Foreign Direct Investment, Domestic Savings and Economic Growth: The Case of Turkey

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ABSTRACT

The present study investigates long run equilibrium relationship between real income growth, foreign direct investment, and domestic savings in Turkey, which is a developing economy. Johansen cointegration tests confirm that foreign direct investments and domestic savings in Turkey are in long run relationship with real income growth. Foreign direct investment has positive, significant, and inelastic impact on real income (0.318) whereas the long run coefficient of domestic savings are not statistically significant. Error correction model reveals that real income of Turkey converges to its long term equilibrium level reasonably low at 6.59% by the contribution of foreign direct investment and domestic savings; but, it is important to note that this coefficient is statistically significant. Finally, Granger causality tests reveal that foreign direct investments in Turkey are output and savings driven. When income and savings in Turkey increases, this will attract more foreign direct investments. Furthermore, this study has again proved that savings are income driven in Turkey.

Keywords: Foreign direct investment, Domestic savings, Real Income

ÖZ

Bu çalışma, gelişmekte olan bir ekonomiye sahip olan Türkiye'de, reel gelir, yabancı doğrudan yatırımlar ve yurtiçi tasarruflar arasında uzun dönem denge ilişkisini araştırmayı hedeflemiştir. Varılan sonuçlara göre, Türkiye'de yabancı doğrudan yatırımlar ve yurtiçi tasarruflar, reel gelir büyümesi ile uzun dönemli bir denge ilişkisi içerisindedir. Uzun dönem denge modeli sonuçlarına göre, yabancı doğrudan yatırımların reel gelir üzerindeki etkisi pozitif, istatistiki olarak anlamlı ve esneklik katsayısı 1'den küçüktür (0.318). Öte yandan, yurtiçi tasarrufların reel gelir üzerindeki uzun dönem etki katsayısı istatistiki olarak anlamlı bulunmamıştır. Hata düzeltme modeli sonuçlarına göre, Türkiye'de reel gelir yabancı doğrudan yatırımların ve yurtiçi tasarrufların katkısıyle uzun dönem denge değerlerine %6.59 hız ile ulaşmaktadır. Bu oran iktisadi olarak düşük seviyede olmasına rağmen beklentilere paralel olarak negatif ve istatistiki olarak anlamlıdır. Son olarak, Granger nedensellik test sonuçlarına göre, Türkiye'de yabancı doğrudan yatırımların reel gelir ve yurtiçi tasarruflar tarafından etkilendiği görülmektedir. Reel gelir ve tasarruflardaki bir değişim, yabancı doğrudan yatırımlardaki bir değişime sebebiyet vermektedir. Öte yandan, yurtiçi tasarruflar da reel gelir tarafından etkilenmektedir.

Anahtar Kelimeler: Yabancı doğrudan yatırımlar, Yurtiçi tasarruflar, Reel gelir

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LIST OF ABBREVIATIONS

ADF test	Augmented Dickey-Fuller test
AIC	Akaike Information Criteria
DS	Domestic Savings
ECM	Error Correction Mechanism
ECT	Error Correction Term
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
PP test	Phillips-Perron test
SIC	Schwartz Information Criterion
VAR model	Vector Auto Regressive model
VECM	Vector Error Correction Model

Chapter 1

INTRODUCTION

In a globalized world, understanding the importance of foreign direct investment (FDI) for economic growth is an important issue. There are some studies in the literature which analyzes the relationship between FDI and economic growth from different perspectives. FDI has gained a significant role for economic development for small developing economies with technology transfer, information transfer and human capital development (see among others Tang et al., 2008; Batten and Vo, 2010; Li and Liu, 2005). Reiter and Steensma (2010) state that many policymakers think FDI has an important role on contributing economic growth in developing countries. According to a report of United Nations-hosted conference in 2002, FDI has a significant contribution on economic growth and is important for developing countries because of its potential to transfer of technology and knowledge, to create new jobs and to encourage entrepreneurship and competitiveness (Reiter and Steensma, 2010).

FDI is an important element for developing economies not only because of increasing supply of capital but also helping human capital formation with technology transfer. FDI contributes to economic development via direct channels as well as indirect channels (Anwar and Nguyen, 2010). Furthermore, Salahuddin et al. (2010) say that the effect of FDI on growth is a theoretical and empirical fact and affects growth in two ways:

First, it contributes to growth by capital accumulation which helps incorporation of new inputs into the production channel of country, therefore, production can be improved by foreign technology transfer. Second, knowledge transfer helps to improve labor training and skill acquisition. Tang et al. (2008) also state that FDI helps countries to overcome their capital shortages and when there is a high risk area or when the domestic investment is limited, FDI completes domestic investment of that area. Alfaro et al. (2009) show that FDI promotes productivity of the country as well and also examine the importance of FDI not only in the sense of its contribution to economic growth by direct capital financing but also in the sense of its externalities by creating technology. Katırcıoğlu and Naraliyeva (2006) state that FDI contributes to economic development by importing technology, managerial skills and market access. According to Li and Liu (2005), FDI is composed of capital stock, know-how, technology and helps to develop the existing stock of knowledge through labor training, skill development and transfer, and some alternative management techniques and arrangements.

On the other hand, there are some studies in literature that shows the relationship between domestic savings (DS) and economic growth as well (see among others Bairamli and Kostoglou (2010), Aghion et al. (2009), Alguacil et al. (2004), Akram-Lodhi and Sepehri (2001)).

In order to have stable economic growth, domestic sources are very important element in developing countries. As domestic sources accumulate; it leads to more domestic investments which increase production in the country. Thus, stable economic development can not be achieved without DS and investments (Bairamli and Kostoglou, 2010). Theoretically, association among DS and income was

explained by Harrod (1939) and Domar (1946) models. It is highlighted that an increase in savings level of the country leads to an increase in domestic investment level and it contributes to growth. In addition, the relationship between gross domestic product (GDP) and savings is positive and it is explained that savings have positive effect on investment and an increase in investment have positive effect on GDP (Katırcıoğlu and Naraliyeva, 2006). Alguacil et al. (2004) investigate the role of DS in contributing to economic growth by Solow's (1956) type growth model which states that higher savings causes economic growth. According to Solow's type of growth model (1956), those countries who try to increase their growth rates by increasing their saving rates will be successful. Akram-Lodhi and Sepehri (2001) investigate the importance of DS as well as foreign savings by estimating the structural three-gap model of growth suggested by Bacha (1990) and Taylor (1991). Aghion et al. (2009) examine DS from a different perspective which states that countries can grow faster by saving more via capital transfer but countries that have international trade can not grow by DS. In addition, savings contribute to economic growth more when a country is not close to technological frontier.

The causal relationship between FDI and DS is also investigated in the literature (see among others Salahuddin et al. (2010), Tang et al. (2008), Katırcıoğlu and Naraliyeva (2006)). Salahuddin et al. (2010) state the fact that FDI and DS have bi-directional relationship but stronger from FDI to DS from the perspective of Bangladesh which is a small developing economy. According to some studies, the importance of FDI for DS is highlighted; it is mentioned that foreign direct investment has a significant impact out of increasing DS for countries like Pakistan and Jordan (Salahuddin et al., 2010). According to Tang et al. (2008), FDI has a

significant effect on improving DS in the case of China which has a fast growing economy. Increase in FDI leads to an increase in DS and this affects the economy positively. Katırcıoğlu and Naraliyeva (2006) examine the causal relationship between domestic savings and FDI in the case of Kazakhstan and bidirectional causation among them is identified by using the Vector Autoregressive (VAR) model.

Understanding the relationship between FDI and DS and their impact on economic development is an essential concern for developing countries. Policy makers should understand the importance of the effect of foreign direct investment on economic development in order to make new reforms and reduce the barriers for attracting more investors to the country.

The aim of this study is to find the equilibrium relationship between FDI, DS and economic growth and the direction of their causality in the case of the Turkish economy which is one of the attractive investment environments for foreign investors as a developing economy. Turkey has attracted considerable amount of investment in stock markets and in real sector in 2005 as a result of macroeconomic stability. Although a few political problems have been experienced both in Turkey and in the region, foreign investors did not withdraw their investments from Turkish stock markets due to high earning rates compared to the other markets. On the other hand, Turkey also attracted considerable FDI during these years. Therefore, this study will be important to utilize the impact of FDI and DS on real income of Turkey.

Starting from 2004, Turkey became an attractive investment area for the foreign investors due to the economic and political stability for the last years as mentioned above. FDI inflows have increased on average after 2004 from 0.50-0.71 % to 2.07-3.80 % of gross domestic product (GDP) and DS were around 16-17% of GDP during years 2004-2009 (TURKSTAT, 2011).

The present study is structured as follows: in chapter 2 theoretical and empirical literature is discussed. Chapter 3 gives some brief information about Turkish economy. Data and methodology of econometric analysis is presented in chapter 4. Chapter 5 shows results of econometric analysis and in chapter 6 conclusion and some policy implications is discussed for the economic development for Turkey.

Chapter 2

THEORETICAL CONSIDERATIONS AND EMPIRICAL STUDIES

2.1 Foreign Direct Investment and Economic Growth

The relationship between FDI and economic growth is considerably investigated in the literature. Endogenous growth models are also used by researchers. The model which is established by Borensztain et al. (1998) shows that economic growth is composed of FDI, human capital, government expenditure, domestic investment and inflation rate. They find positive effect of FDI inflows on economic growth; FDI and DS have complementary relationship. Anwar and Nguyen (2010) find a direct and statistically significant impact of FDI on real income of Vietnam. Katırcıoğlu and Naraliyeva (2006) confirms the existence of long-run equilibrium relationship between GDP and FDI in the case of a developing country, Kazakhstan.

Tang et al. (2008) use VAR model to investigate the relationship between FDI, domestic investment and economic growth in case of China and find a complementary impact of foreign direct investment on local investments meaning that FDI stimulates local investments and this causes higher economic growth in the case of China. Alfaro et al. (2010) highlight that when FDI inflows increase in a developed economy, economic growth rate is higher compared to underdeveloped ones. Literature studies also support the fact that FDI contributes to the developing

economies by technology and capital transfer, labor skill and knowledge transfer. Furthermore, developing countries gain more productivity skills and FDI has a significant role in helping to be more modernized (Batten and Vo, 2009). Batten and Vo (2009) used panel data of 79 countries between 1980-2003 and their findings support the effect of foreign direct investment on income growth. Liu et al. (2010) investigate the importance of factor accumulation as a force of economic development by employing neoclassical and endogenous growth models. FDI is defined as a factor of production in the neoclassical growth models of the literature.

Investments, on the other hand, in the country are increased by FDI. Moreover, it helps to increase the efficiency and continuity of growth. In addition, endogenous growth models in the literature investigate the relationship between long-run growth and technological advances which shows that FDI increases country's growth by technology transfer. Furthermore, continuous political and economic stability, protective rights and proper tax regulations for foreign investors, decreased trade barriers and economic freedom of the country are important determinants for FDI inflows. Therefore, FDI-growth relationship in the countries highly depends on country specific determinants of FDI which attract FDI inflows and absorb new technology transfers (De Mello Jr., 1997). Li and Liu (2005) support FDI driven income by adapting a pooled data of 84 countries between 1970 and 1999. Moreover, Li and Liu (2005) suggest that FDI doesn't only affect growth directly but does have some indirect effects as well. FDI inflows bring human capital and technology to the country and their effects on growth is significant.

Tang et al. (2008) argue that FDI can also help to increase exports of the country by encouraging foreign investments on export industries; by this way FDI contributes to

the growth of the economy trough an increased demand for exports. In addition, Tang et al. (2008) come up with a conclusion that in the case of China FDI has a complementary impact on local investments and it contributes to the economic growth of China. Hermes and Lensink (2003) examine the interaction among FDI and income by using a data of 67 economies and prove the existence of a direct impact of FDI on income. On the other hand, there are also some studies that support the view that FDI doesn't contribute to the growth of economy.

Mah (2009) use an annual data of FDI inflows and real economic growth rates to assess the causality between FDI and growth during 1983-2001 and they find that FDI doesn't stimulate economic growth in China which attracts too much foreign investors because of their foreign investment policies. Mah (2009) conclude that China doesn't need to regulate their policies to attract FDI inflows because FDI inflows continue to increase without these regulations by economic growth.

2.2 Domestic Savings and Economic Growth

The relationship between DS and economic growth is also investigated in the literature (i.e. Alguacil et al., 2004). Solow's growth model (1956) shows the relationship between savings and economic growth. Alguacil et al. (2004) is noted that this model states higher savings help to contribute to the growth of the economy. Countries should create their policies to encourage savings in order to increase income. In addition, Alguacil et al. (2004) state that higher saving level causes capital accumulation and capital accumulation increases GDP. In their study, they use yearly figures for Mexico for 1970-2000 and granger causality tests are carried out to see the relationship between savings and growth. Empirical results of their

study support the Solow's growth model (1956) that higher saving rates contributes to the economic growth that means there is a causal relationship from savings to growth in the Mexico's economy.

On the other hand, Katırcıoğlu and Naraliyeva (2006) find that savings and growth are positively correlated and there is unidirectional causation that runs from savings to growth in the case of Kazakhstan. Odhiambo (2009) explains the importance of savings for economic growth and states that when there is an increase in savings, domestic investment grows and growth in domestic investment leads to increases in real income especially in the developing countries. Moreover, DS have very important role for growth in the developing countries where the supply of loanable funds is in short of demand. In other words, excess of demand for loanable funds means higher savings, higher domestic investment, and an increase in real income (see Hubbard, 2008: 102-120). Odhiambo (2009) finds bidirectional causality between DS and real income growth in the case of South Africa. Bairamli and Kostoglou (2010) highlight that DS helps to increase the production in the country by domestic sources.

2.3 Foreign Direct Investment and Domestic Savings

Literature studies provide mixed results for the relationship between FDI and DS. Salahuddin et al. (2010) examine the causal relationship and find a bidirectional relationship between FDI and DS by using the Johansen cointegration and error correction models but the effect of direction is higher from domestic savings to FDI in Bangladesh. On the other hand, Edwards (1995) uses panel data to examine the causality between DS and FDI but the relationship is not identified clearly because according to econometric results, when a change is observed in DS, significant effect

couldn't be observed on foreign capital inflows. Katırcıoğlu and Naraliyeva (2006) find short term bidirectional causality between DS and FDI in the Kazakhstan economy. Odhiambo (2009) finds also bidirectional relationship between savings and growth for the case of South Africa in the long term period.

Chapter 3

THE ECONOMY OF TURKEY

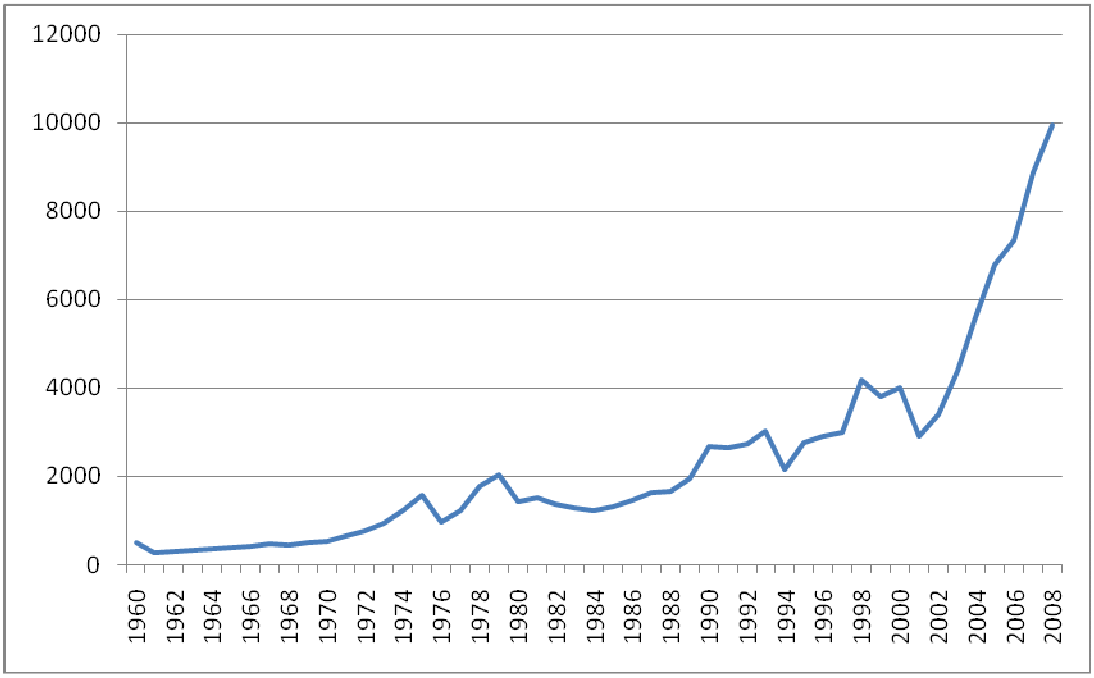
3.1 Republic of Turkey

Republic of Turkey is a geostrategic country in the intersection of the Western Asia and Southeastern Europe with a population of 73.72 million (TURKSTAT, 2011) which was established in 1923. Turkey's neighbors are Bulgaria, Greece, Georgia, Armenia, Azerbaijan, Iran, Iraq and Syria. Turkey is an important power for the region because of its economic and military power. Turkey has memberships in international organizations such as the Council of Europe, OECD, OSCE and G-20 major economies. In addition, Turkey is the 17th country which has largest Nominal GDP in the world.

The Turkish economy is driven by industrial and service sectors. Agriculture and clothing sectors are very important sectors for its industrial employment. Agriculture sector owns 30% of employment (TURKSTAT, 2011). Automotive, construction, and electronic industries are increasingly important industries of the country. Turkey has started to reduce its government control on foreign trade and investments with new economic reforms; privatization attempts have become important tools for improvements in publicly-held industries. GDP of Turkey is $1.116 trillion, GDP per capita is $10,399 and GDP growth is 8.9% in 2010. Moreover, exports are $113.93 billion and imports are $185.49 billion in 2010. On the other hand, public debt is 48.5% of GDP in 2010 (TURKSTAT, 2011)

3.2 Economic Outlook of Turkey

The Turkish economy is not a stable economy and its annual GDP growth was volatile during the years 1960-2009. The biggest decline in GDP growth can be observed in 1978, 1994, 1999 and 2001 when three biggest economic crises occurred throughout the Turkish history. Main reasons of these crises are high inflation and interest rates, balance of payments problems, trade deficit, current account deficit, high public debt and the fragile financial market (Sahin, 2009).



Source: *World Bank (2011).*

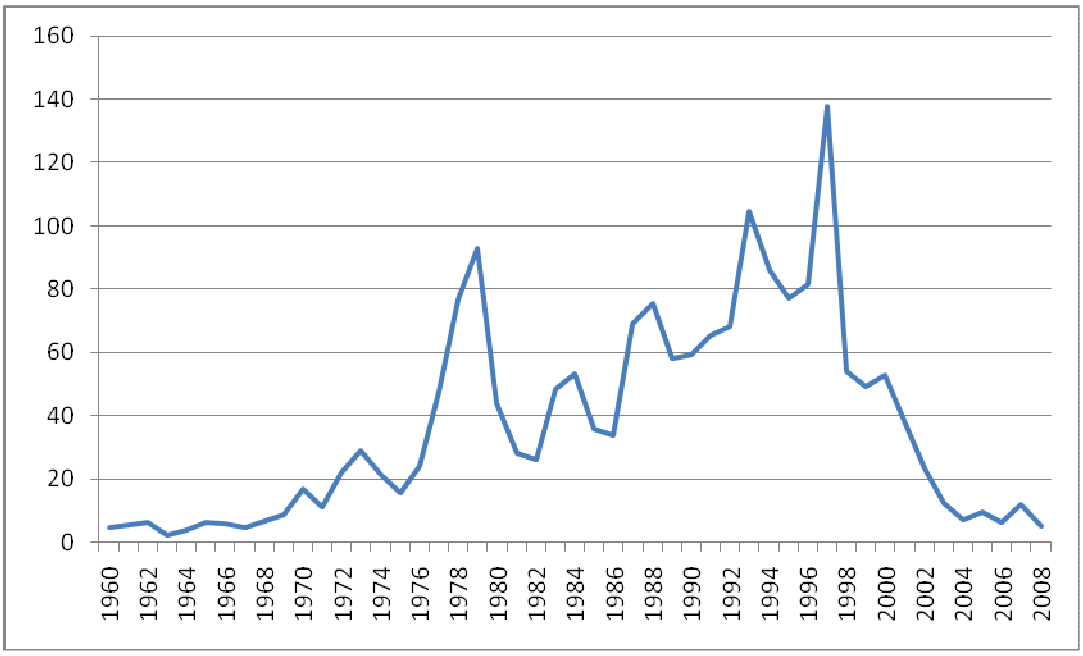
Fig. 3.1 Per Capita Income (USD) 1960-2008

In 1970s, per capita income was around 550$ and after 1990s, it has started to grow considerably. After 2000 to 2008, per capita income reached their highest value which is approximately 9,000$ (TURKSTAT, 2011).

In 1978, Turkey had a sharp decline in its GDP growth because of the global financial crisis as a result of the huge increase in the world petroleum prices. All petroleum importer countries were affected negatively and Turkey was a big importer of petroleum during that period.

In 1994, the Turkish economy had another crisis. The reason behind of this crisis was unsustainable current account deficits. Central Bank of Turkey lost more than half of its international reserves. At the end, half million people lost their jobs. In 1998, there was economic crisis in the Asian countries especially in Russia; therefore, Turkey was also affected and foreign investors took their investments out of Turkey because of the risk created by the Asian Crisis. The Turkish economy faced some difficulties in that period. After that, because of some political improvements, short term economic growth continued until 1999.

In August 1999, there was a big earthquake that hit the country socially as well as economically. After these crises Turkey adopted the IMF programs in 2001 and economic growth was accelerated. These economic, fiscal reforms and stable politics increased the attractiveness of Turkey for foreign investors. However, economic global crisis which started in USA has also affected Turkey negatively causing economic recession.



Source: *World Bank (2011).*

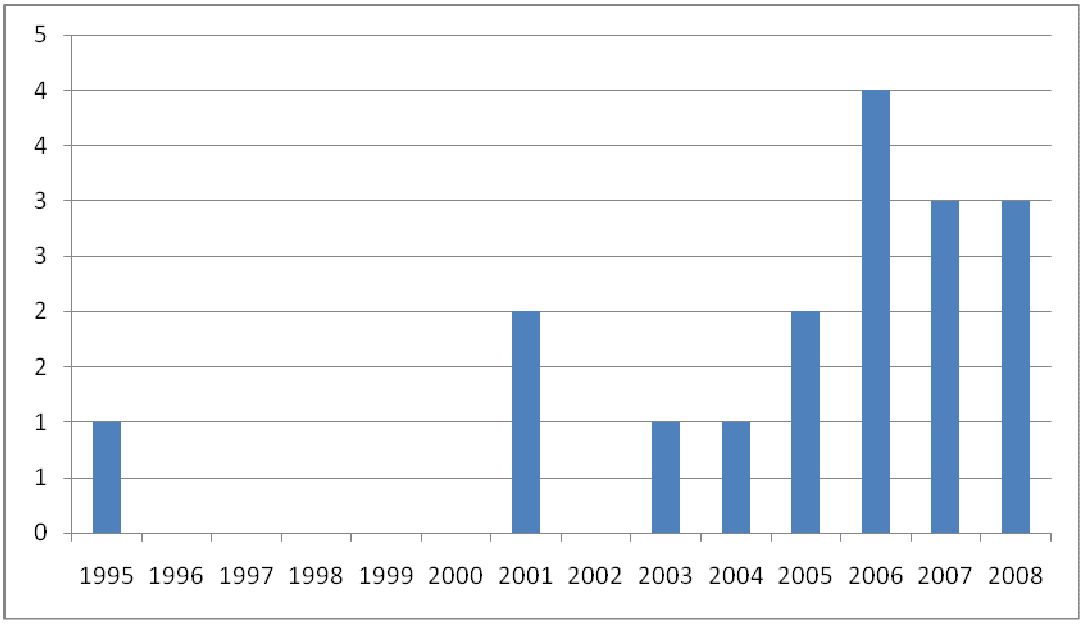
Fig. 3.2 Inflation, (GDP deflator (annual %) 1960-2008)

As can be seen in Figure 3.2, inflation at the beginning of 1960s was less volatile until the first big recession period in 1978. After 1980s inflation in Turkey fluctuated and starting from 1994 inflation rate reached its peak point in 1997 which was 138% (World Bank, 2011). In 1998, Turkey started to adopt a program of IMF in order to reduce inflation rates and after 1998 to 2008 inflation was reduced to around 5-7% (World Bank, 2011).

3.3 Foreign Direct Investments in Turkey

Turkey was not a good investment area for foreign investors because of economic and political instability before 2005. As can be seen in Fig 3.3, FDI inflows as percentage of GDP are near to zero during the years 1996-2000 because of financial crises, political instability and an earthquake in 1999 that hit the economy. However, the situation changed after 2005. After adoption the IMF program in 2001, Turkey attracted foreign investors because of positive expectations, economic growth, FDI

inflows reached 2% of GDP in 2001 (World Bank, 2011). After 2005, Turkey started to improve its attractiveness with new reforms and regulations. FDI inflows reached its peak point in 2006 which was around 4% of GDP as a result of economic and political stability (World Bank, 2011).

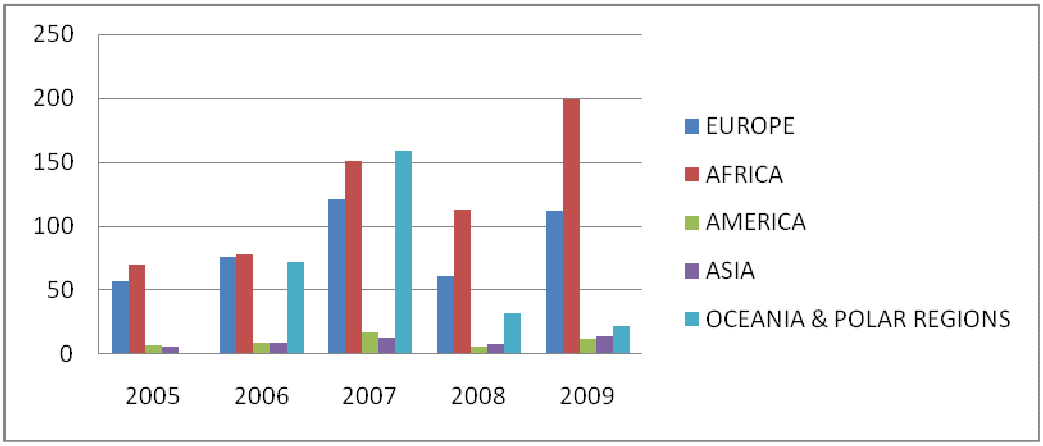


Source: *World Bank (2011).*

Fig. 3.3 Foreign Direct Investment Inflows (% of GDP) 1995-2008

These new reforms in FDI, which is adopted in June 2003, for example, suggest that domestic and foreign investors have same equal rights and obligations (TUSIAD and YASED Report, 2004). The aim of these reforms was to create a secure investment area for foreign investors. Another example is that the transfer of profits, fees and capital have been guaranteed by the system (TUSIAD and YASED Report, 2004). In addition, European Union (EU) membership process also increased the attractiveness of the country because this membership needs economic and political stability which are very important for investors' decisions.

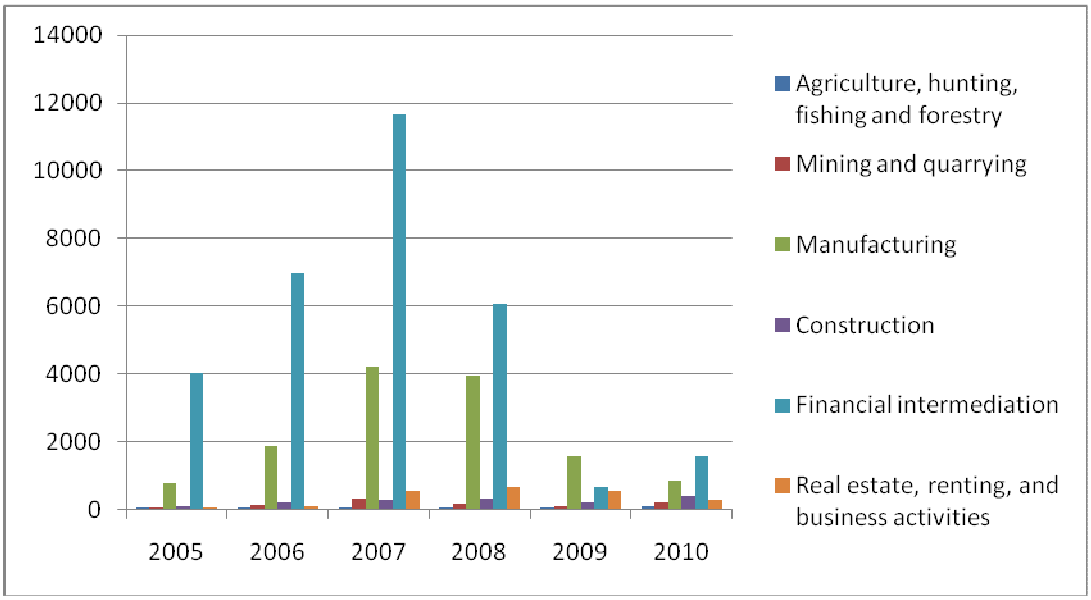
Sayek (2007) states that; in October 2005, EU membership negotiation process started for Turkey and this process helped to attract more foreign investors to Turkey especially from the European countries. she also argues that Turkey shouldn't expect more increases in FDI if membership takes place (Sayek, 2007).



Source: *Central Bank of the Republic of Turkey (2011).*

Fig. 3.4 FDI in Turkey (BY COUNTRY, Million USD) 2005-2009

The biggest supplier of FDI is Africa (mostly from Libyan Arab Jamahiriya and Egypt) from 2005 to 2009 in Turkey. From 2005 to 2009, Africa has an increasing trend and FDI by Africa reached around 200 Million USD in 2009 in Turkey (Central Bank of the Republic of Turkey, 2011). After Africa second biggest supplier is Europe (mostly from Germany, France and United Kingdom) which is around 120 Million USD in Turkey. After 2007, it can be seen that FDI from Oceania and Polar Regions had decreasing trend. On the other hand, FDI from America and Asia had slow but increasing trend during the years 2005-2009 (Fig. 3.3).



Source: *Central Bank of the Republic of Turkey (2011).*

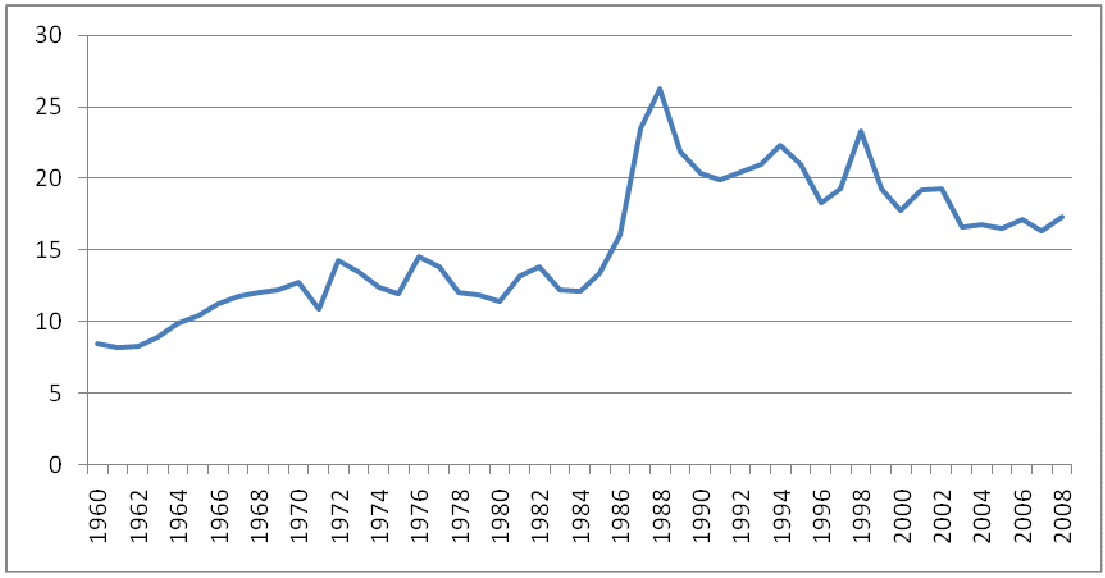
Fig. 3.5 FDI in Turkey (BY SECTORS) Million USD 2005-2010

On the sectoral basis, financial intermediation and manufacturing are the most attractive sectors for FDI during the last five years. During the last 2 years, financial intermediation sector lost its potential attractiveness because of global financial crisis around the world. During 2005-2007 manufacturing and financial intermediation had increasing trend but the period between 2008-2010 financial intermediation and manufacturing had decreasing trend (Fig. 3.5).

3.4 Domestic Savings in Turkey

Savings can be defined as a decision to consume now or consume later for a better future. The aim of savings is to increase wealth, increase living standards and economically a better life in the future (Rijckeghem and Üçer, 2009). Government of Turkey started the 1980 reform in order to increase savings to reduce inflation and increase exports with an effective usage of domestic production.

The 1980 reform caused an increase in savings level after 1980s as it can be observed from Fig. 3.6 (see also Ozcan et al., 2003).



Source: *World Bank (2011).*

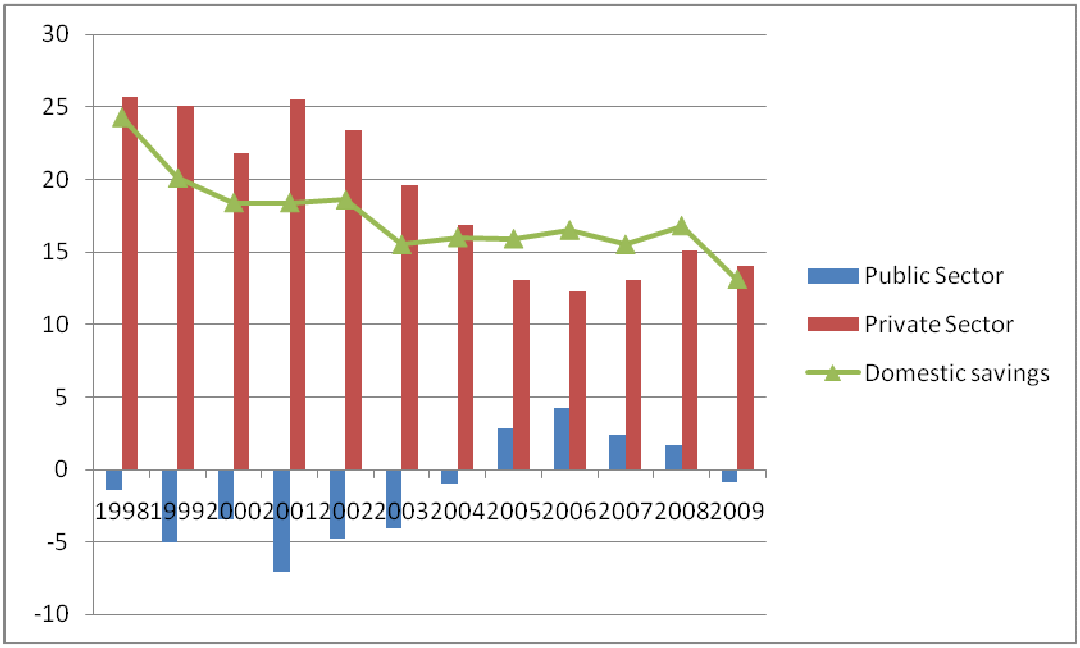
Fig. 3.6 Domestic Savings in Turkey (% of GDP) 1960-2008

As also Ozcan et al. (2003) state, during 1980 public savings started to increase but after 1985 private savings increased and public savings decreased. Moreover, in 1989 public savings continued to decrease because of unregulated liberalization. On the other hand, private savings continued to have an increasing trend during that period.

After the 1994 currency crisis, interest rates increased by more than 30%. As a result, this sharp rise in interest rates causes an increasing trend in aggregate savings level. In this period, increases in private savings have been observed (Ozcan et al., 2003).

During 1998-1999 because of high interest rates (as a result of financial crisis) private savings were very high compared to public savings and in 1998 private savings reached to its peak point (Fig. 3.7).

The reason behind higher savings in the private sector is that during crisis periods interest rates are substantially high and people prefer to save their money instead of consuming (Ozcan et al., 2003).



Source: *IMF (2011).*

Fig. 3.7 Composition of Domestic Savings (% of GDP) 1998-2009

After 2004, public savings started to recover and private savings started to decline. During 2005-2008 period public savings were at positive levels but after 2008 public savings started to decline because of global financial crisis. As a conclusion, in general, after 1980s private savings and aggregate domestic savings had an increasing trend (Fig. 3.7).

Chapter 4

DATA AND METHODOLOGY

4.1 Type and Source of Data

Data used in this study are annual figures for the period of 1960-2008 and variables are Gross Domestic Product (GDP), Foreign Direct Investment (FDI) and Domestic Savings (DS) (both public[1]. Data are gathered from website of World Bank (2011) and TURKSTAT (2011). GDP figures are in constant 2000 US$ and the other variables: FDI and DS are in % of GDP. All variables are transformed into the natural logarithm in the econometric analysis to capture growth effects (Katırcıoğlu, 2009).

4.2 Methodology

In this study, three types of analyses were employed. First of all, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were undertaken to test unit roots of the FDI, DS and GDP. Second, Johansen and Juselius (1990) tests were employed to assess the long-run equilibrium relationship between GDP and its possible determinants of DS and FDI. Lastly, Granger-causality tests were applied in order to identify the direction of causality between variables of the study.

[1] Public savings are budget surpluses (budget revenues are greater than budget expenditures).

4.2.1 Empirical Model

There are many theoretical and empirical studies that focus on the determinants of real income in the countries. These determinants are tested trough the application of various econometric analyses. The present research suggest that FDI and DS might be determinants of GDP in the case of Turkey. Therefore, the functional relationship in this study can be shown as follows (See Katırcıoğlu and Naraliyeva, 2006):

$$GDP = f(FDI, DS) \quad (1)$$

where real income (GDP) is a function of foreign direct investment (FDI) and domestic savings (DS).

The functional relationships in equation (1) can be expressed in logarithmic form in the following model to capture growth impacts as mentioned earlier:

$$\ln GDP_t = \beta_0 + \beta_1 \ln FDI_t + \beta_2 \ln DS_t + \varepsilon_t \quad (2)$$

where at period t, lnGDP is the natural log of real income; lnFDI is the natural log of the foreign direct investment variable; lnDS is the natural log of domestic savings; and ε is the error term. The coefficients of β_1 and β_2 give us elasticities of FDI and DS variables respectively in the long term period (Katırcıoğlu, 2010).

4.2.2 Unit Root Tests

ADF and PP Unit Root Tests are carried out in order to determine the possible co-integration and the level of integration between variables (Dickey and Fuller 1981; Phillips and Perron 1988). ADF and PP procedures are employed to test the stationary of series in the present thesis. The PP procedures are applied to search for unit roots which is an alternative to ADF unit root test and compute a residual variance that is robust to auto-correlation (Katırcıoğlu, 2009).

Enders (1995) suggests that we should start to test for unit roots from the most general model (by including trend and intercept). That is,

$$\Delta y_t = a_0 + \lambda y_{t-1} + a_2 t + \sum_{i=2}^{p} \beta_j \Delta y_{t-i-1} + \in_t \qquad (3)$$

where y is the variable; t = trend; a = intercept; ε_t = Gaussian white noise and p = the lag level. In order to ensure that the errors are white noise, it is better to choose the number of lags "p" in the dependent variable by using the Akaike Information Criteria (AIC) or some other alternative tests for optimum lag (Katırcıoğlu et al., 2007). The existence of the additional estimated parameters creates a problem that it reduces degrees of freedom and the power of the test.

The ADF and PP tests focus on t-statistics and t-tests for λ. The null hypothesis in both ADF and PP tests is that the series is non-stationary. Rejecting of this null hypothesis means that the coefficient is significantly different from zero. If series is

non-stationary at level (we accept Ho), then we take the first difference to make it stationary. If series is stationary, then it is called I(0); but if it is non-stationary, it is called I(1). Moreover, researchers may face some problems in rejecting the null hypothesis because of unknown data generating process. Thus, researchers should start unit root tests from the most general model which includes intercept and trend (Doldado, Jenkinson and Sosvilla-Rivero, 1990). If the drift and trend is denied inappropriately, the power of the test can be reduced to very low levels and even to zero (Campbell and Perron, 1991). Enders (1995: 255) states that reduced power can let the researcher conclude the unit root process with wrong results about the presence of unit roots.

The PP test makes a correction to the t-statistic of the coefficient from the AR (1) regression to account for the serial correlation in ε_t (Katırcıoğlu et al., 2007). The correction is nonparametric since we use an estimate of the spectrum of γ coefficient at frequency zero and this is robust to heteroscedasticty and autocorrelation of unknown form. The popular method is the Newey-West heteroscedasticty autocorrelation consistent estimate as follows:

$$\omega^2 = \gamma_0 + 2\sum_{j=1}^{q}\left(1 - \frac{j}{q+1}\right)\gamma_j \qquad (4)$$

$$\gamma_j = \frac{1}{T}\sum_{t=j+1}^{T} \tilde{\varepsilon}_t \tilde{\varepsilon}_{t-j} \qquad (5)$$

Where q is the truncation lag, γ_j is the covariance of estimated residuals j-lag apart and T is the sample size. The PP t-statistic is computed as

$$t_{pp} = \frac{\gamma_0^{\frac{1}{2}} t_b}{\omega} - \frac{(\omega^2 - \gamma_0) T s_b}{2\omega\hat{\sigma}} \quad (6)$$

Where t_b, s_b are the t-statistic and standard error of β and σ is the standard error of the test regression.

4.2.3 Co-integration Tests

After the determination of the order of integration for variables, cointegration among variables should be tested and the validity of the long-run equilibrium relationship should be identified. In this thesis, trace test of the Johansen approach was used to test the co-integration which suggests that series must be in the same order of integration, I(1) or I(2) if they are not I(0). The Johansen trace test helps to identify the number of co-integrating vectors (or relationships) between variables. At least one co-integrating vector is needed in order to have co-integration among variables. The Johansen trace test is more reliable than the maximum eigen value test for co-integration (see Katırcıoğlu et al., 2007).

The Johansen (1988) and Johansen and Juselius (1990) approach allows us to estimate co-integrating vectors between the set of regressors and a dependent variable and it is a contemporary approach to avoid the problems which arise from

Engel and Granger (1987) methodology[2]. The Johansen methodology can be expressed in the following VAR model:

$$X_t = \Pi_1 X_{t-1} + ... + \Pi_K X_{t-K} + \mu + e_t \qquad (\text{for } t = 1,...T) \qquad (7)$$

Where X_t, X_{t-1}, …, X_{t-K} are vectors of level and lagged values of P variables respectively which are $I(1)$ in the model; $\Pi_1,....,\Pi_K$ are coefficient matrices with (PXP) dimensions; μ is an intercept vector[3]; and e_t is a vector of random errors (Katırcıoğlu et al., 2007). The number of lagged values is determined by the assumption that error terms are not auto-correlated. The rank of Π is the number of co-integrating vectors (i.e. r) which is determined by testing whether its Eigen values (λ_i) are statistically significant. Johansen (1988) and Johansen and Juselius (1990) propose that using the Eigen values is for computation of trace statistics[4] (Katırcıoğlu et al., 2007). The trace statistic (λ_{trace}) can be computed by the following formula[5]:

$$\lambda_{trace} = -T\sum Ln(1-\lambda_i)\,,\ i = r+1,\ ...,\ n-1 \text{ and the null hypotheses are :} \qquad (8)$$

H_0: v = 0 $\qquad$ H_1: v ≥ 1

H_0: v ≤ 1 $\qquad$ H_1: v ≥ 2

H_0: v ≤ 2 $\qquad$ H_1: v ≥ 3

[2]Refer to Kremers et al. (1992) and Gonzalo (1994) for their views about problems faced from the Engel and Granger (1987) tests as compared with Johansen and Juselius (1990) approach.

[3] μ is a vector of $I(0)$ series that also stands for dummies. This ensures that error term by e_t are white noise.

[4] Critical values in the present study are obtained from the work of Osterwald-Lenum (1992).

[5] At the beginning steps, we test the null hypothesis that there is no cointegrating vector. If it is rejected, the alternative hypothesis (i.e. $v \leq 1, ..., v \leq n$) are to be tested after then. If $v=0$ cannot be rejected, this suggest no co-integrating relationship between regressors and dependent variable.

4.2.4 Error Correction Model

There is an assumption that the real income in equation (2) may not immediately adjust to its long-run equilibrium level following a change in any of its determinants (See also Katırcıoğlu, 2010). Hence, the disrepancy between the short-run and the long-run levels of income can be investigated by the following error correction model:

$$\Delta \ln GDP_t = \beta_0 + \sum_{i=1}^{n} \beta_1 \Delta \ln GDP_{t-j} + \sum_{i=0}^{n} \beta_2 \Delta \ln FDI_{t-j} + \sum_{i=0}^{n} \beta_3 \Delta \ln DS_{t-j} + \beta_4 \varepsilon_{t-1} + u_t \quad (5)$$

where Δ shows a change in the GDP, FDI and DS variables and ε_{t-1} is the one period lagged error correction term (ECT), which is taken from equation (2) (Katırcıoğlu, 2010). The ECT in equation (5) shows how fast the disequilibrium between the short-run and the long-run values of dependent variable is eliminated each period. The expected sign of ECT is negative (Katırcıoğlu, 2010).

4.2.5 Granger Causality Tests

Granger causality tests were employed in this thesis in order to estimate the direction of causality among the variables. Granger causality tests are run by employing the Vector Error Correction (VEC) framework when there is cointegration relationship (Katırcıoğlu et al., 2007). When there is cointegrating vector in the related model, the simple Granger's causality tests under the VAR approach can not be undertaken.

Granger (1988) discusses the concerning relationship between Granger causality and co-integration. Co-integration is about long-run equilibrium relationship. However,

VECM is used to identify the causality between two variables for the short term period. Moreover, VECM is used to measure the speed of short-run values approach targeted long-run equilibrium values.

Granger's theory implies that error correction models are needed to augment the simple causality tests with the EC mechanism and are composed of the residuals from the original cointegration models to test for the causality. Error correction presentation can be like the following equations:

$$\Delta \ln \mathrm{Y_t} = C_0 + \sum_{i=1}^{k} \beta_i \Delta \ln \mathrm{Y_{t\text{-}i}} + \sum_{i=1}^{k} \alpha_i \Delta \ln \mathrm{X_{t\text{-}i}} + \varphi_i ECT_{t-1} + u_t \quad (7)$$

$$\Delta \ln \mathrm{X_t} = C_0 + \sum_{i=1}^{k} \gamma_i \Delta \ln \mathrm{X_{t\text{-}i}} + \sum_{i=1}^{k} \varsigma_i \Delta \ln \mathrm{Y_{t\text{-}i}} + \phi_i ECT_{t-1} + \varepsilon_t \quad (8)$$

where Y and X are series of consideration, and φ_i and ϕ_i are the coefficients of ECT_{t-1} that denotes the error correction term in both models, Δ indicates first difference of the variables. In equation (7), X (independent variable) Granger causes Y (dependent variable) if φ_i is statistically significant. In equation (8), Y (independent variable) Granger causes X (dependent variable) if ϕ_i is statistically significant. F-statistic is used to test the joint null hypothesis of α_i, $\varsigma_i = 0$, and t test is employed to estimate the significance of the error correction coefficient.

Chapter 5

EMPIRICAL RESULTS

5.1 Unit Root Test for Stationarity

Stationary nature of the variables is investigated by the ADF and PP tests as mentioned in chapter 4. All variables were due to tests for unit roots at their level forms and first differences. Table 5.1 shows the results of ADF and PP tests.

Table 5.1 ADF and PP Approaches for Unit Roots

Statistics (Level)	ln GDP	Lag	ln FDI	lag	ln DS	lag
τ_T (ADF)	-2.505	(0)	-2.903	(0)	-2.122	(0)
τ_μ (ADF)	-0.965	(0)	-1.971	(0)	-1.977	(0)
τ (ADF)	8.241	(0)	-0.545	(1)	-1.196	(0)
τ_T (PP)	-2.514	(1)	-2.719	(4)	-2.049	(5)
τ_μ (PP)	-0.982	(1)	-1.738	(2)	-1.909	(9)
τ (PP)	8.241	(0)	-0.598	(27)	-1.517	(12)
Statistics (First Difference)	Δln GDP	lag	Δln FDI	Lag	Δln DS	Lag
τ_T (ADF)	-7.075*	(0)	-9.199*	(0)	-6.146*	(1)
τ_μ (ADF)	-7.018*	(0)	-9.051*	(0)	-5.977*	(1)
τ (ADF)	-1.992**	(1)	-9.135*	(0)	-6.263*	(0)
τ_T (PP)	-7.075*	(0)	-16.881*	(25)	-8.203*	(18)
τ_μ (PP)	-7.018*	(0)	-9.962*	(9)	-6.463*	(12)
τ (PP)	-3.502*	(4)	-9.947*	(9)	-6.264*	(9)

Note:

GDP represents real gross domestic product; FDI is the foreign direct investment inflows; DS is the domestic savings. All of the series are logarithmic. τ_T stands for the most general model with an intercept and trend; τ_μ is the with an intercept but without trend; τ is the one without intercept and without trend. Numbers in parantheses are optimum lags in the case of ADF test (AIC). In the case of PP test, numbers in parantheses represent Newey-West Bandwith (Bartlett-Kernel). Unit root tests were performed from the most general to the most restricted model as also suggested by Enders (1995). *, ** and *** represent the rejection of the null hypothesis at alpha 1 percent, 5 percent and 10 percent respectively. Tests were carried out in E-VIEWS 6.0.

5.2 Co-integration Analysis

Johansen Co-integration test can be only used for those non-stationary variables which are integrated of the same order of d. In this study, all three variables were found as I(1) and the tests were employed to GDP, FDI and DS in order to search for possible co-integration among them. In our proposed model, dependent variable is GDP while DS and FDI are independent variables. Test results are shown in table 5.2. Johansen results of this study include three hypotheses. First, the null hypothesis which states that there are no co-integrating vectors among variables and second the alternative hypothesis states that the number of co-integrating vectors are less than or equal to one. And the third one is that vectors are at most two.

According to test results, trace statistics in the first hypothesis are greater than critical value at alpha 5 percent; therefore, the first null hypothesis can be rejected at this level, which suggest that there is at least one co-integrating vector, and therefore a long run relationship could be inferred between real GDP, and its explanatory variables of FDI and DS in Turkey.

Table 5.2 Johansen Test for Cointegration

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None *	0.408764	33.36536*	29.68	35.65
At most 1	0.235898	11.81820	15.41	20.04
At most 2	0.019012	0.786998	3.76	6.65

Note:
*Trace test indicates 1 cointegrating equation(s) at the 5% level as * denotes rejection of the hypothesis at the 5% level*

5.3 Level Coefficients and Error Correction Model Estimation

According to co-integration results, long run vectors were found between GDP and its regressors. In the next step, we need to estimate the level (or long term) coefficients of the model of GDP = f (FDI, DS) and its ECM in order to estimate short term coefficients and ECT. Table 5.3 shows the level equation results and ECM results. In this study, different lag levels were tried until 7 (Pindyck and Rubinfeld, 1991). Short term coefficients can be seen in table 5.3. Short term coefficients of FDI are not statistically significant at all α levels. In addition, short term coefficients of DS are not statistically significant in general but only at lag 7 short term effect of DS on GDP is statistically significant at α=0.05. If there is an increase in DS by 1%, GDP of Turkey decreases by 0.1507% in the short term. Table 5.3 shows that ECT is 6.5982%, negative, and statistically significant at α=0.01. 0.065982 shows that short run values of GDP converge to its long run equilibrium level by 6.598% speed of adjustment every year by the contribution of FDI and DS.

As can be seen from level equation table, when FDI increases by 1%, GDP increases by 0.318% in long term and it is statistically significant at α=0.10. On the other hand, when there is an increase in DS by 1%, GDP decreases by 0.0934% in the long term but it is not statistically significant.

Table 5.3 Error Correction Model

Cointegrating Eq:	CointEq1
LGDP(-1)	-1.000000
LFDI(-1)	+0.318114 (0.17022) [-1.86880]
LDS(-1)	-0.093436 (0.57659) [0.16205]
C	-27.56930
Error Correction:	**D(LGDP)**
CointEq1	-0.065982 (0.02094) [-3.15054]
D(LGDP(-1))	-0.190467 (0.22664) [-0.84040]
D(LGDP(-2))	-0.041463 (0.21269) [-0.19494]
D(LGDP(-3))	-0.403369 (0.21604) [-1.86711]
D(LGDP(-4))	-0.443454 (0.20264) [-2.18841]
D(LGDP(-5))	-0.028370 (0.22934) [-0.12370]
D(LGDP(-6))	-0.255311 (0.21990) [-1.16103]
D(LGDP(-7))	-0.139862 (0.21512) [-0.65015]
D(LFDI(-1))	-0.014193 (0.01198) [-1.18444]
D(LFDI(-2))	0.000527 (0.01041) [0.05059]
D(LFDI(-3))	-0.007507 (0.01181) [-0.63555]
D(LFDI(-4))	0.009980 (0.01258) [0.79357]

Table 5.3 Error Correction Model (Continued)

D(LFDI(-5))	0.015622 (0.01328) [1.17601]
D(LFDI(-6))	0.019623 (0.01171) [1.67585]
D(LFDI(-7))	0.016434 (0.01168) [1.40646]
D(LDS(-1))	-0.037019 (0.05886) [-0.62888]
D(LDS(-2))	0.044092 (0.06296) [0.70028]
D(LDS(-3))	0.017458 (0.06159) [0.28345]
D(LDS(-4))	-0.037825 (0.06511) [-0.58093]
D(LDS(-5))	0.005044 (0.07132) [0.07073]
D(LDS(-6))	0.076366 (0.07797) [0.97944]
D(LDS(-7))	-0.150709 (0.07132) [-2.11302]
C	0.109826 (0.03730) [2.94463]
R-squared	0.632956
Adj. R-squared	0.184347
Sum sq. resids	0.021091
S.E. equation	0.034231
F-statistic	1.410930
Log likelihood	97.05899
Akaike AIC	-3.612634
Schwarz SC	-2.651361
Mean dependent	0.042657
S.D. dependent	0.037902
Determinant resid covariance (dof adj.)	6.10E-06
Determinant resid covariance	5.16E-07
Log likelihood	122.2617
Akaike information criterion	-2.451790
Schwarz criterion	0.557410

5.4 Granger Causality Tests

After co-integration and ECM analyses are done and co-integrating vectors found between variables, Granger causality tests must be applied under the VECM as mentioned in chapter 4 (Enders,1995). Table 5.4 shows the results of Granger Causality Test under Block Exogeneity Approach. The null hypothesis of the model shows the non-causality between variables. If the null hypothesis is rejected that means independent variable Granger-Causes the dependent variable.

Table 5.4 Granger Causality Tests under Block Exogeneity Approach

Dependent variable: LFDI			
Excluded	**Chi-sq**	**df**	**Prob.**
LGDP	10.60409	8	0.2252
LDS	18.65276	8	0.0168*
All	26.65745	16	0.0455
LGDP	18.31138	9	0.0317**
LDS	27.36257	9	0.0012**
All	35.61851	18	0.0079
LGDP	64.55564	10	0.0000***
LDS	85.64504	10	0.0000***
All	105.5428	20	0.0000
Dependent variable: LDS			
LGDP	16.47511	10	0.0868***
LFDI	5.898020	10	0.8238
All	31.57354	20	0.0481

Note:
, ** and * represent prob values at 8, 9 and 10 lag levels respectively.*

In the econometric literature, some methods are used for optimal lag selection. For example, Akaike Information (AIC), Schwartz Information Criterion (SIC) and Hsiao's (1979) sequential procedure. In order to make sure that results are not sensitive to the optimum lag length selection, Pindyck and Rubinheld (1991) highlighted that it is better to do the test with different lag structures. In this study, we prefer to try alternative lag lengths from 1 to 10. Since the number of observations are satisfactory.

Results in Table 5.4 shows that there is single causality running from DS to FDI, from GDP to FDI and from GDP to DS. They are all because of the fact that the null hypothesis of no causality can be rejected at the given levels of α values in Table 5.4. Any bi-directional causality couldn't be observed between variables. This study concludes that a movement in DS precedes a movement in FDI while a movement in GDP precedes movements in FDI and DS. These results show that DS and FDI in Turkey are output (GDP) driven.

Chapter 6

CONCLUSION AND POLICY IMPLICATIONS

6.1 Conclusion

The present research have focused on the empirical relationship between real income growth, foreign direct investment, and domestic savings in Turkey, which has a developing economy and been successful in stabilizing its economy after 2000s. Results of this research suggest that FDI and DS are in long term equilibrium relationship with real income (economic) growth; that is, FDI and DS are determinants of income in Turkey. The long run model in the present thesis shows that FDI has direct, statistically significant, but inelastic impact on economic growth of Turkey in the long run period; however, the coefficient of DS is not statistically significant in the level equation. Results of error correction model suggest that real income of Turkey converge to its long term equilibrium level at 6.59% speed of adjustment by the contribution of FDI and DS, which can be assumed as a low convergence in economics; however, this ratio is negative (as expected) and statistically significant. Long term Granger causality tests have shown that changes in real income and domestic savings precede a change in FDI. This means that FDI inflows in Turkey are output and savings driven. Furthermore, results of this study have proved that DS in Turkey is output (income) driven. Any long term causality couldn't be obtained that run from FDI and DS to real income.

6.2 Implications

Turkey is a developing economy, which experienced many economic and political crises since 1940s. For the first time in its history, Turkey started to stabilize its economy apart from 2000s. Political stability has brought an economic wellbeing which led to economic stability and continuous growth. This economic stability along with the implementation of European Union measurements for full membership has encouraged foreign investors to come and make investments in the Turkish stock markets and different sectors. Turkey now is a safe investment area for foreigners no matter what happen in other countries or regions. Since 2008 some European countries experienced economic crises such as Greece, Portugal, and finally Italy. However the Turkish economy was not affected from these crises seriously owing to the trust of foreign investors for the Turkish markets. It is highly likely that government of Mr. Erdogan will continue for longer time in Turkey; therefore, political stability is expected to result in economic stability which also means trust and safety investment environment for foreigners. Results of the present study reflect this reality in the case of Turkey where foreign direct investment and domestic savings are economic wellbeing driven. So, the Turkish authorities should always be aware of the fact that foreign direct investments and financial inflows (portfolio investment) require economic/political stability and safe environment.

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