   .5551663    -4.16   0.000    -3.397733   -1.221521
      lnPERCD |   1.050299   .1852626     5.67   0.000     .6871907    1.413407
         OTRC |  -.4411058   .1357683    -3.25   0.001    -.7072068   -.1750047
         REER |  -.0056281   .0025837    -2.18   0.029     -.010692   -.0005641
          CUD |   .3217078    .098725     3.26   0.001     .1282104    .5152052
        D1984 |  -.4506071   .2862759    -1.57   0.115    -1.011698    .1104834
        D1985 |  -.2009699   .3043585    -0.66   0.509    -.7975015    .3955617
        D1986 |   .1132893   .2822557     0.40   0.688    -.4399217    .6665003
        D1987 |   .3663125   .2663985     1.38   0.169     -.155819    .8884441
        D1988 |    .074251   .2507523     0.30   0.767    -.4172145    .5657165
        D1989 |  -.0360532   .2430032    -0.15   0.882    -.5123308    .4402244
        D1990 |   .2612727   .2208792     1.18   0.237    -.1716425    .6941879
        D1991 |   .1183315   .2060912     0.57   0.566    -.2855998    .5222627
        D1992 |   .2294497   .2058369     1.11   0.265    -.1739832    .6328827
        D1993 |    .335811   .1998509     1.68   0.093    -.0558895    .7275115
        D1994 |   .1270591   .2107045     0.60   0.546    -.2859142    .5400324
        D1995 |   .4307126   .2036391     2.12   0.034     .0315874    .8298379
        D1996 |    .403107   .1873139     2.15   0.031     .0359785    .7702354
        D1997 |   .5295205   .1713487     3.09   0.002     .1936832    .8653579
        D1998 |   .3211892   .1548228     2.07   0.038     .0177421    .6246362
        D1999 |  -.0039222   .1416504    -0.03   0.978    -.2815518    .2737075
        D2000 |  -.0576072   .1262601    -0.46   0.648    -.3050724    .1898581
        D2001 |  -.2878681   .1276383    -2.26   0.024    -.5380346   -.0377016
        D2004 |   .2607861   .1092823     2.39   0.017     .0465968    .4749754
        D2005 |   .3217924   .1145529     2.81   0.005     .0972729    .5463119
        D2006 |   .1718313   .1148558     1.50   0.135    -.0532818    .3969444
     DAustria |   5.312762   1.419369     3.74   0.000      2.53085    8.094674
      DCanada |   3.503844   1.227861     2.85   0.004      1.09728    5.910408
     DDenmark |   3.768549   1.366283     2.76   0.006     1.090684    6.446415
     DFinland |   4.811036   1.358269     3.54   0.000     2.148877    7.473194
      DFrance |   4.411067   .9584474     4.60   0.000     2.532545     6.28959
     DGermany |    4.54374   .7910719     5.74   0.000     2.993268    6.094213
      DGreece |   4.941581   1.315266     3.76   0.000     2.363707    7.519455
     DHungary |   7.105509   1.214055     5.85   0.000     4.726004    9.485014
       DItaly |   5.296401   1.010601     5.24   0.000      3.31566    7.277142
       DJapan |   .7002399     .41854     1.67   0.094    -.1200834    1.520563
       DKorea |   6.867341   1.358299     5.06   0.000     4.205125    9.529558
  DNetherlands |   4.999537   1.277047     3.91   0.000     2.496571    7.502503
       DNorway |    4.06335   1.421022     2.86   0.004     1.278199    6.848502
       DPoland |   8.489384   1.487418     5.71   0.000     5.574097    11.40467
        DSpain |   6.035751    1.26471     4.77   0.000     3.556965    8.514537
       DSweden |   4.136171   1.324282     3.12   0.002     1.540626    6.731717
  DSwitzerland |   4.908872   1.329855     3.69   0.000     2.302405     7.51534
          DUK |   3.749746   .9101174     4.12   0.000     1.965949    5.533543
        _cons |  -15.5345   2.499313    -6.22   0.000    -20.43307   -10.63594
------------------------------------------------------------------------------
Underidentification test (Anderson canon. corr. LM statistic):          41.571
                                                   Chi-sq(3) P-val =    0.0000
------------------------------------------------------------------------------
Weak identification test (Cragg-Donald Wald F statistic):               13.500
Stock-Yogo weak ID test critical values:  5% maximal IV relative bias   13.91
                                         10% maximal IV relative bias    9.08
                                         20% maximal IV relative bias    6.46
                                         30% maximal IV relative bias    5.39
                                         10% maximal IV size            22.30
                                         15% maximal IV size            12.83
                                         20% maximal IV size             9.54
                                         25% maximal IV size             7.80
Source: Stock-Yogo (2005).  Reproduced by permission.
------------------------------------------------------------------------------
Sargan statistic (overidentification test of all instruments):           0.353
                                                   Chi-sq(2) P-val =    0.8381
------------------------------------------------------------------------------
Instrumented:         lnFDIN
Included instruments: lnSIM lnPERCD OTRC REER CUD D1984 D1985 D1986 D1987 D1988
                      D1989 D1990 D1991 D1992 D1993 D1994 D1995 D1996 D1997
                      D1998 D1999 D2000 D2001 D2004 D2005 D2006 DAustria DCanada
                      DDenmark DFinland DFrance DGermany DGreece DHungary DItaly
                      DJapan DKorea DNetherlands DNorway DPoland DSpain DSweden
                      DSwitzerland DUK
Excluded instruments: lawnordericrg CORR INVL
Dropped collinear:    D1982 D1983 D2002 D2003 D2007 DUSA seatrulpart
------------------------------------------------------------------------------
```

A.13.3 Pagan-Hall Heteroskedasticity Test

```
IV heteroskedasticity test(s) using levels of IVs only
Ho: Disturbance is homoskedastic
    Pagan-Hall general test statistic   :  21.432  Chi-sq(47) P-value = 0.9995
```

A.13.4 Wu-Hausman F Test and Durbin-Wu-Hausman Chi-square test

```
Tests of endogeneity of: lnFDIN
H0: Regressor is exogenous
    Wu-Hausman F test:                 90.78873  F(1,244)    P-value = 0.00000
    Durbin-Wu-Hausman chi-sq test:     78.91401  Chi-sq(1)   P-value = 0.00000
```

A.13.5 Chi-square Test for Year Dummies

```
 ( 1)  D1984 = 0
 ( 2)  D1985 = 0
 ( 3)  D1986 = 0
 ( 4)  D1987 = 0
 ( 5)  D1988 = 0
 ( 6)  D1989 = 0
 ( 7)  D1990 = 0
 ( 8)  D1991 = 0
 ( 9)  D1992 = 0
 (10)  D1993 = 0
 (11)  D1994 = 0
 (12)  D1995 = 0
 (13)  D1996 = 0
 (14)  D1997 = 0
 (15)  D1998 = 0
 (16)  D1999 = 0
 (17)  D2000 = 0
 (18)  D2001 = 0
 (19)  D2004 = 0
 (20)  D2005 = 0
 (21)  D2006 = 0

           chi2( 21) =   78.32
         Prob > chi2 =    0.0000
```

A.13.6 Chi-square Test for Country Pair Dummies

```
( 1)  DAustria = 0
( 2)  DCanada = 0
( 3)  DDenmark = 0
( 4)  DFinland = 0
( 5)  DFrance = 0
( 6)  DGermany = 0
( 7)  DGreece = 0
( 8)  DHungary = 0
( 9)  DItaly = 0
(10)  DJapan = 0
(11)  DKorea = 0
(12)  DNetherlands = 0
(13)  DNorway = 0
(14)  DPoland = 0
(15)  DSpain = 0
(16)  DSweden = 0
(17)  DSwitzerland = 0
(18)  DUK = 0

          chi2( 18) =  508.96
        Prob > chi2 =    0.0000
```