Essays on Applied Econometrics

by

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Abstract

This dissertation consists of three essays. The first essay analyzes the determinants of Foreign Direct Investment (FDI) in the food products sector in Turkey. An Autoregressive Distributed Lag (ARDL) model which is originally proposed by Pesaran and Shin (1999) and popularized by Pesaran *et al*. (2001) is applied to the monthly data over the period of January, 2009, to December, 2016. In the model, FDI inflows are modeled as a function of degree of openness, exchange rate, export price, and wage rate. The empirical results confirm there is evidence of a long-run equilibrium relationship among these variables in Turkey. Findings indicate that degree of openness, and export price have a positive sign and are statistically significant, while the wage rate presents a negative sign and is statistically significant. Finally, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMQ) stability tests are employed to check the stability of short-run and long-run coefficients in the ARDL error correction model, and the results confirm that the model is structurally stable.

Essay 2 examines the relationship between the exchange rate and tourism trade balance in Turkey from year 1970 to 2016 by applying three Vector autoregression (VAR) models. The main findings of this paper can be documented as follows: (i) there is no long-run co-integration relationship among the variables (ii) the reaction of the export revenue to an unexpected 1% depreciation exchange rate shock is positive and statistically significant at the 95% level (iii) the import tourism spending exhibits a robust significant positive response to home demand shock

(iv) the response of trade balance to 1% shock in exchange rate is negative and significant, which shows the evidence of J-curve behavior for the selected eight European countries

The final essay uses household survey data to analyze the relationship between education and poverty in Turkey. To obtain robust estimates of the determinants of household poverty, we applied five different econometric techniques, each relying on a different set of assumptions. such as Ordinary Least Squares (OLS), Linear Probability Model (LPM), Probit and Logit Models, and Instrumental Variable (IV) Probit Model. Both Ordinary Least Squares (OLS) and Linear Probability Model (LPM) model show that the level of education, being female and married, having a job or being retired are the important factors in determining the household head's poverty conditions. However, employing probit and logit models, the results from the analysis provide evidence that married head of households are significantly more likely to poor than single head of households. In addition, the probability of being poor decreases with the household head's educational attainment. However, based on the findings from Instrumental Variable (IV) Probit model, the policy reform, which was implemented in 1961, only increases the household head's years of education for rural residents. Further, the higher the level of education of the household head, the higher the household per capita income.

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I am graduating with the Doctorate of Philosophy degree, and I have completed several research papers some of which are presented in this dissertation. However, none of these would have been possible without the help of very wonderful people.

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I dedicate this dissertation to all oppressed innocents across the globe.

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List of Abbreviations

ADF	Augmented Dickey-Fuller
AIC	Akaike's Information Criterion
ARDL	Autoregressive Distributed Lag
BPG LM	Breusch-Pagan Lagrange Multiplier
CBRT	Central bank of the Republic of Turkey
CEEC	Central and Eastern European Countries
CMM	Knowledge-Capital Model
CUSUM	Cumulative Sum
CUSUMQ	Cumulative Sum of Squares
ECM	Error Correction Model
ECT	Error Correction Term
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
ILCS	Income and Living Conditions Survey
IPI	Industrial production Index
IRF	Impulse Reaction Function
ISO	Istanbul Sanayi Odasi
IV	Instrumental Variable

LPM	Linear Probability Model
MNF	Multinational Firm
MPS	Market Price Support
NAFTA	North American Free Trade Agreement
OECD	Organization for economic Co-operation and Development
OLS	Ordinary Least Square
PP	Philips-Perron
SBC	Schwarz Bayesian Criterion
UNCTAD	The United Nations Conference on Trade and Development
TURKSTAT	Turkish Statistical Institute
VAR	Vector Autoregressive
WHC	Western Hemisphere Countries
WTO	The World Tourism Organization

Essay 1: Analysis of Determinants of Foreign Direct Investment in the Food Product Sector of Turkey

Introduction

Foreign direct investment (FDI) is the investment made by foreign companies in a country, which leads to economic growth of that nation. A country needs capital and revenues to propel the economic growth trajectory, and FDI helps in achieving this feat by bridging the investment-savings gap (Borensztein, Gregorio and Lee, 1998). FDI also brings peace, security, advanced in information technology, industrial cluster development and other benefits (Sanderatne, 2011). Besides, FDI adds value to industries and increase the Gross Domestic Product (GDP) and earnings through foreign exchange (Borensztein, Gregorio and Lee, 1998). If made in a particular sector, FDI brings significant transformation by making the companies in that sector able to hire skilled workforce and improve upon the quality of products and services.

Food FDI has gained sharp increase in the last few years. This trend is evident due to a number of factors- increasing production and exports of processed food (Athukorala and Sen, 1998), escalating food insecurity, high food prices, scarcity of land and water resources to provide adequate food supplies, and increasing urbanization and population making people dependent on imported and ready-made food items. Food FDI is now important because developing countries are faced with a population boom and their agriculture and land resources are limited (UNCTAD, 2005). Hence, food FDI presents a strategic response to private sector

food companies, which find good business opportunities to invest in food demand-struck nations while the nations are able to support the living of their population (Hallam, 2009). Nations likeAfrica and others that are the most affected by food insecurity and shortages benefit the most from food FDI because food supplies are ensured while the government offers tax and subsidies to foreign investors to sustain the food manufacturing and agriculture industry in these nations (Gibbon and Ponte, 2005).

The objective of the study is to analyze the main determinants of food product FDI inflows in the case of Turkey. This paper is, to the best of our knowledge, the first in directly testing the linkage between the determinants of FDI flows into the Turkish food processing industry.

The paper is organized as follows: After the introductory section, the paper continues with an overview of the relationship between total FDI inflows and economic growth in Turkey, and then looks into Turkey's food industry from different perspectives. Section 3 summarizes empirical evidence of earlier studies on the determinants of FDI in the food processing industry. Data and econometric methodology are discussed in Section 4. The results are analyzed in Section 5. The paper concludes with evaluating the consequences of the major findings.

An Overview of Foreign Direct Investment (FDI) Inflows into Turkey

Turkey is a country located at the junction of Europe, Asia, and the Middle East. Its competitive advantages, such as geographic importance, closeness to different markets, young labor force, political and financial stability, and expanding local economy make it one of the most appealing destinations for foreign direct investment (FDI). A survey conducted in 2013 by Ernst & Young based on representative samples of 201 multinational firms for Turkey shows that 52.6% of

respondents believe that local labor skill level is the most important factor in attracting the FDI to the country. Besides, macroeconomic stability and Turkish culture have emerged as the second and third major factors contributing to FDI in Turkey with shares of 51.4% and 47.5 %, respectively.

Since the 1990s, Turkey has faced several economic crises, in 1994, 2000, and 2001. Starting from 2002, the Turkish government has put into practice new economic policies, which coupled with sound monetary, fiscal and financial stability. The aim of these regulations is to establish a strengthened macroeconomic and financial stability, to improve the confidence of the business environment and to overcome the 2001 economic crisis with minimum damage (Business Reporter, 2013). Based on these positive steps, the economy between the years 2002 and 2007 enjoyed strong uninterrupted economic growth with at an average annual growth rate of 6.8%. Yet, this positive trend became reversed with the global economic meltdown of 2008. Starting in mid-2008, the impacts of the crisis began to be felt and the Turkish production and construction sectors contracted by 10.8% and 13.4%, respectively. With the crisis, the growth rate of GDP dropped to 0.7% in 2008, and it further fell by 4.8% in 2009. Although Turkey was deeply affected by the global crisis, its negative impacts on the Turkish economy did not last for a long time and it recovered quickly from the financial crisis towards to the end of 2009 and the Turkish economy experienced positive growth in 2010 at a rate of an 8.5%, 8.8% in 2011, 2.2% in 2012, 4.2% in 2013, 2.9% in 2014 and 4% in 2015 (Colak and Comert, 2014).

Political and economic stability, a confident investment climate, a young and dynamic population, the closeness of Turkey to Europe as well as the Middle East and Africa help to attract more FDI into Turkey. The total FDI inflow in Turkey escalated dramatically in the mid-2000s. Figure 1.1 illustrates the relation between GDP growth and the inflows of FDI into

Turkey over the period of 2000 - 2015. While the accumulated FDI inflows to Turkey accrued to only about USD 1.2 billion a year during 1980-2000 period, it surged to USD 11.5 billion between 2001-2015, which is an increase of thirteen-fold. Although Turkey's FDI inflows reached USD 22 billion in 2007, the highest level ever recorded; there was some fluctuation between the years. In 2009, FDI decreased to USD 8.5 billion as a result of the global slowdown of 2008. After falling sharply during the crisis, FDI inflows to Turkey reached USD 9.1 billion in 2010, USD 16.2 billion in 2011, and dropped to USD 11 billion in 2015. Compared to 2011, FDI inflows to Turkey decreased by 26% in 2015 in line with the global FDI flows.

On the other hand, Turkey's food processing industry is the largest and most dynamic sector among the manufacturing activities. Nandu Nandkishore who is the executive vice president at Nestle states that "Turkey is one the fastest growing and most dynamic market in Asia, Oceania, and Africa. This investment makes the site one of its major regional manufacturing hubs, in western Turkey" (Business Reporter, 2013, p.3).

Following a very serious economic transformation in the last 10 years, the performance of Turkey's food product sector has developed significantly and many multinational firms have increased their investment into Turkey, in particular, in the food service sector. During the period 2007 to 2012, the amount of FDI inflows in the food processing industry increased at the rate of 68.6% per annum, reached a peak of USD 2201 million, and then it has been on a downward trend since 2013. FDI inflows in food product industry in Turkey after 2007 can be seen from Table 1.1. According to a report by the Global Agriculture Information Network dated 2014, the major multinational enterprises (MNEs) investing into Turkey's food processing sector were Coca-Cola, Pepsi Co., Unilever, Cargill, Nestle, Danone, Cadbury Schweppes, Kraft, Carlsberg, Frito-Lay, Haribo, CP, and Perfetti van Melle (Atalaysun, 2014). Unilever, the largest in the

industry with its 30 brands in the Turkish market, employs over 5000 people and reported net revenues of 3,391,950,836 million Turkish lira in 2014 (ISO, 2014).

Literature Review

FDI in the food sector has increased for a number of reasons. First and foremost, it helps address the issue of food insecurity in developing nations where advanced technology, agricultural tools and equipment and other food production amenities are either absent or in their initial stages. It particularly helps nations increase domestic food supplies and production to ensure the availability of food to the nationals (Smith and Häberli 2012; Slimane et al., 2015), thereby reducing local poverty and improving the basic standard of living (FAO, 2015). It also helps create employment opportunities because FDI helps increase production levels, thus leveraging the demand for workers and employees (Gerlach and Liu, 2010).

While numerous empirical studies have been conducted to identify the factors that affect the level of FDI activity in host countries, studies bearing on food industry FDI determinants are limited. Each study uses different variables, which are identified as determinants of food product FDI change from country to country and from study to study. Bolling *et. al.* (1998) sought trends in trade and investment in the Western Hemisphere countries' (WHC) food processing industries. That study covered the period from 1984 through 1994 with a dataset from WHC including the United States, Brazil, Canada, Mexico, Colombia, Argentina, Venezuela, and Chile. The findings of the study suggest that the liberalization of FDI rules had a significant impact on the growth of investment. Country size was also found to matter in attracting more foreign direct investment.

Using a similar country set, Mattson and Koo (2002) argued that the relationship between U.S. exports and FDI in the processed food industry in the Western Hemisphere. They used a sample of eight Western Hemisphere countries, such as Canada, Mexico, Argentina, Brazil, Colombia, Costa Rica, Guatemala, and Venezuela, over the 1989-1998 periods. They include a number of macroeconomic variables such as market size, exchange rate, and agricultural tariffs. They found that foreign affiliate sales are complements for exports from the U.S. food processing industry. That is, FDI has a positive and significant impact on exports while the effect of tariffs on export is negative. On the other side, exports and market size have a positive and significant impact on FDI inflows but these inflows are negatively influenced by exchange rate volatility. They also explored regional differences using country dummy variables and conclude that U.S. processed food exports are larger to Canada and Mexico and smaller to Brazil and Argentina.

As for the literature on FDI activity in the food product sector, Josling *et.al.,* (1996) reviewed the flows of FDI projects into the Central and Eastern European countries (CEECs) by collecting data from newspaper announcements. Their findings highlight that such investments are heavily concentrated in the food processing industry, especially confectionary, ice cream, and beverages. Results of the research carried out by Berkum (1999) are akin to those of Josling *et.al.* (1996), and in addition he points out that more resource-intensive activities like grain milling or meat processing in CEEC region attract the smallest quantities of FDI rather than the subsectors of food-processing sectors such as confectionary, ice cream, and beverage.

Gopinath *et. al.* (1999) examined the linkage between the determinants of inflows of FDI and its relationship to trade in the U.S. food processing industry by using panel data from ten developed countries covering the period from 1982 through 1994, based on a model of a profit maximizaing firm. Their empirical findings show that there is substitution between exports and

foreign sales. Moreover, the level of GDP per capita is an important factor in determining FDI inflows, foreign sales, and exports in the U.S. food processing industry.

A country-level empirical study concerning the determinants of FDI inflow in Poland's food industry in 28 countries of investor-origin during 1990s was performed by Walkenhorst (2001). In this study, he estimated a Tobit model based on a gravity model. The result reveals that the market size of a country, geographical distance from the investing country, trade intensity, and relative unit cost of labor are significant factors in determining the FDI inflows in Poland's food industry.

Makki *et. al.* (2003) examined the effects of host country characteristics on U.S. processed food FDI and exports using panel data. The data covered 36 developed and developing countries for the years 1989 through 2000. They examined a number of macroeconomic variables such as GDP, per-capita income, trade, tax rates, interest rates, inflation rates, exchange rates, consumer price index, and food price index. The findings of the study reveal that the choice of a host country for FDI depends on various country characteristics and policies. The openness of countries, market size and per-capita income have a significant impact on the decision of U.S. food-processing firms whether to invest abroad or not, but the impact of these factors varies between developed and developing countries. Moreover, economic development has a positive influence on FDI inflows to developing countries but has a negative impact in developed countries.

Using statistical data set consisting of several OECD countries for the years 1990-2000, Wilson (2006) investigated the relationship between food product FDI, trade, and trade policy by utilizing a gravity model on panel data. According to this study, trade and FDI flows are connected to each other and the outward investment and export are positively influenced by

market share. Further, the Market Price Support (MPS) has a negative and significant impact on FDI inflows that indicates due to high level of local agricultural costs investors do not want to invest. Lastly, not being a member either EU or NAFTA has a negative and statistically significant suggesting "an investor in a home country invests in a host country with preferential tariffs in a third country to exploit the preferential tariffs" (Wilson, 2006, p.12).

Similarly, Wilson and Cacho (2007) used panel data from 1990 to 2000 to analyze the relationships among FDI, trade and trade-related policies in the food sector in the OECD and four African countries (Ghana, Mozambique, Tunisia and Uganda) based on a gravity model. They include of set of variables such as, GDP_{home}, GDP_{host}, the market price support (MPS), $WAGE_{home}$, distance, market share, and tariff rates. The study found that FDI and trade policy are related. Market share and tariff rates have a positive impact on outward investment whereas outward investment is influenced negatively by MPS and wages. Furthermore, the dummy variable for non-membership in NAFTA or the EU has a negative impact in determining the FDI inflows.

Xun (2006) examined the determinants of U.S. outgoing FDI in the food-processing sector by applying the Knowledge-Capital Model (CMM) to panel data by employing a sample of 19 developed countries over the period of 1984-2002 and 20 developing countries covering 1990-2002. According to the econometric results, market size, home country trade cost, factor endowment, and host country investment cost affect the food sector FDI significantly.

Lastly, a recent study by Parajuli (2012), using the Autoregressive Lag (ARDL) bounds test approach for U.S. and Mexico from 1998 to 2008, also attempted to identify the principal determinants of FDI in the processed food sector. He employed a number of macroeconomic

variables including per-capita GDP, real exchange rate, exports, the relative difference in wages in the countries, the relative difference in interest rates, and membership in NAFTA. The study found that per-capita GDP, exports, the real exchange rate, the relative difference in wages, and being a member of NAFTA are positively correlated with food product FDI inflows.

There is no previous study that has been conducted in the food product market concerning FDI inflows for Turkey. This paper tries to fill this gap. Thus, the objective of this article is to identify, based on the time series data for the period of January 2009 to December 2016, the influence of country-specific characteristics on inward investment into Turkey's food processing sector. Specifically, the study analyzes the openness of the sector, exchange rate, wage, and export price. The study makes use of the autoregressive distributed lag (ARDL) bounds test technique to analyze the determinants of FDI in Turkey's food product market.

The Data, Model Specification and Estimation Procedure

Data and Variable Definitions

This research uses monthly time-series data spanning from January of 2009 to December of 2016, with a total of 96 observations for each variable. This study analyzes a set of potential determinant variables that impact the FDI inflows to Turkey for food product sector obtaining the data directly from the Central Bank of the Republic of Turkey (FDI is the dependent variable), and we classify the independent variables into four categories including the Trade Openness index (Openness) for the food product industry; the average daily earning (Wage); the export price for the food product industry (Price); and the exchange rate is the average exchange rates, which is expressed as local currency units against the U.S. dollar. The explanatory variables used in the econometric analysis are discussed in more detail below.

Trade Openness

Trade openness is used to measure a country's degree of openness. In the existing literature, a large of number of empirical studies have been documented to test the link between trade openness and FDI (Jordaan, 2004; Demirhan, 2008; Sridharan *et al.*, 2010; Blonigen and Piger, 2011; Grubaugh S. G., 2013; Guris and Gozgur, 2015). Empirical findings of the studies claim that there is mixed evidence concerning the effect of openness on FDI flows and that it depends on the type of investment. In this study, we use the degree of openness index[1] that is computed as the sum of the monthly seasonal and calendar adjusted export index and import index divided by the monthly seasonal and calendar adjusted industrial production index for the food processing industry. Foreign trade indices monitor an overall measure of value and volume changes of imported and exported goods. The data for trade openness for the food processing industry are obtained directly from the Turkish Statistical Institute (TurkStat). The variable is used in its natural log form and is expressed in US dollars.

Hypothesis 1: *Higher levels of trade openness in a sector, the greater the levels of FDI that sector should attract.*

Export Price

The impact of export price depends on the level of the country's development. Makki *et. al.* (2003) show that the export price reduces the level of FDI inflows to developed countries, but increases in the developing countries s (Makki *et. al.*, 2003). In this study, we use consumer price index for food processing sector in order to test the relationship between export price and FDI inflows. The expected sign of the export price on FDI flows for the food processing industry is

[1] The Openness Index is an economic metric calculated as the ratio of country's total trade, the sum of exports plus imports, to the country's gross domestic product ((X+M)/GDP) (Wikipedia).

positive and the data for export price, indicated by the unit value of imports, for the food processing industry are obtained directly from the Turkish Statistical Institute (TurkStat). The variable is used in its natural log form and is expressed in US dollars.

Hypothesis 2: *A higher price in a sector increases the level of inward FDI to the host country, holding everything else constant.*

Wage Rate

Wage rate influences the level of FDI inflows into the host country. Several researchers determined various mechanisms through which the inward FDI may have different effect on wages in the recipient countries. The expected sign of the wage rate on FDI flows for the food processing industry is negative and the purpose of the MNEs is to cut their production costs by reducing labor costs as much as possible. Thus, wage rate is the one of the important factor that affects foreign investors' decisions whether to invest abroad or not, this is because they choose their investment locations based on labor costs (Makki *et. al.,* 2003). The data for wages for the food processing industry are obtained directly from the Turkish Social Security Institute. The variable is used in its natural log form and is expressed in US dollars.

Hypothesis 3: *A high wage in a sector decreases the level of inward FDI, other things being constant.*

Exchange Rate

A number of studies have examined the relationship between the exchange rates and FDI flows. These studies all amounted to divergent empirical findings. In existing literature, some studies suggest that exchange rate affects the inflows of FDI to host countries either positive or negative

way. Therefore, there is no clear statement as to how exchange rates affect FDI. For example, Barrel and Pain (1998) found that a depreciation in the host countries' currencies increased FDI flows whereas Waldkirch (2003) concluded that an appreciation of host currency increases FDI flows into Mexico. However, Amuedo-Dorantes and Pozo (2001) reported that no statistically significant relationship between the level of the exchange rate and inward FDI flows into the United States. The data for exchange rate is obtained directly from the Central Bank of the Republic of Turkey. The variable is used in its natural log form and is expressed in US dollars.

Model Specification and Estimation Procedure

To analyze the determinants of FDI, we use the following reduced form:

$$\mathrm{FDI_t} = \mathrm{f}(\mathrm{Price_t}, \mathrm{Wage_t}, \mathrm{ExchangeRate_t}, \mathrm{Openness_t}, \mathrm{u}) \quad (1)$$

where FDI_t is the inflows of foreign direct investment for food, beverage, and tobacco product in the host country, $Price_t$ is export prices, indicated by the unit value of imports, $Wage_t$ is the average daily earning, $Openness_t$ is the openness of the economy, $ExchangeRate_t$ is the average exchange rates expressed in local currency units against the U.S. dollar and u is the error term.

For computational purposes, as stated above, all variables are expressed in logarithmic values in order to eliminate or reduce the effect of any heteroscedasticity problem for economic time series data. Thus, the regression equation used for this econometric analysis is:

$$\ln(FDI)_\mathrm{t} = \alpha_0 + \alpha_1 \ln(Price)_t + \alpha_2 \ln(Wage)_t + \alpha_3 \ln(\mathrm{ExchangeRate_t})_t + \alpha_4 \ln(Openness)_t + u_t \quad (2)$$

where the variables are as stated before and where the parameters to be estimated are $\alpha_1, \alpha_2, \alpha_3$, α_4, and α_5 stand for the long-run elasticities of FDI with respect to *Price*, *Wage*, *Exchange rate*, and *Openness*, respectively. The stochastic error term is denoted by u_t that satisfies the normal requirements, and *t* represents monthly time period.

In terms of methodology, this study makes use of the Autoregressive Distributed Lag (ARDL) model (or the bounds test approach) which was originally proposed by Pesaran and Shin (1997) and gained importance by Pesaran *et al.* (2001). If the order of integration of the underlying variables is purely I (0), purely I (1), or a mixture of both, then the ARDL approach is more appropriate model than other time series methods.

An ARDL representation of equation (2) is formulated as follows:

$$\begin{aligned}\Delta \ln(FDI)_t = \beta_0 &+ \sum_{i=1}^{m} \alpha_{1i}\, \Delta In(FDI)_{(t-i)} + \sum_{i=0}^{m} \alpha_{2i}\, \Delta In(Price)_{(t-i)} + \sum_{i=0}^{m} \alpha_{3i}\, \Delta In(Wage)_{(t-i)} \\ &+ \sum_{i=0}^{m} \alpha_{4i}\, \Delta In(\text{ExchangeRate})_{(t-i)} + \sum_{i=0}^{m} \alpha_{5i}\, \Delta In(Openness)_{(t-i)} + \theta_1 ln(FDI)_{t-1} \\ &+ \theta_2 ln(Price)_{t-1} + \theta_3 ln(Wage)_{t-1} + \theta_4 ln(\text{ExchangeRate})_{t-1} + \theta_5\, ln(Openness)_{t-1} + v_t\end{aligned} \tag{3}$$

where all variables are as previously defined, Δ denotes the first difference operator; m's are the optimal lag length; the terms with summation signs represent the error correction dynamics (short run multipliers of the model), i.e. $\alpha_{1i}, \alpha_{2i}, \alpha_{3i}, \alpha_{4i}$, and α_{5i}, and the second part of the equation (the terms with $\theta's$) represents the long-run multipliers of the model; β_0 is the drift component, and v_t is the white noise errors.

After estimating equation (2) using OLS technique, the null hypothesis of the non-existence of the long-run relationship amongst the variables is conducted, i.e. $H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = 0$ against the alternative hypothesis $H_0: \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq 0$,. The

joint F-statistic or Wald statistic can be used for testing the significance of the coefficients on the lagged levels of the explanatory variables in the conditional-error correction form of the ARDL model. Four sets of appropriate asymptotic critical value bounds for the F-statistics, such as 1 percent, 2.5 percent, 5 percent, and 10 percent, for each level of significance are tabulated by Pesaran and Pesaran (2009) and the calculated F-statistic value is compared with the critical values. If the computed F-value is above the upper bound critical level (for (*I(1)*), the null hypothesis is rejected which implies there is a long-run co-integration association among the time series. Contrarily, if the computed F-value is smaller than the lower bound critical value (for (*I(0)*), the null hypothesis cannot be rejected which concludes that there is no long-run association among the time series. Finally, if the F-value lies within lower and upper critical bounds, however, the result is inconclusive.

Once a long-run relationship has been established, the second step is to estimate equation (3) using the appropriate lag length based on the Akaike's Information Criterion (AIC). The third and final stage is to estimate the short-run dynamics by constructing a one-period lagged error correction version of the ARDL model, which is associated with the long-run coefficients. This is specified as follows:

$$\Delta \ln(FDI)_t = \beta_0 + \sum_{i=1}^{p} \alpha_1 \Delta In(FDI)_{(t-i)} + \sum_{i=0}^{q_1} \alpha_2 \Delta\, In(Price)_{(t-i)} + \sum_{i=0}^{q_2} \alpha_3 \Delta In(Wage)_{(t-i)} + \sum_{i=0}^{q_3} \alpha_4 \Delta In(\text{ExchangeRate})_{(t-i)} + \sum_{i=0}^{q_4} \alpha_5 \Delta In(Opennes)_{(t-i)} + \psi ECT_{t-1} + \varepsilon_t \quad (4)$$

where $\alpha_{1i}, \alpha_{2i}, \alpha_{3i}, \alpha_{4i}$ and α_{5i} denote the short-run dynamic coefficients of the model's convergence to equilibrium, ψ is the speed of adjustment for the explained variable towards long-run equilibrium and *ECT* is the error correction. The error correction term (*ECT*) is defined as: $ECT = lnFDI_t - (\varphi_1 lnPrice_t + \varphi_2 lnWage + \varphi_3 lnExchangeRate_t + \varphi_4 lnOpenness)$

and the coefficient of ECT (ψ) is expected to be less than zero and statistically significant in order to imply co-integration relationship.

Empirical Analysis and Results

This section discusses the findings of various stages of analysis including the descriptive statistics, unit root results for stationarity test, ARDL bounds test for co-integration, the estimates of long-run coefficients, and the diagnostic tests of the model.

Descriptive Statistics

Monthly data over the period of January, 2009, to December, 2016 were used to estimate equation (1). The descriptive statistics of the selected variables are reported in Table 1.2. Among all variables, Openness is the lowest standard deviation values with 0.151 that states the ranking of this variable in explaining variability in FDI. In addition, the monthly *FDI* inflow has highest mean and standard deviation of 16.448 and 1.579 respectively in the data.

Results from Unit Root Test

A number of unit root tests have been developed to test the stationarity of the variables and the conclusions of those stationary tests may differ from each other (Nieh and Wang, 2005). This paper performs two different unit root tests, i.e., Augmented Dickey and Fuller (ADF, 1981) and Philips and Perron (PP, 1988) to check the order of integration of the variables under consideration by examining the Akaike information criteria (AIC) with maximum lag lengths. All the tests mentioned above are testing the null hypothesis of stationary data. Table 1.3. reports the results of the two different stationary tests.

The variables *lnFDI* and *lnOpenness* are stationary in level form *I(0),* whereas other variables, i.e., *lnExchangeRate, lnPrice* and *lnWage* are non-stationary in their level form. After

differencing the data, the unit root test reveals that the series for *lnExchangeRate, lnPrice* and *lnWage* became stationary and integrated of order *I(1)*. Therefore, the findings obtained from the tests clearly indicate that the series are integrated with a mixture of *I(0)* and *I(1)* which support the use of the ARDL co-integration technique to determine the long-run relationships between variables.

Results from ARDL Bound Tests for Co-integration

The computed F-statistics and Wald-statistics for the model are 13.578 and 708.337 respectively. Through the results, it is evident that both the statistics are greater than the upper critical bound values for 1 percent level of significance (4.37) which push to accept the hypothesis of co-integration among foreign direct investment, exchange rate, trade openness, labor force, and export price in the model. The findings of the F-statistic and Wald for the ARDL model is reported in Table 1.4 and Table 1.5.

After confirming the co-integration association among variables, the next step is to select the long-run ARDL model. Akaike's Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan-Quinn Information Criterion (HQC) are used in the determination of optimal lag length for the ARDL model by testing the lowest number of lags and concludes that the ARDL model satisfies the condition of the tests of serial autocorrelation, heteroscedasticity, and normality at the same time. Pesaran and Pesaran (1997) suggest to choose 12 lags as the optimal lag length given the fact that it uses monthly data covering the period of January, 2009, to December, 2016. Given the maximum number of lags length (12) and the number of variables employed (5), we selected the lag 11, which corresponds to the ARDL

(1,0,0,8,2)[2] for long-run model after various specification trials. The results of the appropriate ARDL model based on AIC, SIC, and HQC are reported in Table 1.6 with diagnostic tests' statistics of the model.

Discussion of Long-run Results

The long-run coefficients of the variables under investigations are reported in Table 1.7. The test statistics in Table 1.7 suggest that all independent variables reported in the model were statistically significant at the different significance levels and the sign of the variables are consistent with theoretical predictions in determining a long-run relationship in Turkey within the study period.

The coefficient of *ExchangeRate* is significantly not different from zero at any significant levels with a coefficient value of -0.404 and a p-value of 0.174. The variability of *ExchangeRate* in Turkey for the food product sectors is insignificant which is not affecting the variability of the inflow of FDI. No firm conclusion can be drawn.

The impact of the degree of openness, *Openness*, which is measured as trade index is positive and significant at the 5% level. From the result, a change in trade openness index by 1 percent leads to an increase in FDI flows for the food product industry by 2.20 %, all things being considered equal. This result suggests that openness is an important factor in explaining FDI inflows for the food product sectors in Turkey which supports evidence of openness being a significant determinant of FDI found by earlier studies such as Jordaan (2004), Demirhan (2008), Sridharan *et al.* (2010); Blonigen and Piger (2011), Guris and Gozgur (2015). In addition,

[2] $\boldsymbol{ARDL}\ (\mathbf{1},\mathbf{0},\mathbf{0},\mathbf{8},\mathbf{2})$ indicates that 1 lags for *FDI*, 8 lags for *Exchange Rate*, 0 lags for both Export Price and *Openness*, and 2 lags for *Wage*.

foreign investors place much importance on the degree of openness of the Turkish economy while determining the location of economic activities.

Considering the impact of the export price to FDI, the statistic of price of export is significantly different from zero at 1% significant level with a coefficient value of 3.57 and a p-value of 0.066. This result suggests that holding everything else constant, a change in export price index by one-percentage point causes 3.57 percentage-point increase the level of FDI flows for the food product industry in Turkey. This result is consistent with Makki *et.a*l. (2003).

Lastly, the coefficient of *Wage,* in the long run, was found to have a negative sign in the line with expectations of this study and statistically significant at 1 %. From the result, one-percent increase in wage rate is associated with a 2.74 % decrease on inward FDI for the food product sectors in Turkey.

On the other hand, the coefficient on the lagged error correction term is highly significant at the 1 percent level with the expected sign which suggests that the error correction model is well fitted. More precisely, the coefficient of ECT is estimated to -0.92 (0.000) which indicates that approximately 92 percent of the disequilibrium in FDI from the previous period's shock will be converged back to the long-run equilibrium in the current period.

Diagnostic Tests

In this section, several diagnostic tests were performed to verify the stability of the model. The results of these tests are given in Table 1.8. In serial correlation, the probability of the F-stat value for the Breusch-Pagan Lagrange Multiplier (BPG LM) test is 0.847 which is greater than the 5 percent significant levels and it implies that there is no serial correlation in the long run relationship. Further, the probability of the data is higher than the 5% significant level, which

shows that the data used for the model is normally distributed. Finally, we use BPG test to check whether the model suffers from a heteroscedasticity problem or not, and we conclude that there is no heteroscedasticity problem in the model.

In order to determine the goodness of fit of the ARDL model, the stability tests proposed by Borensztein *et al.* (1998) and suggested by Pesaran and Pesaran (1997), Pesaran and Shin (1999), and Mohsen *et al.* (2002) have been employed to examine the stability of short-run and long-run coefficients. For test, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMQ) stability tests have been performed to assess the parameter constancy on the basis of the AIC-based error correction models. The results of Figures 1 and 2 clearly confirm that the parameters are stable over the sample period since the plot of the CUSUM and CUSUMQ statistics stay within the 5% level of significance. Thus, the null hypothesis of all coefficients under estimation is steady and cannot be rejected.

Concluding Remarks

In the literature, few empirical studies investigate the determinants of FDI inflows for the food product industry, and none exists for Turkey. Therefore, this paper attempts to fill in this gap. Based on review of previous studies, we have identified four important determinants that generally influence FDI. They are, trade openness, export price, and wage rate. This study has tested the long-run cointegration relationship between the variables under study by using Error Correction Model (ECM) based on the ARDL bound testing approach during the period of January, 2009, to December, 2016. The significance of both the F-statistic and Wald statistic of the ARDL model confirms the presence of a long-run relationship among variables.

It is also found that the variable trade openness, which is measured as trade index, has a positive relationship with FDI in the long run. We conclude that trade openness is a crucial factor in promoting Turkey's food product FDI. As argued earlier, on the basis of this result, countries with an efficient investment environment and greater trade liberalization policies promote FDI inflows into the host country.

The export price has a positive effect on Turkish food processing industry. This finding means that when export prices increase, MNEs make an effort to invest more into the host country in order to raise their profits. This result is further supported by Makki *et.al.* (2003).

The empirical results show that the variable wage rate has a negative effect on FDI inflows for food processing industry in Turkey. This conclusion implies that the higher wage rate in food processing sector reduces the level of FDI inflows to Turkey.

Moreover, other results show that the error-correction coefficient, which determines the speed of adjustment, had the expected negative sign and is significant. The finding suggests that deviations from long-term disequilibrium in FDI inflows are corrected by approximately 81 percent in each of the following period. In addition to those results, the model passes all of the diagnostics and stability tests.

Based on the conclusions above, these empirical findings have important key recommendations to policy makers. Since 2002, based on the 2023 vision that is the 100th anniversary of the Republic of Turkey, Turkish government has introduced four different incentive schemes in 2003, 2006, 2009, and 2012 in order to provide economic and financial stability, to expand the local economy, and to regulate its investment climate for more FDI inflows into the country. Yet, none of these incentive schemes did not help Turkey's food

processing sector as a desirable level. Thus, the Turkish government should prepare a specific program to protect the foreign investors in this industry. Further, the Turkish government also needs to formulate and implement prudent policies in order to enhance Turkey's dynamics such infrastructure, human capital quality, financial sector intermediation, labor market performance.

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Table 1.1: Sectoral Distribution of Cumulative FDI in Turkey (In Millions of USD)

Sectors	Years								
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Agriculture, Hunting, Forestry and Fisheries	**9**	**41**	**48**	**81**	**32**	**43**	**49**	**61**	**47**
Mining and Quarrying	**336**	**145**	**89**	**136**	**146**	**213**	**251**	**365**	**202**
Manufacturing	**4,131**	**3,972**	**1,640**	**924**	**3,596**	**4,342**	**2,210**	**2,731**	**4,111**
• Food Products, Beverages, and Tobacco Manufacturing	691	1251	219	124	649	2201	400	449	958
• Textile Product Manufacturing	231	187	78	94	148	376	59	137	429
• Manufacture of Chemicals and Chemical Products	1111	199	336	120	348	579	261	491	339
• Electric Manufacturing Optical Instruments	266	239	59	177	464	143	607	918	78
• Motor Vehicles, Trailers, and Semi-Trailers Manufacturing	64	71	224	38	93	121	75	142	138
• Other Manufacturing	1768	2025	724	371	1894	922	808	658	2105
Electricity, Gas, and Water Services	567	1,055	2,158	1,827	4,295	924	2,552	1,131	1,261
Services	**14,094**	**9,520**	**2,331**	**3,288**	**8,064**	**5,236**	**5,074**	**4,285**	**6,235**
• Construction	287	337	209	310	301	1428	206	232	76
• Wholesale and Retail Trade	234	2088	389	435	709	221	356	1136	569
• Hotels and Restaurants	679	25	55	113	122	16	57	24	23
• Transportation, Communication and Storage Services	33	96	230	183	5883	130	295	594	1524
• Financial Intermediation Activities	11717	6136	817	1621	300	2084	3734	1470	3535
• Health and Social Services	176	147	105	112	298	546	105	202	59
• Other Community, Social and Personal Service Activities	968	691	526	514	451	811	321	627	449
TOTAL	**19,137**	**14,733**	**6,266**	**6,256**	**16,133**	**10,758**	**10,136**	**8,573**	**11,856**

Source: The Central Bank of the Republic of Turkey (CBRT)

Table 1.2: Definitions and descriptive statistics of the variables used in the empirical analysis

Variable	Definition	Descriptive Statistics					
		Obs.	**Mean**	**S.D.**	**Median**	**Min.**	**Max.**
FDI	Foreign direct investment inflows of for food product industry (natural logarithm)	96	16.448	1.579	16.523	13.815	21.375
Openness	Trade Openness Index for food product industry calculated with the 2005 base year (natural logarithm)	96	0.855	0.151	0.815	0.547	1.239
Wage	Average monthly wage for food product industry (natural logarithm)	96	4.413	0.250	4.410	3.929	4.917
Export Price	Export price, indicated by the unit value of imports, for the food processing industry (natural logarithm)	96	5.654	0.244	5.684	5.180	6.099
Exchange Rate	Exchange rate is the average exchange rates expressed in local currency units against the U.S. dollar (natural logarithm)	96	0.682	0.247	0.594	0.349	1.249

Source: Author's calculation using Eviews 9.

Table 1.3: The results of various unit root tests on the log values of the variables based on SIC

	ADF		PP	
Variable	τ_c	τ_{c+t}	τ_c	τ_{c+t}
FDI	-8.8056*** **[0]** (0.0000)	-9.0128*** **[0]** (0.0000)	-8.8520*** **[3]** (0.0000)	-43.5444*** **[26]** (0.0001)
Exchange Rate	1.6862**[0]** (0.9996)	-2.5838 **[1]** (0.2886)	1.4189 **[1]** (0.9990)	-1.8976 **[2]** (0.6480)
Openness	-3.9056*** **[0]** (0.0029)	-3.8418*** **[0]** (0.0185)	-3.9056*** **[0]** (0.0029)	-3.8418*** **[0]** (0.0185)
Export Price	-0.6844 **[0]** (0.8449)	-3.9788** **[1]** (0.0126)	-0.6749 **[4]** (0.8472)	-3.4435 **[0]** (0.0518)
Wage	1.6039 **[11]** (0.9994)	-6.7953*** **[7]** (0.0000)	-0.2290 **[7]** (0.9299)	-9.3714*** **[6]** (0.0000)
∆FDI	na	na	na	na
∆Exchange Rate	-7.1640*** **[0]** (0.0000)	-7.6173*** **[0]** (0.0000)	-7.1640*** **[0]** (0.0000)	-7.5809*** **[2]** (0.0000)
∆Openness	na	-11.4687*** **[0]** (0.0000)	na	-12.7621*** **[9]** (0.0000)
∆ Export Price	-8.7073*** **[0]** (0.0000)	na	-8.6321*** **[5]** (0.0000)	-8.5715*** **[5]** (0.0000)
∆Wage	-6.7953*** **[7]** (0.0000)	na	-25.0077*** **[5]** (0.0001)	na
1% level* **	-3.5104	-3.5073	-3.5006	-4.0575
5% level **	-2.8925	-2.8951	-2.8922	-3.4578
10% level*	-2.5833	-2.5847	-2.5831	-3.1548

Notes: All variables are in logs in the series. Asterisks (***) and (**) show values are significant at 1% and 5% level with MacKinnon (1996), respectively. The figures within the [.] for the ADF are the appropriate lag lengths selected by SIC (Schwarz Info Criterion), whereas the figures within the parentheses for the PP is the optimal bandwidths decided by the Barnett kernel of Newey and West (1994). ∆ denotes the first difference of the variable. Results obtained from Eviews 9.

Table 1.4: ARDL Bounds Test for Co-integration

Variables	**F-Statistics**	**Inference**
F(FDI / Price, Exchange Rate, Openness, Wage)	**13.578*****	Co-integration

Significance Value	**Lower Bound**	**Upper Bound**
1%	2.20	3.09
2.5%	2.56	3.49
5%	2.88	3.87
10%	3.29	4.37

Notes: *** Statistical level at 1% level; ****** Statistical level at 5% level; and ***** Statistical level at 10% level. The lag length k=11 was selected based on the Akaike info criterion (AIC), Schwarz Info criterion (SCi) and Hannan-Quinn criterion (HQC). Results obtained from Eviews 9.

Table 1.5: ARDL Bounds Test for Co-integration

Wald Test: Long-run Relationship			
Test Statistics	**Value**	**DF**	**Probability**
F-Statistics	708.337***	(16,72)	0.0000
Chi-Square	11333.40	16	0.0000

Null Hypothesis

C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=C(9)=C(10)=C(11)=C(12)=C(13)=C(14)=C(15)=C(16)=0

Notes: *** Statistical level at 1% level. Results obtained from Eviews 9.

Table 1.6: ARDL Lag Length Order Selection Criteria based on AIC, SCI and HQC

Lag Length	Selected Model	AIC	SIC	HQC	R^2	F-Stat	Normality (prob.)	Serial Correlation	Heteroscedasticity	Bound-test	ECT(-1)
1	(1,0,0,1,1)	3.784	3.999	3.871	0.126	1.802	0.719	0.705	0.889	13.952	-0.955
2	(1,0,0,1,2)	3.743	3.986	3.841	0.176	2.281	0.024	0.749	0.952	15.640	-0.981
3	(1,0,0,1,2)	3.743	3.986	3.841	0.176	2.281	0.724	0.028	0.952	15.640	-0.981
4	(1,0,0,1,2)	3.743	3.986	3.841	0.176	2.281	0.724	0.028	0.952	15.640	-0.981
5	(1,0,0,1,2)	3.743	3.986	3.841	0.176	2.281	0.724	0.028	0.952	15.640	-0.981
6	(1,0,0,1,2)	3.743	3.986	3.841	0.176	2.281	0.724	0.028	0.952	15.640	-0.981
7	(1,0,0,2,2)	3.749	4.020	3.858	0.188	2.173	0.715	0.934	0.887	14.165	-0.960
8	(1,0,0,2,2)	3.749	4.020	3.858	0.188	2.173	0.715	0.934	0.887	14.165	-0.960
9	(1,0,0,2,2)	3.749	4.020	3.858	0.188	2.173	0.715	0.934	0.887	14.165	-0.960
10	(1,0,0,2,2)	3.749	4.020	3.858	0.188	2.173	0.715	0.934	0.887	14.165	-0.960
11	**(1,0,0,8,2)**	**3.736**	**4.006**	**3.837**	**0.392**	**2.988**	**0.503**	**0.220**	**0.726**	**13.578**	**-0.929**
12	(12,12,12,11,10)	3.355	5.149	4.076	0.848	2.026	0.758	0.008	0.633	3.793	0.541

Source: Author's calculation using Eviews 9.

Table 1.7: Long-run coefficients of ARDL $(1, 0, 0, 8, 2)$ model

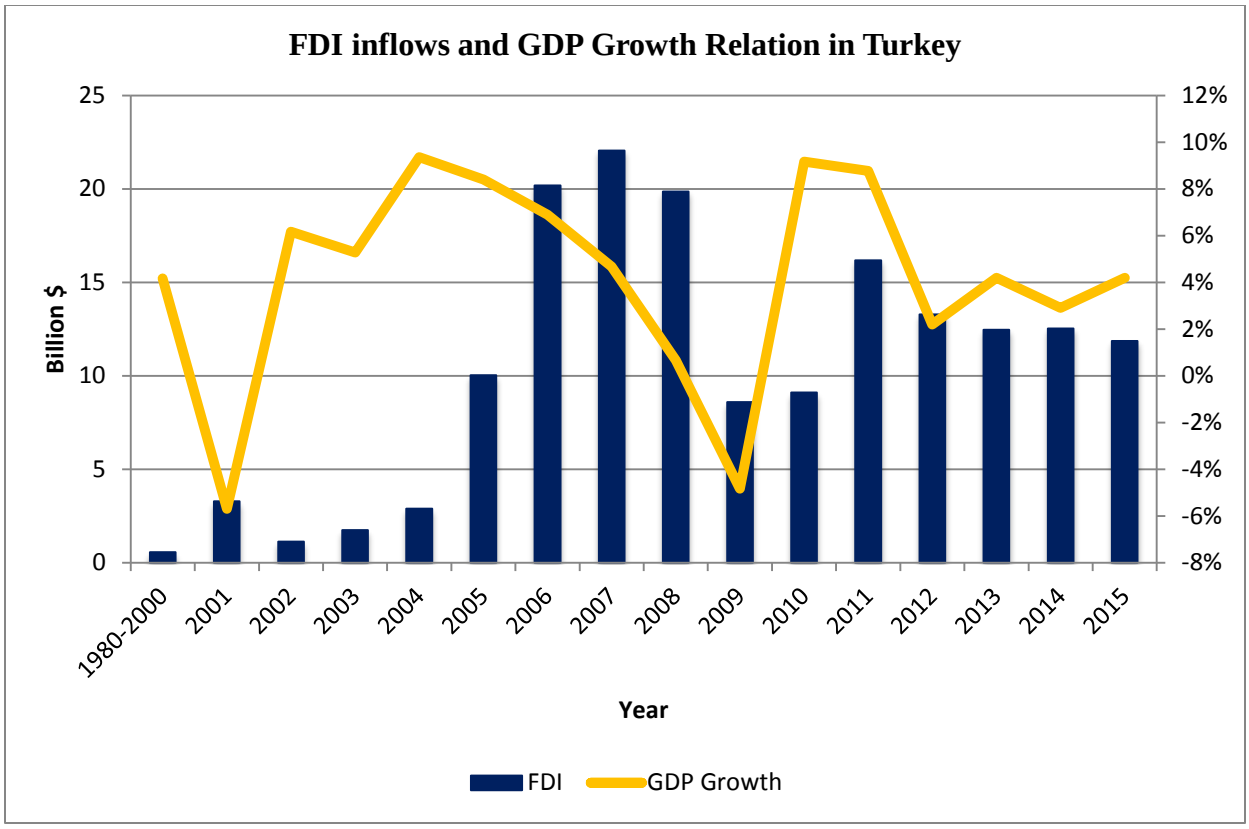
Long run coefficients (Total Effect)			
Variable	**Coefficient**	**Std. Error**	**Prob.**
Openness	2.204^{**}	1.825	0.041
Exchange Rate	-0.404	3.216	0.174
Export Price	3.579^{*}	4.383	0.066
Wage	-2.744^{***}	4.912	0.002
Constant	8.210^{*}	14.449	0.057
ECT(-1)	**-0.929**	0.104	0.000

Notes: $\mathbf{R^2} = 0.392$; $\mathbf{Durbin - Watson} = 2.121$; $\mathbf{F - stat} = 2.988\ (0.000)$. ***, **, and * denote significant at 1%, 5%, and 10 % levels, respectively.
Source: Author's calculation using Eviews 9.

Table 1.8: Diagnostic tests for ARDL Regression

Test Statistics	Test Applied	Prob.	Chi-Square	F-statistics
A: Serial Correlation	Lagrange multiplier test of residual serial correlation	0.8476	0.6871	0.5826
B: Normality	Test of Skewness and Kurtosis	0.5034	0.4722	2.3724
C:Heteroscedasticity	Breusch-Pagan-Godfrey Test	0.7647	0.7264	0.7117

Source: Output of Eviews 9.



Source: The Central Bank of the Republic of Turkey (CBRT)

Figure 1.1: FDI inflows (million $) and GDP Growth Relation in Turkey
(Note: Values are averaged over the period 1980-2000)

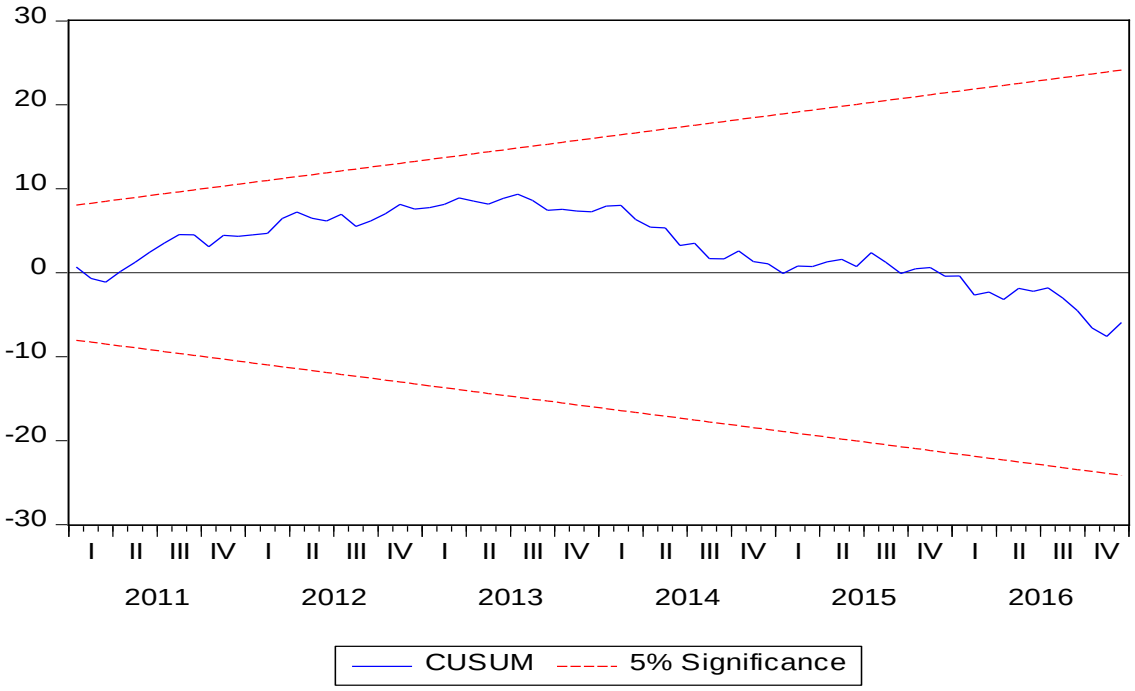


Figure 1.2: Evaluation of the stationarity of short-term coefficients (CUSUM)

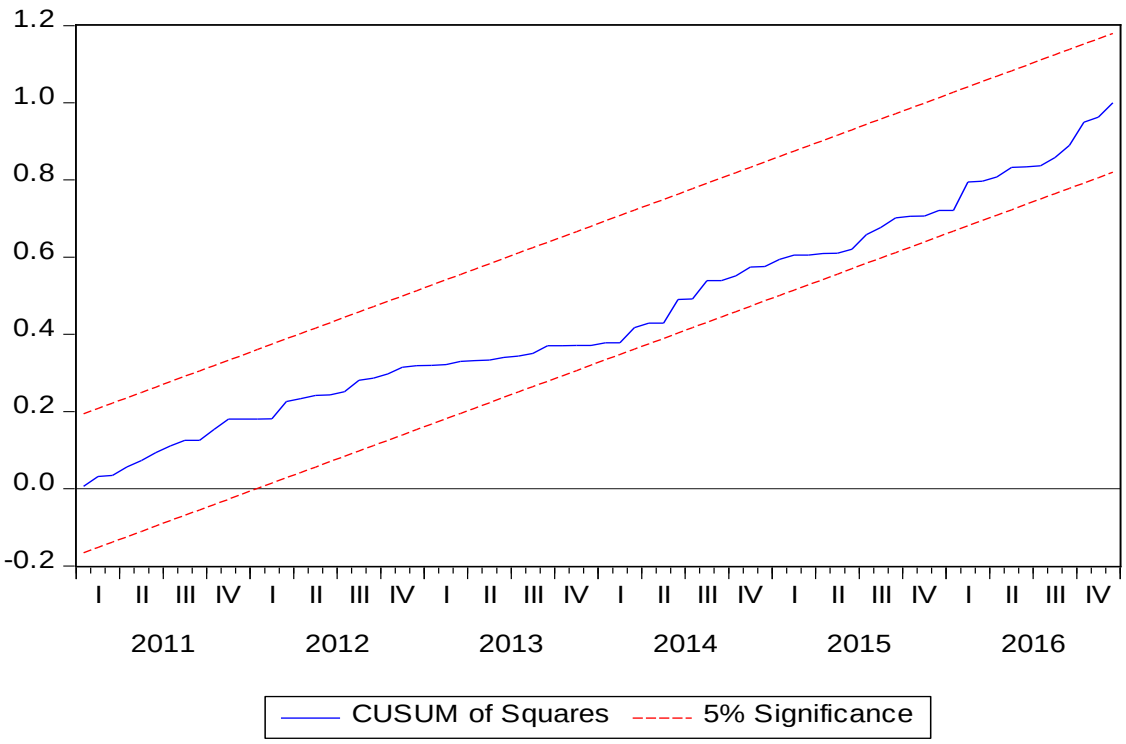


Figure 1.3: Evaluation of the stationarity of long-term coefficients (CUSUMQ)

Essay 2: Exchange Rate and Turkish Tourism Trade: is there a J-Curve?

Introduction

In today's world, tourism is akin to globalization. Tourism, in this regard, is the movement of peoples from one part of the world to another. But in this instance, this is a temporary stage and these people usually come back to the place where they started their travel. This pursuit is usually to become aware of different cultures, dance, music, clothes, and languages of other places of interest.

With the world becoming what is termed a "global village," tourism too is getting enhanced in some ways. It could be business tourism, where one goes to another place with regard to one's occupation for professional reasons. One could be going for religious tourism purposes, where a traveler is in search of enhancement of knowledge of a given religion or is on a pilgrimage. Tourism could also be just for satisfying an inner desire to travel to unknown or exotic destinations or for the thrill of the adventure involved in some activity. Whatever the case, tourism has a direct effect bearing on globalization since the more we travel, the more global in our outlook and thinking we become.

International tourist arrivals increased by about 4.4 percent in the year 2015 (WTO, 2016). About 50 million additional tourists, by this we mean overnight visitors, went to international places in comparison with the year before (WTO, 2016). Also, international tourist arrivals to the European Union increased by four percent in the year 2016. Translating into terms of world tourism, this is about 40 percent of entire travel (UNWTO, 2017). As far as Turkey is

concerned, the number of foreigners in Turkey came down by 3.96 percent in March 2017 from 1.65 million in the same month previous year (Trading Economics, 2017).

Tourism has several positive impacts. First and foremost, it is a source of employment creation. Also, it goes a long way in enhancing a country's image on a global platform. It helps not just to preserve the traditions, customs and culture of any given place, but also spreads them to the home countries of the tourists. In addition, it brings foreign exchange to the country, thereby helping the economy.

Moreover, tourism may help to improve a locale place – with visitors coming in there may be improvements in cleanliness, environment enhancement and other benefits. Local industry and handicrafts boost since visitors tend to purchase items for memorabilia and gifting purposes. However, some of the negative aspects associated with tourism are that it puts pressure on the environment. This is more so when the number of visitors to any given place is very large and if existing resources are already strained. Tourism, when all its related spheres are not taken care of, can cause a natural habitat loss, increased pollution, soil erosion and other negative outcomes

The remainder of this paper is structured as follows. The first section overviews the profile of the Turkish tourism market. The next section summarizes the relevant literature and highlights the main contributions of this research. The following sections briefly describe the model, methodology, the data, and report the empirical findings. Finally, the last section reports the main conclusions of the study.

A profile of Turkish Tourism Market

Tourism is an important element of international trade and one of the largest investment and development industries affecting local, regional, national and global economies in the world

(Akay et al., 2017). It offers a large amount of economic benefits such as generating new job opportunities, encouraging the private sector, helping to improve per capita income and standard of living, facilitating development of basic infrastructural facilities, creating a multiplier impact on a national economy, and reducing poverty (Saayman and Saayman, 2015). It is a noteworthy point that tourism as a field needs a lesser scale of per capita funds. Even the technological as well as labor related skills necessary for this sector are on the lower side. Also, tourism encounters much less of a protectionist attitude in world economies than manufacturing does. Thus, tourism has become an appealing arena to explore for lesser developed places and countries looking for methods for economic development (Sharma, 2004).

Thanks to its great geographical location and natural opportunities, and its many historical, religious, and archaeological sites, Turkey is one of the leading countries in tourism. Since free market economy policies and government's promotion of tourism in the 1980s, tourism has come to play a major role in the Turkish economy. The Tourism Encouragement Law of 1982 put tourism among the "sectors of special important for development." In addition, the Turkish government introduces many incentives – such as exceptions from several taxes including customs and export taxes, the transfer of public land to private tourism companies, low interest loans to the investors through the Turkish Tourism Bank, investment allowance, concessional tariff rates for power, water, and gas consumption - to boost the tourism sector (Özen and Kuru, 1998; Nohutcu, 2002; Yolal, 2016). As a result of these incentive policies, tourism experienced a remarkable success after the mid-1980s.

For the reasons stated above, the number of f international visitors coming to Turkey increased almost thirty-five times, rising from 725 thousand in 1970 to 39.4 million in 2015. According to World Tourism Organization report, in 2016 Turkey held 6th place in the

international ranking of the 'Top10' tourist destination assessed by the number of arrivals. In addition, in terms of tourist revenue, in 2016 Turkey occupied 12th place in the international tourist receipts. According to the World Travel and Tourism Council Data (2013), tourism contributes 12.5% to Turkish gross domestic product (GDP).

It also important to note that the Turkish tourism industry, in 2016, faced difficulties such as the downing a Russian warplane by a Turkish jet in November 2015, the terrorist attack on Istanbul's Ataturk airport in June 2016, and a failed military coup attempt in July 2016. The number of tourist arrivals to Turkey amounted to 25 million, a decrease by 41% compared to 2015. In addition, according to data compiled the Republic of Turkey Ministry of Culture and Tourism, during the first quarter of 2017, Turkey welcomed 3.8 million tourists, a 6.43% decrease over the corresponding period of 2015.

During 2007-2016, about 50% of inbound tourists staying in Turkey came from the European Union countries (TURKSTAT, 2017). The top twelve tourists' origin countries are, on average, Germany, Russia, the United Kingdom, Bulgaria, Iran, Georgia, the Netherlands, France, USA, Ukraine, Greece, and Italy. Furthermore, the number of visitors from Germany, Russia, the Netherlands, France, USA, Italy and Greece has significantly declined in recent times.

Review of Related Literature

There is an old saying, "The world is a great book, of which they that never stir from home read only a page" (St. Augustine, 354-430, AD). Indeed, travelling the world enables one to see a lot of things and gain experience concerning different cultures. Failing to travel would make one remain within his or her cultural setting. Therefore, one would not be updated on many issues.

There is a multitude of previous studies on tourism. For example, Vogt (2008) analyzes the real income and relative elasticity of demand in tourism exports and imports. The study makes use of data from the year 1973 to 2002. The findings show that the response of the trading partners to the changes in real income in tourism may have an impact on tourism in the country by increasing surpluses on the tourism balance of trade in the country. The spending of people from these countries in the United State enables trade in tourism to improve as they bring in foreign exchange. The rates of exchange partly determine the choice of foreign tourists coming to the country.

In their research note, Thompson and Thompson (2010) discuss the effects of exchange rates and the adoption of the euro in tourism revenue in Greece using a sample period of 32 years. The paper identifies that tourism is a crucial factor in the economy of the country. It earns the country a lot of foreign exchange. The results of the study show that the rates of exchange have an impact on tourism in Greece. A depreciation of the rates of exchange enables the country to earn more foreign exchange in tourism. It also shows that the adoption of the euro had a positive impact on tourism in Greece. It makes the country at par with other European countries since they have the same currency.

Cheng et al. (2013a) analyze the impact of exchange rates on tourism in the United States using data from 1973 to 2007. The analysis discusses the revenue earned from tourism exports and spending on travel imports with regard to the balance of trade. The results of the study show that currency depreciation has a positive impact on the balance of tourism trade in the country. Notably, the depreciation of foreign exchange rates facilitates more spending among the tourists from foreign countries. They also show that travelling outside the country for tourism is considered a luxury. However, it is common for people to travel to the United States for tourism.

Cheng et al. (2013b) discuss the effects of real exchange rates and income on tourism in the United States. The paper analyzes the revenue earned by exporting tourism and spending on imports using the data available between the years of 1973 to 2010. The results of the study show that depreciation has a positive impact on the revenue earned from tourism exports. However, it does not affect import spending on tourism in the country. The paper also states that when the exchange rates drop, tourists have more to spend, increasing foreign income from tourism. However, local tourists have no impact since they spend local currency.

More recently, Chi (2015) examined the effects of income and exchange rates on the exports and imports of tourism in the country. He explained the trends with an aim to help understand the determinants of the balance of trade in the tourism sector in the United States. The findings of the study show that appreciation of the dollar has a negative impact on the trade balance in tourism in the country. The paper also notes that the appreciation of the dollar makes the exchange rates unfavorable for tourists, thereby making them avoid the country as a tourist destination.

Turning to the domestic literature, a few empirical studies have been carried out on tourism development for Turkey. For instance, Halicioglu (2010) analyzes the demand for tourism in Turkey with regard to international exchange rates and income. The results show that depreciation in international exchange rates has a positive impact on the demand for tourism, thereby leading to a positive trade balance in tourism. Favorable exchange rates enable the tourists to spend more local currency in the country.

Kilic and Bayar (2014) discuss the relationship between the volatility of the exchange rates and expenditure on tourism in Turkey using annual data from 1994-2013. The Johansen co-integration test is used to get the relationship between the series. The results of the study show

that there is a positive relationship between the rates of exchange in the country and expenditures on tourism. When the exchange rates depreciate, international tourists are attracted to the country leading to an increase in foreign income, which helps improve the tourism sector. In addition, Akay et al. (2017) analyzed the effects of income and exchange rates on tourism in Turkey by applying Johansen's maximum likelihood approach to measure the long-term impact of the exchange rates and income on tourism in the country. They report that income is the most important factor that can explain the trade balance in tourism over the long-term. In particular, the results show that foreign income and real exchange rates affect tourism in a positive manner, while domestic income affects tourism in a negative manner. Furthermore, they point out that when the rates of exchange are low, foreign income for the tourists would increase, making more people choose the destination, but domestic income has no effect on tourism since there is no foreign exchange involved.

This paper extends the Turkish tourism literature in three ways. First, this study focuses on the dynamic interactions among the variables by applying a multivariate VAR framework. Second, using annual data for the period 1970-2016, this study analyzes the presence of J-curve for the eight major Turkey tourist arrival European Union (EU) countries: Australia, Belgium, France, Germany, Greece, Netherlands, Italy, and Portugal. Third, this study employs Vector autoregressive Model (unrestricted) (VAR) which does not provide the short run or long run effects of the exchange rates on tourism.

Theoretical Framework for Tourism Trade

In dealing with the tourism trade balance analysis, this paper follows similar equation chosen from Vogt (2008), Cheng *et al.* (2013a, 2013b), and Chi (2015), which examines the relationship

between exchange rate and tourism trade balance. The linear models for Turkish exports (X_t) and imports (M_t) of tourism are specified as below:

$$EX_t = f\ (Y_t^*, E_t) \tag{1}$$

$$IM_t = f\ (Y_t,\ E_t) \tag{2}$$

where X_t is the export revenue, M_t is the import spending, Y_t is Turkey's income, Y_t^* is foreign income, and E_t is the exchange rate of Turkish lira against foreign currencies. Equation (1) and (2) are rewritten in a double-log functional form, and we have

$$ln\ X_t = a_0 + a_1\ lnY^* + a_2\ lnE_t + \varepsilon_t \tag{3}$$

$$ln\ M_t = b_0 + b_1\ lnY + b_2\ lnE_t + \vartheta_t \tag{4}$$

In the literature, trade balance is usually measured as the difference between export revenue and import spending. In this study, following a similar approach proposed by Bahmani-Oskoosee and Brooks (1999), Boyd *et al.*(2001), Onafowora (2003) and Cheng *et al.* (2013a, 2013b), we measure the trade balance as the ratio of export revenue and import spending, $B \equiv X/M$. After taking natural logarithm, we specify trade balance equation as follows

$$\ln B_t = ln\ X_t - ln\ M_t \tag{5}$$

Substituting Equations (3) and (4) into (5), we get

$$\ln B_t = (a_0 - b_0) + a_1\ lnY^* - b_1\ lnY + (a_2 - b_2)\ lnE_t + (\varepsilon_t - \vartheta_t) \tag{6}$$

To understand the correlation between the tourism trade and exchange rate, one must consider the J-Curve phenomenon. J Curve serves as an example of movement in variables that declines

in the beginning and then gradually increases to the new higher levels than the starting point forming the shape of letter "J" on time series graph.

This curve is mostly found in the economic situations of the country where the currency of the country is depreciated or devalued considering the better future perspectives for the country. It explains the situation wherein the trade deficit of a country is high initially due to devaluation or depreciation in the currency due to higher costs of imports and lesser. With the passage of time, the situation of exports improves due to devaluation in the country, thereby, giving competitive advantage to the country to trade in the world and also, imports starts declining due to the availability of cheaper products at the domestic market compared with the imported goods. This situation brings in positive effects in the balance of payments and the net balance of payments becomes positive giving a "J" curve effect in the economy (Staff, 2003; Rode, 2012)

Data and Empirical Methodology

Data

As noted in the introduction, in this study, tourist arrivals from seven member countries of EU: Australia, Belgium, France, Germany, Greece, Italy, Netherlands, and Portugal are considered. These countries have been selected on the basis of tourism demand for Turkey from EU. To avoid the seasonality problem, data consists of annual observations during the period 1970 - 2016. Secondary data sources were used in the study and are collected from various sources. Data for tourism arrivals for the period 1970-2016 are obtained from Turkish Statistical Institute (TURKSTAT). Turkey's income is GDP and we record income for the rest of the world as the sum of GDP of the selected countries. The foreign exchange is measured as the price of a dollar

in terms of Turkish liras. All GDPs are obtained from the World Bank. All variables are expressed in natural log form.

Figure 2.1 presents the plots of all variables in natural logs. Tourism export revenue, *X*, generally shows an increasing trend since 1970, while there are some fluctuations in import spending, *M,* between the years. In addition, trade balance, B, is always negative except mid-1970s. The exchange rate, E, had three periods of Turkish lira depreciation, up to late 1970s then during the mid-1990s, and again up to 2007s, then two periods of appreciation, from 1982 to 1985 and from 1998 to 2001. Over the period 1970-2016, Turkey's income,Y, and foreign income, Y^*, fluctuates between the years.

Empirical Methodology

This study applies the method of time series econometrics, which is vector autoregressive (VAR) estimation technique to model the exchange rate and tourism trade balance in Turkey. The VAR model is a multi-equation system in which all variables are treated as endogenous and jointly determined. The VAR model helps to investigate the interrelations between the variables and each dependent variable are regressed against their own and each other's lagged values in the system (Enders, 2004).

As stated previously, we use three VAR econometric models. First, the export model is based on a tri-variate VAR (p) with the exchange rate r_t, tourism export x_t, and foreign income y_t^*. Second, the import model is based on a tri-variate VAR (p) with the exchange rate r_t, tourism import m_t, and home income y_t. Third, the tourism balance model is a quad-variate VAR (p) with the exchange rate r_t, tourism balance $b_t = x_t - m_t$, foreign income y_t^*, and home

income y_t. The relationship between the three time series: x_t, m_t, and b_t takes the following form:

$$x_t = \alpha_1 + \sum_{j=1}^{p} \beta_{1j}\, x_{t-j} + \sum_{j=1}^{q} \beta_{2j}\, r_{t-j} + \sum_{j=1}^{r} \beta_{3j}\, y^*_{t-j} + \varepsilon_{1t}, \qquad \text{(Model 1)}$$

$$m_t = \alpha_2 + \sum_{j=1}^{p} \gamma_{1j}\, m_{t-j} + \sum_{j=1}^{q} \gamma_{2j}\, r_{t-j} + \sum_{j=1}^{r} \gamma_{3j}\, y_{t-j} + \varepsilon_{2t}, \qquad \text{(Model 2)}$$

$$b_t = \alpha_3 + \sum_{j=1}^{p} \theta_{1j}\, b_{t-j} + \sum_{j=1}^{q} \theta_{2j}\ r_{t-j} + \sum_{j=1}^{r} \theta_{3j}\, y^*_{t-j} + \sum_{j=1}^{m} \theta_{4j}\, y_{t-j} + \varepsilon_{3t}, \qquad \text{(Model 3)}$$

where, x_t, m_t, and b_t are dependent variables, $\alpha_1, \alpha_2, and\ \alpha_3$ are the intercepts, x_{t-j}, m_{t-j}, r_{t-j}, y_{t-j}, y^*_{t-j} and b_{t-j} are the lagged values of interested variables, and ε_{it} are error terms that are assumed to be normally distributed and white noise.

Building a VAR model involves several stages. First, time series variables should be tested for unit roots individually to determine their respective orders of integration by using common unit root tests, such as Augmented Dickey-Fuller (ADF) or Philips-Perron (PP). Second, the appropriate lag length of the VAR should be determined through the use of optimum lag length selection criteria, such as the Akaike Information Criterion (AIC) or the Schwarz Bayesian Criterion (SBC). Third, the Johansen's (1998) co-integration test should be applied to analyze the long-term relationship among the variables. Lastly, the Impulse Reaction Function (IRF), which refers to the reaction of any dynamic system to an external shock, and variance decomposition analysis, can be used to examine the inter-relationship among the variables.

Results of Data Analysis

Descriptive Statistics

The descriptive statistics of data is reported in Table 2.1. This paper uses yearly data covering from 1970 to 2016 with 47 observations for each variable. The exchange rate has a smaller

standard deviation among all the variables. The maximum growth rate of exchange rate was 1.33%, whereas the minimum was -0.09%. On the other hand, the minimum trade balance over the entire period was -1.88% as against the maximum of 0.27%.

Stationary Pre-test Results

Time series data often non-stationary and this situation could cause the problem or spurious regression and biased results (Maddala, 2001). In this study, the Augmented-Dickey-Fuller (ADF) and Philips-Perron (PP) tests, the null hypothesis is non- stationary, are applied to determine the stationary of all variables. Table 2.2 reports the results of unit root in each variable. Both unit root tests are in agreement that all the variables are non-stationary in levels but their first differences are stationary at the 1% level. In other words, the results confirm that all the variables are integrated process of first order, *I(1).*

Co-integrating Analysis and VAR Model Checking

Before proceeding to Johansen's co-integration analysis, optimal lag length (p) is determined using a VAR model. The choice of the optimum number of lags was made using Akaike (1974, 1976), Schwarz (1978), and Hannan-Quinn (1979) criteria. Table 2.3 shows the results of VAR lag order selection criteria for three tests. The maximum possible lag length considered in each model is four (years). For Model 1, all three criteria select an optimal lag length of one; therefore we select VAR (1). For Model 2, the SIC and HQC criteria select a VAR (1) model while the AIC criteria selects a VAR (2). But, as the lag one has serial correlation problem, we select VAR (2) for model 2. Finally, for Model 3, all three criteria suggest the lag one; thus we choose VAR (1) for model 3. Once the optimal lag length is chosen, the next step is to determine the existence of long-run relationship between variables. To test for co-integration, the Johansen's (1998) co-integration test is applied to detect the long-term relationship between the variables. Engle and

Granger (1987, p.264) states that, "it may not be easy to test whether a set of variables are co-integrated before estimating a multivariate dynamic model." Table 2.4 presents the results of the Johansen multivariate co-integration test for all three systems of equations. As seen from Table 4, two tests, the trace test and maximum eigenvalue test, are employed to test co-integrating among the variables. In model 1, we examine if there is a long-run relationship between tourism export revenue, exchange rate, and foreign income, whereas in model 2, we analyze if tourism import spending, exchange rate, and home income co-integrated in the long-run. In addition, in model 3, we investigate if there is a long-run relationship between tourism trade balance, exchange rate, home income, and foreign income. According to all maximal eigenvalue and trace statistic tests, all calculated p-values are above the 0.05, thus the results of all three models indicate that we do not reject the null hypothesis that there is no co-integration at the 0.05 level.

Impulse Response Function

To check the VAR to be stationary, all the inverse roots of the characteristics AR polynomial must lie inside the unit circle. If this is not the case, impulse-response inferences are not valid. In this study, all three VAR models do not have a root outside the unit circle, hence we conclude that all three VAR models are stationary, which allows us to proceed to the impulse response analysis.

The impulse response functions (IRFs) represent the way a system reacts to the exogenous shocks (Inoue and Kilian, 2013). Estimated export revenue, import spending, and trade balance response functions are reported in Figure 2.2, Figure 2.3, and Figure 2.4, respectively. Point estimates of the IRFs are plotted with a solid line, whereas the dotted lines show a two-standard-deviation band around the point estimates. In the first panel of Figure (2.2a), export revenue exhibits a robust significant positive response to an unexpected 1%

depreciation exchange rate shock that takes 6 years to converge to the steady state. The second panel of Figure (2.2b) shows a robust nearly elastic positive response to foreign income shocks. Lastly, the third panel of Figure (2.2c) represents a 1% shock in foreign demand reduces the export revenue at a decreasing rate and converges to equilibrium after 10 years.

In the import spending model (Figure 2.3a), the response of import spending to a positive 1% exchange rate shock has an insignificant negative affect on import spending in the first period followed by a period of gradual increment in the intensity. It then converges to the steady state after 10 periods. Similarly, Figure (2.3b) shows that the reaction of import spending to 1% shock in home income shock is negative and not significant at the 90%. In addition, Figure (2.3c) represents the response of import tourism spending to home demand shock. The results indicate that 1% shock in home demand has a positively significant impact on import tourism spending and decreases over time.

In the trade balance model (Figure 2.4a), the reaction of trade balance to 1% shock in exchange rate is negative and significant at the 95%. It shows as negative in the first two periods and then starts to converge to the steady state. The response of trade balance to foreign income shock is shown in Figure (2.4b). The results show that an unexpected 1% foreign income shock reduces the trade balance and is significant at the 90%. In addition, Figure (2.4c) shows how trade balance responds positively to the shocks in home income in the first three periods and as expected, home income lowers the trade balance. But these affects are not significant at any significance level. Lastly, the trade balance represents a robust significant positive response to its own shocks as depicted in Figure (2.4d).

Variance Decomposition Analysis

There are similar results from the variance decomposition analysis. Tables 2.5, 2.6, and 2.7 present the variance decomposition results for each model. As it can be seen from Table 2.5, Table 2.6, and Table 2.7, in the short-run (i.e. 3 years), the findings conclude that a shock in exchange rate explains only 1.79 percent of the variation in tourism export revenue but it explains approximately 0.74 percent of the variation in tourism import spending. In addition, a shock in exchange rate explains only 2.87 percent of the variation in tourism trade balance. On the contrary, Table 2.6 reports that in the fifth period, 95.46 percentage variance in tourism import spending is explained by 1.82 percent variance in exchange rate and 2.71 percent variance in home income. In the tenth lag period, 85.60 percent variance in tourism import spending is explained by 3.12 percent variance in exchange rate and 11.26 percent of the variance in home income. Similarly, as it is obvious from the Table 2.7, in the seventh lag period 87.51 percent variance in tourism trade balance is explained by 8.75 percent variance in exchange rate, 3.68 percent variance in home income, and 0.03 percent variance in foreign income.

Concluding Remarks

The present work explores the dynamic relationship among tourism export revenue, tourism import spending, the exchange rate, the home and foreign income in Turkey over the period of 1970 to 2016 by applying three vector autoregression (VAR) models. From our estimation results, the export revenue shows a significant positive response to exchange rate shock. However, the response of import tourism spending to home demand shock is positive and statistically significant at the 95% level. Finally, an unexpected 1% exchange rate shock worsens the trade balance initially, and then starts to converge to the steady state. In summary, we

conclude that the J-curve hypothesis is only valid for trade balance model for the selected eight European countries.

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Table 2.1: Descriptive Statistics

Variable	*N*	*Mean*	*Std. Dev.*	*Max.*	*Min.*
Import Spending (***M***)	47	6.589	1.543	8.678	3.742
Export Revenue (***X***)	47	7.904	1.997	10.443	3.943
Home Income (***Y***)	47	25.798	1.171	27.580	23.511
Foreign Income (Y^*)	47	29.049	0.847	30.079	27.083
Exchange Rate (***E***)	47	0.570	0.361	1.335	-0.094
Trade Balance (***B***)	47	-1.314	0.570	0.270	-1.888

Source: TURKSTAT, (2017).

Table 2.2: Unit root results of log variables (H_0: one unit root; H_A: no unit root)

Variables	Specification	Augmented Dickey-Fuller (ADF)			Philip-Perron (PP)		
		τ	τ_c	τ_{c+t}	τ	τ_c	τ_{c+t}
Import Spending	Level	1.38	-1.18	-2.60	1.35	-1.18	-2.73
	Differenced	-5.75	-6.66	-6.71	-5.81	-6.64	-6.71
Export Revenue	Level	1.72	-2.25	-1.55	1.42	-2.83	-1.43
	Differenced	-4.48	-5.96	-6.29	-4.37	-5.91	-6.95
Trade Balance	Level	0.16	-2.32	-2.73	0.22	-2.31	-2.75
	Differenced	-7.42	-7.44	-7.42	-7.53	-7.78	-8.25
Exchange Rate	Level	-1.44	-2.69	-2.63	-1.15	-2.23	-2.20
	Differenced	-4.73	-4.67	-4.64	-4.73	-4.67	-4.69
Home Income	Level	1.72	-1.45	-2.33	1.71	-1.66	-2.84
	Differenced	-5.36	-6.77	-6.86	-5.60	-6.78	-6.87
Foreign Income	Level	2.46	-3.22	-2.25	1.57	-2.96	-1.74
	Differenced	-3.71	-4.51	-5.03	-3.80	-4.43	-4.94
Test critical values							
1% percent		-2.61	-3.58	-4.17	-2.61	-3.58	-4.17

Notes: The table reports results of Augmented Dickey-Fuller (ADF) and Philips and Perron (PP) unit root tests. τ , τ_c, and τ_{c+t} indicate the model statistics without either constant or trend, with constant, and with constant and trend, respectively. The number of lags is chosen by the Schwarz Information Criterion (BIC) for the Augmented Dickey-Fuller and the Philips and Perron (PP). Tests for unit roots have been carried out in Eviews 9.0.

Table 2.3: VAR lag order selection criteria

Lag Order	Model 1			Model 2			Model 3		
	AIC	**SIC**	**HQC**	**AIC**	**SIC**	**HQC**	**AIC**	**SIC**	**HQC**
0	3.795	3.918	3.840	4.544	4.667	4.589	3.230	3.394	3.291
1	-3.945*	-3.454*	-3.764*	-2.288	-1.796*	-2.106*	-5.610*	-4.791*	-5.530*
2	-3.904	-3.044	-3.587	-2.366*	-1.506	-2.049	-5.475	-4.000	-4.931
3	-3.799	-2.571	-3.346	-2.025	-0.796	-1.572	-5.167	-3.037	-4.381
4	-3.891	-2.294	-3.302	-2.080	-0.483	-1.491	-5.210	-2.424	-4.183

Notes: *Indicates the smallest value of the criterion. AIC, Akaike Information Criterion; SIC, Schwarz Information criterion; HQ, Hannan-Quinn Information Criterion.

Table 2.4: Results of Johansen's maximum likelihood tests for multiple co-integrating relationships

	Model 1		**Model 2**		**Model 3**	
Null Hypothesis	Test-Stat	P-value	Test-Stat	P-value	Test-Stat	P-value
Trace test						
$None\ (r = 0)$	35.576	0.0696	29.971	0.0877	58.772	0.0634
$At\ most\ 1\ (r \leq 1)$	15.494	0.1133	14.589	0.0681	28.682	0.0668
$At\ most\ 2\ (r \leq 2)$	3.841	0.1009	4.364	0.0767	7.721	0.4957
Maximum Eigenvalue Test						
$None\ (r = 0)$	16.406	0.2020	15.381	0.2630	30.089	0.0733
$At\ most\ 1\ (r \leq 1)$	12.690	0.0873	10.224	0.1976	20.961	0.0528
$At\ most\ 2\ (r \leq 2)$	6.480	0.1109	4.364	0.0722	6.949	0.4952

Source: Author's computation from the data using Eviews 9.

Table 2.5: Export variance decomposition analysis

k	$s.e.$	x_t	r_t	y_t
1	0.189	100.000	0.0000	0.0000
2	0.253	99.222	0.634	0.143
3	0.294	97.613	1.794	0.591
4	0.323	95.327	3.221	1.450
5	0.343	92.497	4.719	2.783
6	0.359	89.264	6.141	4.593
7	0.372	85.781	7.388	6.829
8	0.383	82.200	8.405	9.394
9	0.394	78.661	9.175	12.163
10	0.403	75.278	9.711	15.010

Note: *k* denotes the forecast horizon in years. Variance decomposition analysis is carried out from a tri-variate vector autoregressive model with the export revenue ordered first, whereas the foreign income is placed last. Standard errors (s.e.) are obtained from 5000 nonparametric bootstrap simulations. All results are obtained using Eviews 9.0.

Table 2.6: Import variance decomposition analysis

k	$s.e.$	m_t	r_t	y_t
1	0.252	100.000	0.0000	0.0000
2	0.336	99.554	0.268	0.176
3	0.389	98.591	0.742	0.666
4	0.426	97.192	1.291	1.516
5	0.454	95.461	1.822	2.716
6	0.475	93.514	2.277	4.208
7	0.493	91.466	2.630	5.902
8	0.508	89.418	2.880	7.701
9	0.521	87.447	3.039	9.512
10	0.534	85.609	3.126	11.263

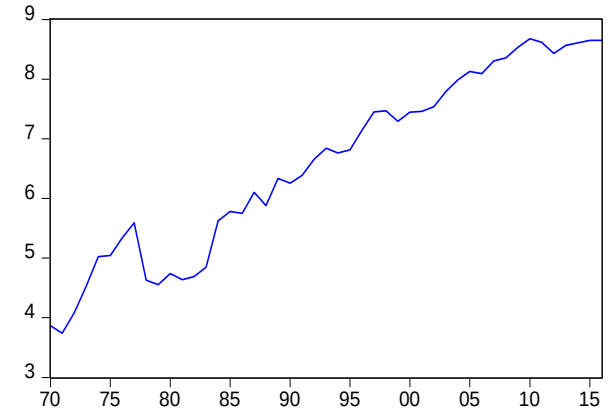
Note: *k* denotes the forecast horizon in years. Variance decomposition analysis is carried out from a tri-variate vector autoregressive model with the import spending ordered first, whereas the home income is placed last. Standard errors (s.e.) are obtained from 5000 nonparametric bootstrap simulations. All results are obtained using Eviews 9.0.

Table 2.7: Trade balance variance decomposition analysis

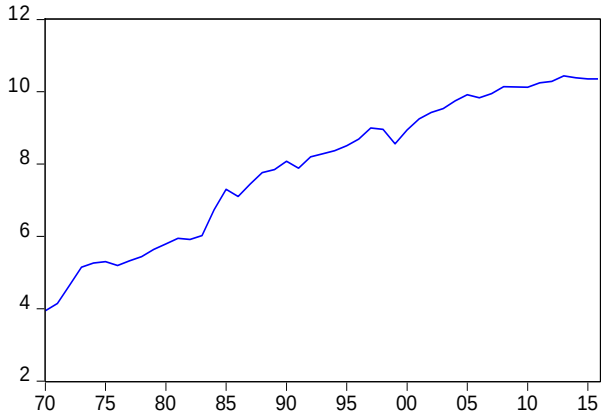
k	$s.e.$	b_t	r_t	y_t	y_t^*
1	0.230	100.000	0.0000	0.0000	0.0000
2	0.257	98.184	1.116	0.680	0.018
3	0.267	95.511	2.872	1.583	0.032
4	0.274	92.915	4.681	2.366	0.036
5	0.279	90.710	6.295	2.957	0.035
6	0.283	88.929	7.652	3.383	0.035
7	0.286	87.515	8.759	3.686	0.038
8	0.288	86.402	9.648	3.902	0.046
9	0.290	85.527	10.353	4.060	0.058
10	0.292	84.841	10.905	4.176	0.076

Note: *k* denotes the forecast horizon in years. Variance decomposition analysis is carried out from a quad -variate vector autoregressive model with an ordering, the trade balance, the exchange rate, the home and foreign income. Standard errors (s.e.) are obtained from 5000 nonparametric bootstrap simulations. All results are obtained using Eviews 9.0.

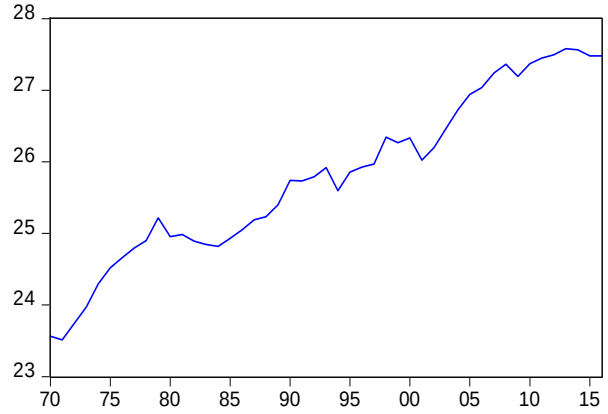
Figure 2.1: Variable series.



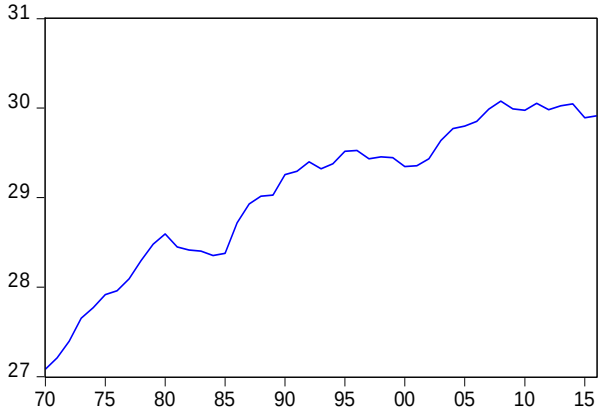
Import Spending



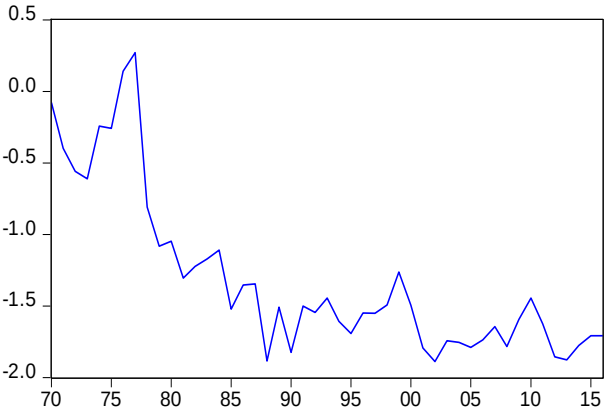
Export Revenue



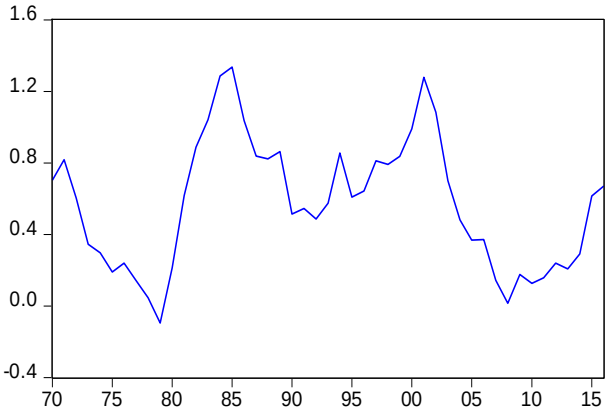
Domestic Income



Foreign Income



Trade Balance

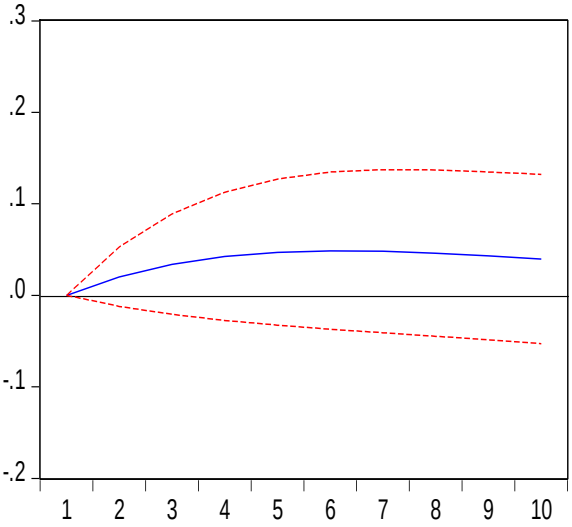


Exchange Rate

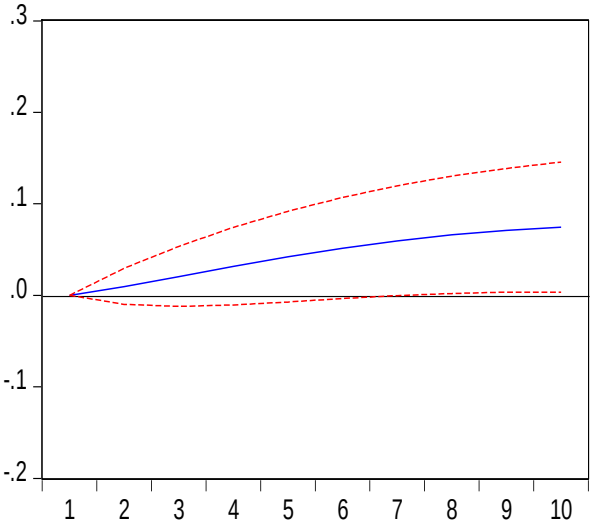
Source: TURKSTAT, (2017)

Figure 2.2: Impulse Response Function Estimates of Export Revenue

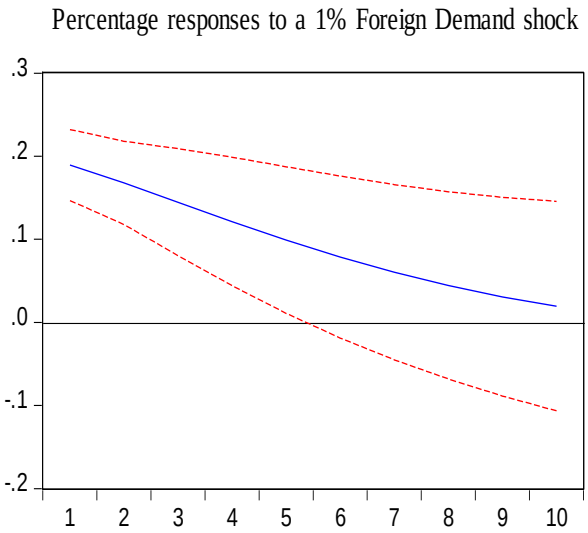
(a)



(b)

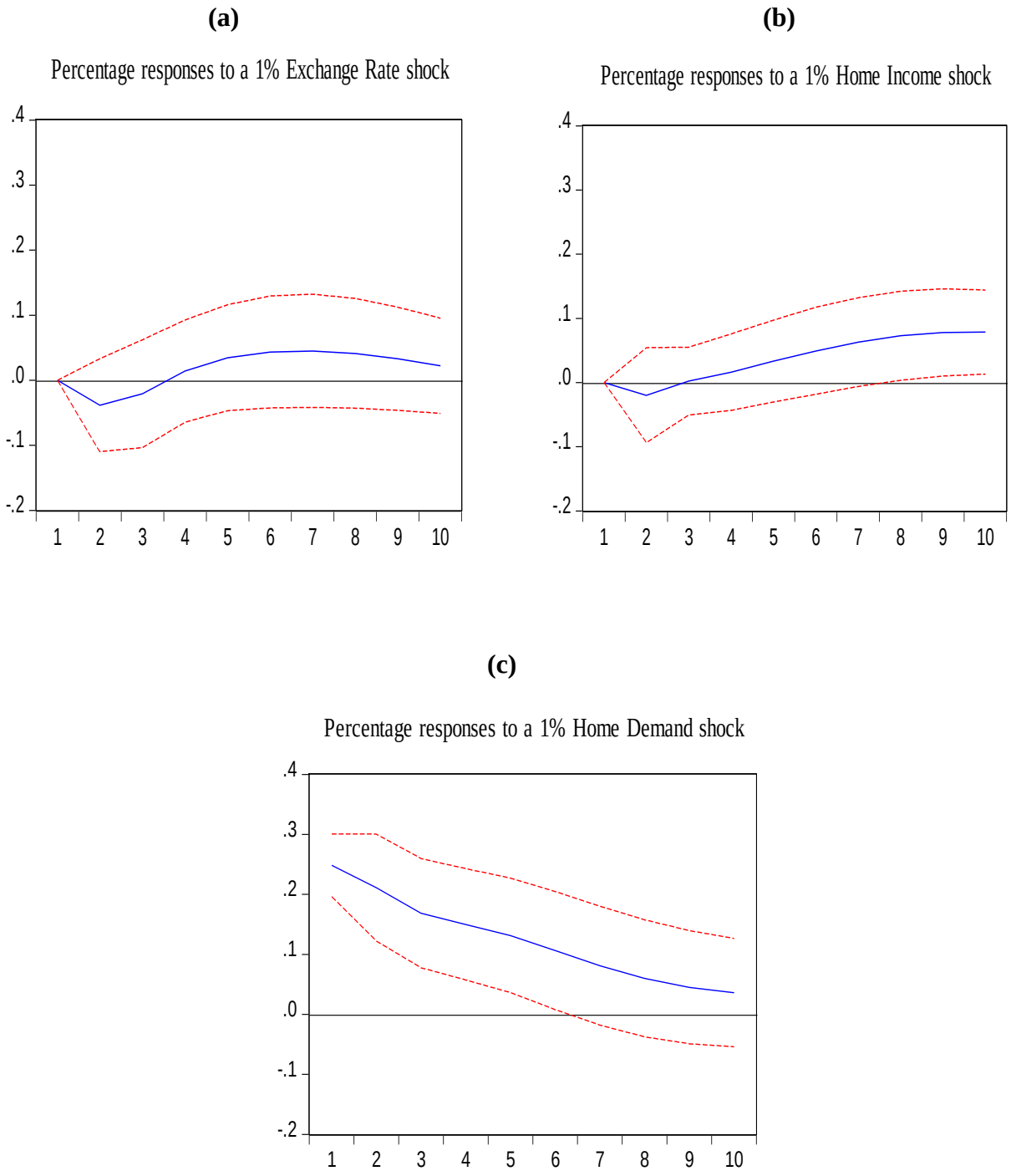


(c)



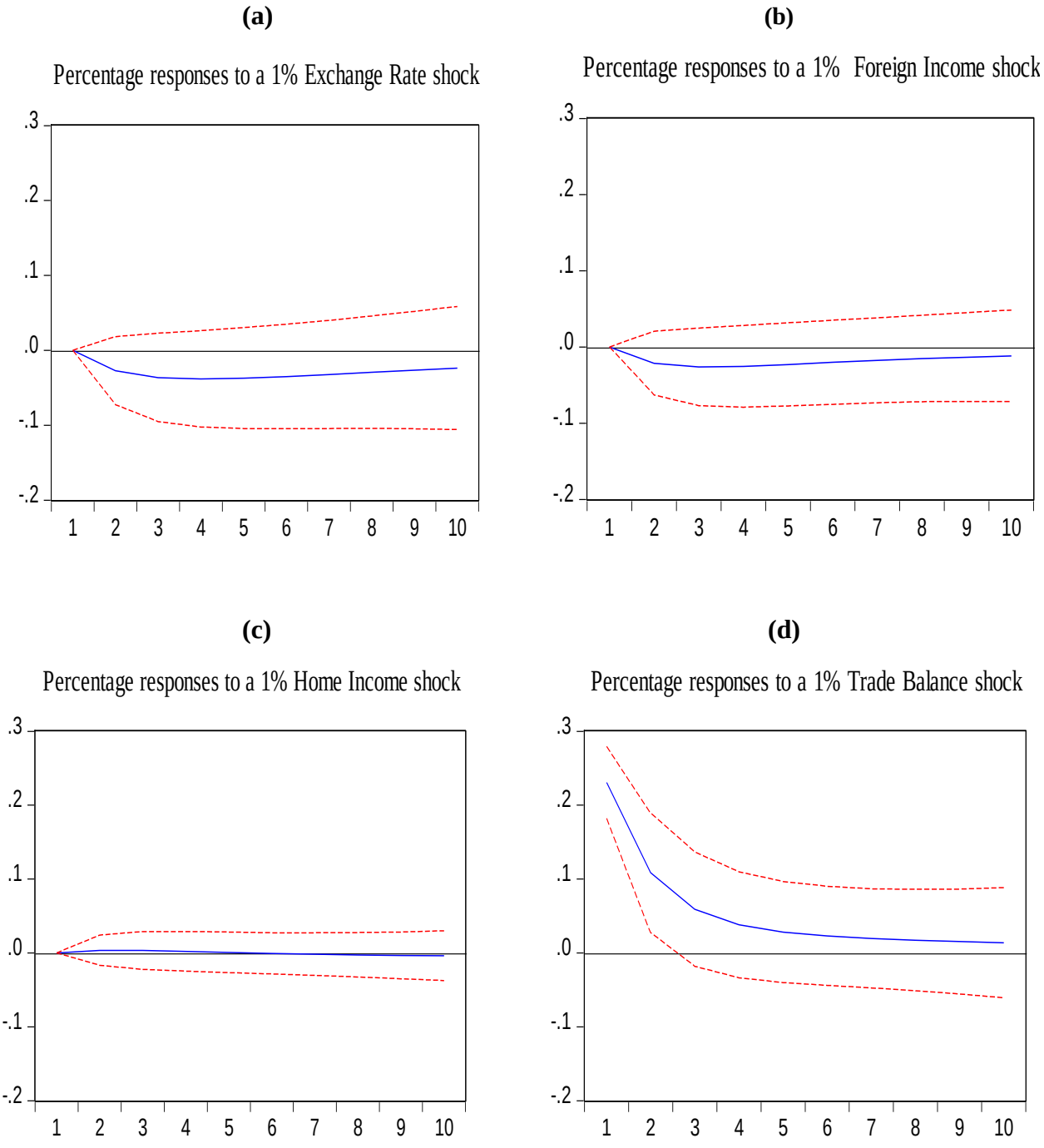
Note: Impulse-response functions are obtained from a tri-variate vector autoregressive model with the exchange rate ordered first, whereas the foreign demand variable is placed last.

Figure 2.3: Impulse Response Function Estimates of Import Spending



Note: Impulse-response functions are obtained from a tri-variate vector autoregressive model with the exchange rate ordered first, whereas the home demand variable is placed last.

Figure 2.4: Impulse Response Function Estimates of Trade Balance



Note: Impulse-response functions are obtained from a quad-variate vector autoregressive model with ordering of the exchange rate, the home income, the foreign income, and the trade balance.

Essay 3: The Causal Effect of Education on Poverty: Evidence from Turkey

Introduction

Since poverty is a multifaceted concept involving economic, social, and political elements, there is no unique definition of poverty. The concept of poverty differs from country to country in terms of level of development and how it is viewed by people. The United Nations (1998) identifies it as "… the inability of getting choices and opportunities, a violation of human dignity" (UN Statement, June 1998, signed by the heads of all UN agencies) whereas the World Bank (2000) defines poverty as "poverty is pronounced deprivation in wellbeing and comprises many dimensions" (World Bank, 2000, p.15). In the existing literature, poverty is measured by various methods such as the absolute poverty approach, relative poverty approach, and subjective poverty approach.

Poverty posits challenges to education since lower levels of educational attainment are typical of students raised in poverty. Lower academic achievement among high concentrations of poor students is supported by insufficient funding, weakened parental support, and higher teacher turnover caused by inadequate school resources and lower opportunities for teachers' professional development (Blazer and Romanik, 2009). Therefore, poverty deprives children of the choice of educational opportunities and reduces educational outcomes (Coley and Baker, 2013). Even before going to school impoverished children may not acquire the social skills necessary for studying due to situations in the family, for example, parental inconsistency and

a lack of support for children (Ferguson *et al*., 2007). The deficiencies continue through postgraduate training so poverty has a negative effect on academic achievement.

There has been ongoing debate about the links between poverty and the level of education. Poverty and educational attainment are closely intertwined. Investment in education reduces the risk of poverty through enhancing the wages or income as well as people's productivity. In addition, education allows people to obtain some necessary skills which promote their capacity to produce more effectively. On the other hand, poverty limits the quality of education and equal access to education by affecting the resources to students. (Chaudhry and Rehman, 2009). As a result, poverty and education are inversely related to each other.

The rest of the paper is structured as follows. The next section presents the previous literature about the relationship between education and poverty. Section 3 discusses potential endogeneity problem. Section 4 describes data, provides definitions of the main constructed variables and presents results of descriptive statistics. Section 5 discusses the estimation methodologies used in this study. Main findings are presented in Section 6. Section 7 summarizes the main conclusions.

Literature Review

Education plays an important role in combating poverty as it prepares poor people for the competitive labor market (Blustein *et al*., 2014). Graduates are able to lead productive lives since education aims to equalize economic opportunity in the country by offering a route out of poverty for the disadvantaged (Coley and Baker, 2013; Raffo, *et al*., 2007). Educational initiatives which mean to close the poverty achievement gap by providing student assessments face obstacles linked to accountability for student achievement without controlling all the factors

so educational institutions are incapable of eliminating inequalities completely (Blazer and Romanik, 2009; Lacour and Tissington, 2011).

Despite poverty being a major obstacle to lack of knowledge, education remains the key to success. Education and poverty are closely linked. Over the past decades, students without full education backgrounds have had lifelong struggles. Biddle (2014) defines poverty as the lack of food, shelter, education, information.

Numerous studies have been performed on the direct impact of poverty on education. These studies often lack economic theory, and instead take an ad hoc approach. Black *et al*. (2013) argue outcomes for children age 4 to 15 are directly proportional to parents' income and also that cognition is negatively affected by lower income. For example, parents from poor backgrounds are likely to give birth to premature children and the premature children are at higher risks of failure in school as compared to those born in middle or higher income families.

Educating a girl child is said by some to be the first step to eliminating poverty in a nation. Lampert and Burnett (2015) argue that educating girls on their rights concerning marriages and responsive health care empowers them, improving their decision making towards early pregnancies that can terminate their education process. The problem is poverty makes it hard for these girls to get that knowledge, leading to most of them dropping out of school.

Similarly, Mihai *et al.* (2015) found that when girls stay longer in school, it lowers the chances of early marriages. Staying longer in an educational environment improves their success rates of being rewarded with good jobs after school. They also added that for developing nations with high levels of poverty, these girls may leave school and fail to get jobs since the government is not in a position of employing all the graduates.

In addition, Schwill *et al*. (2014) note that children learn hygiene in primary school since it is there where they are taught causes, symptoms, and the dangers of illnesses including HIV. Without this knowledge, students including those who had a chance to finish school and educate the community may perish from preventable diseases.

A study by Rolleston (2011) investigated the linkage between school attendance, welfare and poverty in Ghana over the period 1991-2006 using the Ghana Living Standards Surveys. This case study found that increased educational access plays an important role in determining household welfare. Lastly, Cannon (2015) and Burn and Childs (2016) reported that poverty is associated with the learning environment. Students from well-developed urban areas will be in a better position to access good quality education and an organized infrastructure as compared to those from less developed areas. In a well-structured environment, studies show that other than academics, activities such as soccer and swimming games improve students' concentration and reading during class time. However typically only institutions in areas where most of the population is above the poverty line will afford this service.

The literature on the association between poverty and education in Turkey is limited and these studies do not take the endogeneity problem into account. For example, Kizilgol and Ucdogruk (2011) investigate the link between poverty and household living standards using the Household Budget Surveys over the period from 2002-2006 by applying the Heckman selection model. In this study, they find that the probability of falling into poverty decreases with the household head's education. In other words, the higher the education access of the head, the higher household welfare.

The Household Budget Survey data of 2008 is used by Caglayan and Dayioglu (2011) to explore the factors that could influence poverty status and living standards of a household in

Turkey by employing parametric and semi-parametric logit models. According to the econometric results, the occupation of the household head, income and working status are the most important determinants of poverty. Lastly, using a similar dataset, Bilenkisi *et. al* (2015) apply logistic regression models to analyze the effect of the household head's educational attainment on poverty risk. Their empirical findings highlight that there is a negative relationship between the head of household's education level and the risk of poverty. Household poverty is higher among female-headed households compared to male-headed households because of low education.

Potential Endogeneity Problem

There are numerous explanations for why education may be endogenous to poverty, among them the idea that a proper investment in educational attainment in early life may have a consequence on both poverty in later life and further education in the future. Additionally, other variables such as social activities away from school, the child's ability, the background of a person's family as well as time preferences may concurrently influence poverty and education (Engle and Black, 2008). At the same time, just as there may be reverse causality resulting from education to poverty, there may equally be a causality from poverty to education. For example, investment in education reduces poverty through enhancing the wages or income as well as people's productivity. In addition, education allows people to obtain some necessary skills which promote their capacity to produce more effectively. On the other hand, poverty limits the quality of education and equal access to education by affecting the resources to students (Chaudhry and Rehman, 2009). As a result, poverty and education are inversely related to each other. Therefore, we estimate IV models where education is instrumented by several instrumental variables.

First instrument is the Turkish educational reform, which made in 1960s. This instrument is similar to the one used by Tansel and Karaoglan (2016) for their analysis of health and education in Turkey. In the early 1960s, the Turkish government made numerous changes in the educational sector. For instance, in January, 1961, there was a law passed that increased the mandatory schooling program from three to five years in the villages (Erdogan, 2003; Sen, 2013). Additionally, in 1960, a law allowed the graduates from middle schools to teach in the primary schools, while the higher graduates would teach in the middle schools after successfully completing teaching training courses. Consequently, these new laws increased the number of teachers and schools in the country (Akyuz, 2007). Following Tansel and Karaoglan (2016), we calculate the average years of schooling based on the Ministry of Education statistics[1]. If a household head completed primary school in 1952 or later, the years of schooling is equal to 5. Thus, the instrumental variable, $Reform1961$, takes the value of one if the household head was born in 1952 or later, and it is zero if the household head was born before 1952.

The second instrument is constructed based on the 1997 Compulsory Schooling reform. The Turkish parliament passed a law in 1997 to increase the mandatory years of schooling from 5 to 8 years. Exposure to this reform is used as an instrument for completed schooling to analyze the effect of education on various poverty outcomes. The instrumental variable, $Reform1997$, takes the value of one if the household head was born after 1986, and it is zero if the household head was born before 1986. However, it uncertain whether those who were born in 1986 were exposed by the reform because of education system in Turkey (Cesur *et al.*, 2014).

[1] The average years of schooling for primary school graduates prior to 1952 is calculated as a weighted average of three and five years of schooling where the weights are the number of rural and urban primary school graduates respectively. (Tansel and Karaoglan (2016)).

Data and Definitions of Variables

Data

To analyze the impact of education attainment on poverty, this study uses cross-sectional data obtained from the Turkish Statistical Institute's (TURKSTAT) Income and Living Conditions Survey (hereafter, ILCS) which took place in 2013. The ILCS is a nationally representative survey repeated each year. The purpose of the survey is to monitor the indicators on income distribution, poverty, social exclusion, labor status, demographical characteristics, educational and health status of household members. The 2013 ILCS was performed with face-to-face interviews between April 2013 and July 2013, applying a two-stage stratified random sampling approach (with household as the cluster unit, and all members of the household over 15 years of age interviewed). The first-stage sampling unit considers the household whose members continue to live at the same address as in the previous application and also new households. The second-sampling unit includes sample persons who have moved to another dwelling and households that have moved to another address. The original sample consists of 19,899 households, 6,671 of which were from rural areas and 13,228 of which were from urban areas. The survey covers the entire country and the target population comprises all persons residing within the borders of the republic of Turkey. The survey excludes the institutionalized population in the dormitories, guesthouses, childcare centers, orphanages, nursing homes, private hospitals, prisons, and military barracks.

Dependent Variable

Our objective is to identify the linkages between household characteristics and poverty. The key outcome variable, *poverty*, is constructed based on the "relative poverty approach" which is

proposed by the OECD. The relative poverty approach takes into account net total disposable income of each household to generate a specific poverty line for the sample, using 50-percent of the median of per capita net equivalence disposable income. Then, the calculated poverty line allows us to compare each household's net total disposable income level[2]. Specifically, the poverty line for the sample has been computed as follows:

(i) Calculating the equivalence scale to compare households with different structures. According to the OECD (2008), the equivalence scale[3] (also known as 'modified-OECD equivalence scale') can be derived for each household using the following equation:

$$a_i = 1 + \left(N_i^{Adult} - 1\right) * 0.5 + \left(N_i^{Child}\right) * 0.3 \quad (1)$$

where a_i denotes the i^{th} household's equivalence scale, N_i^{Adult} refers the number of adults older than or equal to 14 years old who live in the i^{th} household, N_i^{Child} states the number of children younger than 14 years old who live in the i^{th} household.

(ii) After computing each household's equivalence scale, the next step is to find each household's per capita equivalence disposable income (Y_i) by dividing each household's net total disposable income (D_i) by the computed equivalence scale.

$$Y_i = \frac{D_i}{a_i} \quad (2)$$

[2] Net total disposable income level is calculated as the total of individual disposable income of all members of the households, adding the total of yearly income for the household and subtracting taxes paid during the reference period of income and regular transfers to the other households or persons.

[3] The OECD equivalence scale method, first proposed by Haagenars et al. (1994), assigns a value of 1 to the first household member, of 0.5 to each additional adult and of 0.3 to each child.

(iii) The last step is to find the poverty line by taking fifty-percent of the median household per equivalence disposable income set. The poverty line is written as:

$$Poverty\ line = \{median\ of\ (Y_1, Y_2, \dots, Y_i\} * 0.50 \quad (3)$$

Following these calculations, the dependent variable in logistic regression analysis is determined as follow: If a head of household per equivalence disposable income is less than the calculated relative poverty line, the variable is coded 1 which indicates *poor* households, otherwise *non-poor*. The value of the computed poverty line for Turkey is 5276.86 Turkish Liras based on equation (3).

A person's prosperity is defined not only by the goods that she can afford, but also by the comparison to what other members of society can afford. The comparison of what people can afford with regards to what other people can be expected to afford is made through the relative poverty analysis (Iceland, 2005). To find whether a person is relatively poor, her well-being is compared to the objective measure determined by the researcher – the average standard of living. According to Alcock (1998), relative poverty requires value judgment to determine whether one is poor compared to others and, thus, is subjective.

Relative poverty concerns the economic status of a person compared to other society members. It shows whether a person lacks consumption, income, housing of appropriate quality, clothing, and other material possessions compared to others (Iceland, 2005). The relative poverty line is determined ~~i~~n each region considering the distribution of consumption, income, housing, or material possessions in this region. According to Woolard and Leibbrandt (1999) for developed countries, the relative poverty line should be established at half of the country's average consumption, income, or other characteristics mentioned above. Accordingly, those

who fall below this line are classified as relatively poor and those who fall above this line are classified into "not poor" category.

Relative poverty is often criticized for its consideration only of the objectively set consumption and income levels. However, those who fall into the category "poor" may actually not feel themselves poor, while those falling into the "not poor" category may, in fact, feel poor.

The Methodologies and Models

This study aims to analyze the relationship between education and poverty using various econometric techniques including Ordinary Least Squares (OLS), Linear Probability Model (LPM), Logit and Probit Models, and Instrumental Variable (IV) Probit Model. Each method depends on a different set of assumptions and highlights various aspects of the underlying processes of determining the impact of education on poverty.

In the application of the OLS model, we use a continuous dependent variable. Following Mincer (1994) a standard model is based on the human capital earnings function can be written as follows:

$$InY_i = X_i\beta + \varepsilon_i \quad (4)$$

where InY_i is the natural logarithm of per relative income for observation i, and X_i is a vector of individual characteristics including age, age squared, gender, marital status, education level, and working status. β is the vector of unknown parameters to be estimated, and ε_i is a random disturbance term, which is assumed to satisfy the usual properties of mean zero and constant variance.

In the case of the variable explained in the model is binary, we use the liner probability model, logit model and probit model to analyze the relationship between the level of educational

attainment and poverty. In such cases, the outcome variable takes a value of one when the head of household is poor and the value of zero otherwise. The LPM is simple to estimate and use OLS for a regression., where the dependent variable is a binary variable instead of continuous. The structural model is

$$y_i = x_i\beta + \varepsilon_i \tag{5}$$

where x_i is a vector of values for the i-th observation, β is a vector of parameters, and the ε is the error term. The LPM predicts the probability of an event occurring, for example, y=1 if a household head is poor, and y=0 otherwise. Although the LPM is easy to estimate and interpret, it has some shortcomings. First, it violates the OLS assumptions such as heteroscedasticity and normality. Second, the linear probability model can produce out of range predictions.

We also used binomial logit and probit models to analyze the impacts of educational level on the poverty risk. As with LPM, these models also use a binary dependent variable. The difference between the LPM and probit and logit model are: (i) predicted probabilities in both probit an d logit models are limited between 0 and 1, (ii) probit model assumes ε_i is normal, (iii) these models cannot be estimated by OLS.

In the logit and probit regressions, we focus on the marginal effects rather than on the coefficients. Sekyere and Chiaraah (2014, pp. 32) states that "the marginal effect which is analogous to the elasticity gives the percentage change in the probability of a success in response to a percent change in the explanatory variable". From our results, the coefficient signs for variables and marginal effects are consistent with the probit and logit models that imply we have an economic meaning. Moreover, the probit and logit models produce almost identical marginal

effects (Katchova, 2013). Probit and logit models are estimated using the Maximum Likelihood Method (MLE). The logit and probit models can be expressed as follows:

For the logit model,

$$F(x'\beta) = \Omega(x'\beta) = \frac{e^{x'\beta}}{1+e^{x'\beta}} = \frac{\exp(e^{x'\beta})}{1+e^{x'\beta})} \quad (6)$$

where $F(x'\beta)$ is the cdf of the logistic distribution.

For the logit model,

$$F(x'\beta) = \emptyset(x'\beta) = \int_{-\infty}^{x'\beta} \emptyset(z)dz \quad (7)$$

where $F(x'\beta)$ is the cdf of the standard normal distribution.

However, the association between the probability of outcome variable and a specific variable is interpreted by means of the marginal effect, which is computed as follow:

$$\frac{\phi[s(X)]}{X_m} = \emptyset(s).\frac{\partial s}{\partial X_m} = \emptyset(s)\left(a_m + \sum_{i=1}^{k} b_{mi}X_i\right) \quad (8)$$

The marginal effects provide insights into how the explanatory variables shift the probability of frequency of falling into poverty.

Lastly, we used IV-probit model to deal with endogeneity problem between education and poverty. As discussed above, poverty and education are inversely related to each other. Therefore, we estimate IV models where education is instrumented by several instrumental variables. IV regression is a powerful tool to analyze causal effects. In practice, finding good instrument is the most difficult aspect IV estimation. Using invalid instruments produce meaningless results. It therefore is important to assess whether a given set of instruments is valid

in an econometric model. If the instruments are weak, then the normal distribution provides a poor approximation to the sampling distribution of the Two Stage Least Squares (TSLS) estimator, even if the sample size is large. In fact, if instruments are weak, then the TSLS estimator can be badly biased in the direction of the OLS estimator. That is, TSLS is no longer reliable in the case of weak instrument. To test an instrument is 'reliable', we use the first-stage F-statistic, which is testing the hypothesis that the coefficients on the instruments equal zero in the first stage of TSLS. In the case of one instrument and one endogenous regressor, if the F-statistics from the first-stage regression exceeds 10, we have sufficiently strong instrument for the case of exactly-identified case (Stock and Watson, 2011).

In this study, we use two different instruments such as the Turkish educational reform in 1960s and the 1997 Compulsory Schooling Reform. To address endogeneity of educational attainment, we estimate an IV-probit model depicted by Equation (9) below,

$$Pov_i = \beta_0 + \beta_1 Educ_i + X_i\delta + \varepsilon_i \quad (9)$$

where the variable Pov_i has two different outcomes. First, it is a continuous variable and defined as the natural logarithm of per capita relative income. Second, it is a binary variable and denotes whether the household's per equivalence disposable income is below the calculated poverty line or not. Therefore, in this case, 1 indicates the head of household is poor and 0 indicates otherwise. $Educ_i$ is an indicator to state the years of schooling of the household's head. The vector, X, stands for personal characteristics of the household head, including age, gender, marital status, and employment status. Equation (9) is the expression of the second-stage regression in IV-probit model.

Since poverty and educational attainment are closely intertwined, estimating equation (9) by Ordinary Least Square (OLS) could lead to biased results because of unobserved determinants that may affect the risk of poverty. Alternatively, reverse causality may exist and poverty may influence the level of education attainment. To solve the endogeneity of educational attainment, we use different Education Reforms implemented in Turkey as an instrument. The first-stage of IV-probit model can be expressed as follow:

$$Educ_i = \alpha_0 + \alpha_1 EducationalReform_i + X_i\vartheta + \mu_i \qquad (10)$$

where $EducationalReform$ is a dummy variable that indicates whether the household head was affected by the reform or not.

Estimation Results

Summary Statistics

To avoid the problem of perfect multicollinearity, one classification is dropped from each group of variables for estimation purposes. Table 3.1 and Table 3.2 provide the choice of explanatory variables and their summary statistics, respectively. From Table 3.2, the set of socio-economic and demographic characteristics contains the following variables: *Female*, which is coded 1 if the individual is female and 0 otherwise. On average, 15% of the individuals in the rural area are female whereas it is 16% in the urban area.

Age measures the age of the individuals of the sample. To test nonlinearity between income and age, we also introduce the variable *age squared* (Age^2). The average age in the rural area 53 years, while it is 47 years in the urban area.

Marital status is measured by three dummies indicating whether the individual has married (Married), has never married (Single), has divorced or separated or widowed (Divorced--Widowed - Separated). The reference variable is whether the individual is single. In the sample of urban area, 81% of the individuals are married, 4% of the individuals are single (never married), and 15% of the individuals are divorced or widowed or separated. This corresponding numbers for urban area are 81%, 3%, and 16%.

We define four dummies to control for individuals' labor market status. The variable *Working* takes the value 1 if the individual is working. The dummy *Retired* is coded 1 if the individual is retired. The *Inactive* dummy takes the value 1 when the individual reports being a seasonal worker, busy with household chores and student. The reference variable is whether the individual is not working in a paid job (*Unemployed*). In the urban sample, 63% the individuals are working, 4% are unemployed, 13% are retired, 20% are inactive in the labor force. The labor market structure in the urban area tends to be quite similar to the rural area.

We define the Educational level as a qualitative variable with five categories: '*Illiterate*,' '*Primary School degree*,' '*Secondary School degree*,' '*High School degree'* and '*University degree or above*'. In the sample of rural area, 28% of the individuals are illiterate, 52% have completed primary school, 8% have completed secondary school, 7% have completed high school and 5% have university studies.

OLS Estimation Results

Table 3.3 presents the robust OLS estimation results of the logarithmic relative income equation (4) ignoring the endogeneity of education. Most of the findings are consistent with expectations and previous studies. The adjusted-R square for rural and urban areas stand at 0.25 and 0.35,

respectively. According to Su and Heshmati (2013), the R-squared value tends to be small in Mincerian model because of (i) the individual incomes have a large dispersion so that makes regressions difficult to capture the marginal effects of each variable; (ii) there might be some unobserved effects that we fail to capture using the selected variables such as ability.

The age variable has a positive impact on the household head's earnings, with a one-year increase in age increasing household head's income 0.02 in both areas, holding other variables constant. However, age squared is included in the regression to explain the non-linearity of the variable.

With respect to the gender of the household head, in both areas, the variable's coefficient is negative and statistically significant at 1 percent. This implies that per capita household relative income with a male household is higher than female-headed ones. Statistically, a female-headed household who lives in rural area is estimated to earn about 22.9% less than male counterparts.

As presented in Table 3.3, education, as expected, is an important factor in determining the household head's relative income. According to the results, all the levels of education are statistically significant at the 1 percent in both rural and urban areas and it is a crucial part in increasing household head welfare. This indicates that the higher level of education the household head, the higher the household per capita relative income. Especially, on average, the income of the household head with primary education is 41.3% and 42.4% higher compare to people with no education in rural area and urban area, respectively. Similarly, university diploma has the greatest impact on income in both area. Having a university diploma, on average, increases the household head's income 2.56 percent point in rural area and 2.63 percent point in urban area.

The next variable, marital status of the household head had a negative sign and is significant at the 1 percent in both areas except the widowed/divorced/separated in urban areas, which is not statistically significant at any significance level. Statistically, married household head's income in rural and urban areas is 24.6% and 14.4% less than those who are single, keeping all other things the same.

Lastly, we analyzed the relation between employment status of household head and per capita income. According to the results, being both employed and retired has a positive sign and are statistically significant at the 1 percent level for both areas, which indicates that per capita household's relative income is higher for working and retired household head. Statistically, on average, being employed and retired is 61.4% and 62% and 63.3% and 53.4% higher compare to people with unemployed in rural area and urban area, respectively. However, the coefficient of being inactive (such as, housewife, student) is only statistically significant at the 1 percent in urban areas.

The Results of LPM, Logit and Probit Models

Table 3.4 presents the regression results based on three different econometric specification. As discussed above, the linear probability model is simply running OLS for a regression, where the dependent variable is a binary variable. The interpretation of the coefficients in the LPM is very straightforward. Because the regression in column (1) and column (4) are a linear probability model, respectively, for rural and urban sample groups, its coefficients are estimated changes in predicted probabilities resulting from a unit change in the independent variable. Accordingly, keeping all other things the same, an increased level of education will reduce the head of household probability of being poor. More specifically, holding the other variables in column (1) and column (4) are constant, the probability of falling into poverty for college graduate is 0.303

(30.3%) and 0.366 (36.6%) less than for someone with a no educational attainment for the rural area and urban area, respectively. In short, because the coefficients are all negative and get bigger as educational attainment increases, the probability of being poor reduces as educational attainment increases.

The coefficient for being female in regression (1) and (4) is -0.106 and -0.089, indicating that the difference between poor and non-poor household heads is 10.6 percentage points for the rural residents and 8.9 percentage points for the urban residents, holding constant the other variables in the regression, respectively. This is statistically significant at the 1% significance level.

We do find, however, the condition of the labor force is an important factor for both area and all types of labor force have statistically significant at the 1% level and negative effect on the risk of poverty. For example, a retired household head who lives in rural and urban area is estimated to decrease the probability of being poor by 34.1 and 33.3 percentage points, respectively.

With respect to the additional regressors, the findings indicate that only being married have statistically significant negative impacts on the probability of being poor for both rural and urban group. In addition, the linear probability model shows only urban residents' poverty risk is significantly affected by age.

On the other hand, the logit and probit regressions are run to investigate the effect of the explanatory variables on the likelihood of the household head being poor. We report marginal effects to assess the magnitude of the factor effect on the likelihood of poverty risk. The estimates reported in columns (2), column (3), column (5) and column (6) yields similar findings. As can

be seen from both specifications, most of the independent variables are statistically significant at the 1 percent level. More specifically, with respect to the impact of marital status, married head of households were significantly more likely to poor than single head of households. Also, living divorced or widowed or separated dummy variable is not statistically significant for both models. Likewise, the probability of falling to poverty decreases with head of household age.

For both rural and urban group, the results show that educational levels (primary, middle, high, and college) of the household head significantly fall the probability of being poor for both rural and urban residents. This is in line with what was expected. More specifically, compared to the benchmark group (no education) those who have acquired some level of education are less likely to be poor. People with higher level of educational attainment will have more opportunities for a better job and subsequently, higher earnings.

Considering the impact of the employment status dummy variables are statistically significant in both models and areas, with the exception of the inactive dummy. For logit models, employed household heads 12.7% in rural area and 15.2% in urban area are less likely to be poor. Similarly, the results of probit models indicate that retired household head who lives in rural area less likely to be poor, while those who live in urban area more likely to be poor.

Looking at gender, as expected, female-headed households are more likely to be poor than male-headed households. According to the results, the marginal effects for age-squared, being divorced, widowed or separated, and inactive working status seem unlikely to impact both urban and rural residents' poverty level as the coefficients are statistically insignificant.

IV Probit Estimation Results

As discussed above, in the presence of endogeneity, OLS procedure can generate biased and inconsistent estimators. In this study, before estimating IV-probit equations, one should decide whether it is necessary to use an instrumental variable to correct the endogeneity problem. In such case, the proper test is the Hausman specification test of endogeneity, which indicates whether or not one of the explanatory variables in a regression suffers from endogeneity. The findings show that the Hausman test's p-value very small (0.0004), which determines that OLS estimates are not consistent. Similarly, to deal with endogeneity in a binary dependent variable model, we also used Hausman test for decision. The test result shows that we have an endogeneity problem with education and poverty, with a p- value of (0.0000).

To analyze the impact of different Turkish educational reforms on poverty, the years of schooling is instrumented with the policy reform (*Reform1961)* and *(Reform 1997)* dummy. In IV regression, we first focus on the reliability of the coefficient estimates depends on the validity of the instruments by checking the diagnostic statistics. Table 3.5 reports the first-stage regression estimates of 2SLS model in the case of relative income. We use different educational reforms for both urban and rural areas. For the regression in column (1), (2), (3), and (4), the first-stage F-statistics are 24.85, 7.21, 2.56, and 5.12, respectively. Of these four, only one exceeds 10. We conclude that the instrument used for rural area, which is 1961 educational reform, is not weak, thus we can rely on the standard methods for statistical inference using the 2SLS coefficients and standard errors. Similarly, Table 3.6 shows the first-stage regression estimates of 2SLS model in the case of whether the household's per equivalence disposable income is below the calculated poverty line or not. Again, only F-statistic value from first-stage

regression for rural residents is higher than 10, indicating 1961 educational reform is a sufficiently strong instrument.

However, column (1) of Table 3.5 and Table 3.6 demonstrate that the educational expansion increases years of schooling by about 20 and 9 percent for rural residents. In other words, a household head who were born in or after 1952, the impact of educational expansion on the years of schooling is positive and the coefficient significant at the one-percent level.

Table 3.7 and Table 3.8 display the second stage results from IV-probit estimation. From column (1) of Table 3.7, the results suggest that additional years of schooling has a significant positive impact on a household head's relative income, which means that an additional years of schooling increases the head of household who reside in rural area relative income by 7.3 percent. This is the line with what as expected.

Table 3.7 also reports the impact of control variables on the relative income. The married or divorced dummy variable is statistically significant at the 1%, indicating being married and divorced decrease a household head's relative income by 33% and 25%, respectively. With respect to employment status, being employed or retired has a significant positive affect on relative income, whereas being inactive is not statistically different from zero. In addition, age and age-squared variables are statistically significant at the 5%, and relative income increases at older ages.

On the other hand, column (1) of Table 3.8 presents that an additional years of schooling has a significant negative impact on the probability of being poor, but this impact is not statistically significant at any significance level. The coefficient on female is 0.05, indicating that female-headed households is more likely to be poor. Further, all employment status are

statistically significant, which imply that having a job or being retired or inactive reduces the likelihood of being poor by 3.1%, 3.9% and 0.7%, respectively. In addition, being divorced significantly falls the probability of being poor for rural residents.

Summary and Conclusion

This paper is the first of its' kind to use different econometric techniques to analyze the impact of educational attainment on poverty. We measured poverty level by using relative poverty approach. In relative poverty approach, we compute the relative poverty line to compare each household's net total disposable income. If a household head's per disposable income falls below the computed relative poverty line is classified as a poor household head, otherwise not. Yet, relative poverty approach has some shortcomings. First and foremost, because the poverty line objectively determined by a researcher, some household heads who fall into the category "poor" may actually not feel themselves poor, whereas those that are classified as "not poor" may actually feel poor. Therefore, we also use the relative income, which is the ratio each household's net total disposable income to the computed equivalence scale. In such case, we have a continuous outcome for poverty.

In this study, we identified various factors such as levels of education of the household head, gender of the household head, age of the household head, employment status of the household head, marital status of the household head as statistically significant determinants of relative income and the probability of being poor.

To address the endogeneity problem, we instrument the educational level using the Turkish educational reform, which were implemented in 1961. The findings reveal that the educational expansion increases years of schooling by about 20 and 9 percent for rural residents. Moreover, the results also suggest that additional years of schooling has a significant positive

impact on a household head's relative income, which means that an additional years of schooling increases the head of household who reside in rural area relative income by 7.3 percent

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Table 3.1: Explanatory variables used in the empirical analysis

Variables	Type	Description
Dependent Variable		
Poverty incidence	Dummy	Poverty status; 1=poor, 0=non-poor
Relative income	Continuous	Log of relative income
Explanatory variables		
Female	Dummy	1= Household head is female, 0=Otherwise
Age of household head	Continuous	Age of household head (in years)
Age-squared	Continuous	Age squared
Never Married	Dummy	1=Never married, 0=Otherwise
Married	Dummy	1= Married, 0=Otherwise
Divorced/Widowed/Separated	Dummy	1=Divorced/Widowed/Separated, 0=Otherwise
No education	Dummy	1= Household head with none education, 0=Otherwise
Primary school	Dummy	1= Household head with primary education, 0=Otherwise
Middle school	Dummy	1= Household head with middle education, 0=Otherwise
High school	Dummy	1= Household head with high education, 0=Otherwise
College and above	Dummy	1= Household head with college and above education, 0=Otherwise
Working	Dummy	1= Household head is working, 0=Otherwise
Unemployed	Dummy	1= Household head is unemployed, 0=Otherwise
Retired	Dummy	1= Household head is retired, 0=Otherwise
Inactive	Dummy	1= Household head is inactive, 0=Otherwise

Source: 2013 Turkish ILCS

Table 3.2: Summary statistics of the variables employed in regression

	Rural				Urban			
Explanatory Variables	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Poverty incidence	0.14	0.35	0	1	0.13	0.34	0	1
Relative income	8.99	0.651	4.02	11.95	9.40	0.69	1.76	12.83
Social and Economic Variables								
Female	0.15	0.36	0	1	0.16	0.36	0	1
Age	53.54	15.56	16	93	47.49	14.65	15	110
Age Squared	3109.15	1721.35	256	8649	2470.36	1523.99	225	12100
Marital Status								
Married	0.81	0.39	0	1	0.81	0.38	0	1
Divorced/Widowed/Separated	0.16	0.37	0	1	0.14	0.35	0	1
Working Situation								
Working	0.63	0.48	0	1	0.63	0.48	0	1
Retired	0.13	0.34	0	1	0.19	0.34	0	1
Inactive	0.20	0.40	0	1	0.13	0.39	0	1
Educational Level								
Primary School	0.52	0.49	0	1	0.39	0.48	0	1
Middle School	0.08	0.274	0	1	0.11	0.32	0	1
High School	0.07	0.26	0	1	0.19	0.39	0	1
College and Above	0.05	0.21	0	1	0.17	0.38	0	1

Source: ILLC, 2013, Turkey

Table 3.3: Results for OLS estimation (Dependent variable: *InY*)

Variables	**Rural (n=6,671)**	**Urban (n=13,228)**
Constant	7.891*** (75.07)	7.950*** (115.15)
Female	-0.261*** (-8.59)	-0.193*** (-8.03)
Age	0.020*** (6.44)	0.021*** (10.34)
Age-Squared	-0.00007*** (-2.59)	-0.00008*** (-4.14)
Married	-0.283*** (-5.37)	-0.214*** (-6.67)
Divorced/Widowed/Separated	-0.156*** (-2.78)	-0.058 (-1.62)
Primary School	0.346*** (18.72)	0.354*** (20.07)
Middle School	0.547*** (18.34)	0.511*** (23.54)
High School	0.716*** (20.73)	0.725*** (35.16)
University or Above	1.276*** (34.54)	1.290*** (59.89)
Working	0.479*** (10.69)	0.483*** (12.78)
Retired	0.491*** (10.23)	0.428*** (10.82)
Inactive	0.046 (0.352)	0.183*** (4.37)
Adjusted R^2	0.25	0.35

Source: 2013 Turkish ILCS

Note: Asterisk *** indicates values are significant at 1% level. The numbers in *parentheses* are the t- statistics

Table 3.4: Comparison of LPM, Logit, and Probit Estimates

Dependent variable: the probability of being poor

	Rural			Urban		
Regression Model	**LPM**	**Logit**	**Probit**	**LPM**	**Logit**	**Probit**
Regressor	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Female	-0.10***	-0.06***	-0.07***	-0.08***	-0.10***	-0.09***
	(-5.71)	(-4.53)	(-4.52)	(7.00)	(-7.81)	(-7.25)
Age	-0.002	-0.003*	-0.002*	-0.002**	-0.002**	-0.003**
	(-1.59)	(-1.71)	(-1.82)	(-2.33)	(-2.05)	(-2.55)
Age-Squared	-0.00001	-0.00007	-0.00005	-0.00001	-0.00001	-0.00001
	(-0.82)	(-0.43)	(-0.38)	(-1.42)	(-1.34)	(-1.06)
Married	0.05**	0.04*	0.061*	0.05***	0.063***	0.05***
	(1.98)	(1.82)	(1.95)	(4.10)	(3.22)	(3.04)
Divorced/Widowed/Separated	-0.03	-0.013	-0.009	-0.007	0.016	0.005
	(-0.92)	(-0.34)	(-0.29)	(-0.51)	(0.72)	(0.23)
Primary School	-0.14***	-0.09***	-0.11***	-0.17***	-0.12***	-0.13***
	(-12.44)	(-10.62)	(-10.94)	(-13.54)	(-14.87)	(-14.84)
Middle School	-0.22***	-0.15***	-0.18***	-0.25***	-0.19***	-0.20***
	(-12.39)	(-9.58)	(-10.63)	(-17.08)	(-17.85)	(-18.13)
High School	-0.24***	-0.16	-0.19***	-0.32***	-0.26***	-0.26***
	(-12.95)	(-9.71)	(-10.92)	(-23.22)	(-24.70)	(-25.13)
University or Above	-0.30***	-0.44***	-0.43***	-0.36***	-0.42***	-0.39***
	(-13.92)	(-6.44)	(-8.14)	(-27.57)	(-22.07)	(-26.28)
Working	-0.28***	-0.12***	-0.15***	-0.28***	-0.15***	-0.16***
	(-11.23)	(-8.30)	(-8.58)	(-12.43)	(-13.93)	(-13.73)
Retired	-0.34***	-0.27***	-0.29***	-0.33***	-0.04***	0.25***
	(-12.07)	(-10.97)	(-11.64)	(-13.90)	(-3.28)	(-16.56)
Inactive	-0.11***	-0.02	-0.03	-0.18***	-0.25	-0.06
	(-3.98)	(-1.54)	(-1.63)	(-6.90)	(-1.34)	(-1.66)
Constant	0.69***			0.78***		
	(11.34)			(20.65)		

These regressions were estimated using the n=6,671 observations in urban area and n=13,228 observations in rural area in the Turkish (2013) ILCS data set described in Table 3.1. He linear probability model was estimated by OLS, and probit and logit regressions were estimated by maximum likelihood. For logit and probit model, we report marginal effects to assess the magnitude of the factor effect on the likelihood of poverty risk. t-ratios are given in parentheses under the coefficients. Individual coefficients are statistically significant at the *10%,*5% and*1% level.

Table 3.5: Effect of different Educational Reform on Education: First-Stage IV Estimates for the log of relative income

Dependent variable: Years of Schooling								
		Rural (n=6,671)				**Urban (13, 228)**			
		(1)		**(2)**		**(3)**		**(4)**	
		First Stage		**First Stage**		**First Stage**		**First Stage**	
		Est.	**t-stat**	**Est.**	**t-stat**	**Est.**	**t-stat**	**Est.**	**t-stat**
Instrumented variable: Education **Instrument:** Educational Reform (Dummy)	**Reform 1961**	0.203	3.13			0.061	0.075		
	Reform 1997			-0.142	0.138			-0.031	0.15
		F-test of instruments		**F-test of instruments**		**F-test of instruments**		**F-test of instruments**	
		F-stat	**p-value**	**F-stat**	**p-value**	**F-stat**	**p-value**	**F-stat**	**p-value**
		24.85	0.000	7.21	0.370	2.56	0.152	5.12	0.138
Number of treated observations		4,314		122		10,486		469	

This table reports the results first-stage regression of TSLS model in the case of log of relative income. We used as instruments Reform 1961 and Reform 1997. We report the report the results of first-stage estimate and joint F-test of significance of the instruments. *t-statistics* are reported in parentheses.

Source: Author's calculations

Table 3.6: Effect of different Educational Reform on Education: First-Stage IV Estimates for the probability of being poor

Dependent variable: Years of Schooling									
		Rural (n=6,671)				**Urban (13, 228)**			
		(1)		**(2)**		**(3)**		**(4)**	
		First Stage		**First Stage**		**First Stage**		**First Stage**	
		Est.	**t-stat**	**Est.**	**t-stat**	**Est.**	**t-stat**	**Est.**	**t-stat**
Instrumented variable: Education **Instrument:** Educational Reform (Dummy)	**Reform 1961**	0.089	3.95			0.021	0.254		
	Reform 1997			-0.156	-3.16			-0.109	-3.96
		F-test of instruments		**F-test of instruments**		**F-test of instruments**		**F-test of instruments**	
		F-stat	**p-value**	**F-stat**	**p-value**	**F-stat**	**p-value**	**F-stat**	**p-value**
		15.8861	0.000	5.65	0.151	1.242	0.265	8.69	0.224
Number of treated observations		4,314		122		10,486		469	
Number of poor household		960				1,831			

This table reports the results second-stage regression of TSLS model in the case of the probability of being poor. The dependent variable is the log of relative income. We investigate the effect of years of schooling on relative income. z-*statistics* are reported in parentheses.

Source: Author's calculations

Table 3.7: Effect of different Educational Reform on Education: Second-Stage IV Estimates for the log of relative income

Dependent Variable: The Log Relative Income

	Rural				Urban			
	(1) Second-Stage		(2) Second-Stage		(3) Second-Stage		(4) Second-Stage	
	Est.	**z-stat**	**Est.**	**z-stat**	**Est.**	**z-stat**	**Est.**	**z-stat**
Years of Schooling	0.073*	(-1.94)	-1.66	(-1.52)	0.01	(0.01)	-0.05	(0.15)
Age	0.04**	(2.35)	0.08	(2.74)	0.019	(0.45)	0.01	(1.42)
Age-squared	-0.0003**	(-2.08)	-0.0007	(-2.59)	-0.0001	(-0.30)	-0.0001	(-0.89)
Female	0.07	(1.31)	-0.03	(-0.37)	0.22	(3.49)	0.23	(7.26)
Married	-0.33***	(-3.59)	-0.16	(-1.12)	-0.48	(-2.34)	-0.49	(-7.23)
Divorced/Widowed/Separated	-0.25***	(-3.02)	-0.13	(-1.09)	-0.39	(-2.06)	-0.39	(-6.01)
Employed	0.058***	(11.10)	0.59	(8.04)	0.67	(5.05)	0.67	(13.46)
Retired	0.067***	(11.22)	0.69	(8.28)	0.58	(9.55)	0.59	(14.84)
Inactive	-0.07	(-0.91)	-0.19	(-1.62)	0.06	(0.85)	0.06	(1.55)

This table reports the results first-stage regression of TSLS model. The dependent variable is the log of relative income. We used as instruments Reform 1961 and Reform 1997. We report the report the results of first-stage estimate and joint F-test of significance of the instruments. *t-statistics* are reported in parentheses.

Source: Author's calculations

Table 3.8: Effect of different Educational Reform on Education: Second-Stage IV Estimates for the probability of being poor

Dependent Variable: The Probability of Being Poor

	Rural				Urban			
	(1) Second-Stage		(2) Second-Stage		(3) Second-Stage		(4) Second-Stage	
	Est.	**z-stat**	**Est.**	**z-stat**	**Est.**	**z-stat**	**Est.**	**z-stat**
Years of Schooling	-0.18	(0.95)	0.74	(-1.23)	0.07	(0.12)	0.03	(0.99)
Age	-0.009	(-1.01)	-0.03	(-2.25)	-0.005	(-0.26)	-0.01	(-2.39)
Age-squared	-0.0006	(0.80)	0.0003	(2.13)	0.0003	(0.16)	0.0001	(2.06)
Female	0.05*	(-1.67)	0.01	(0.37)	-0.08	(-2.70)	-0.07	(-4.29)
Married	0.05	(1.18)	-0.04	(-0.62)	0.10	(1.03)	0.05	(1.53)
Divorced/Widowed/Separated	-0.01***	(-0.30)	-0.08	(-1.28)	0.06	(0.70)	0.01	(0.55)
Employed	-0.031***	(11.59)	-0.31	(-8.44)	-0.33	(-5.03)	-0.30	(-11.15)
Retired	-0.039***	(12.89)	-0.40	(-9.55)	-0.38	(-12.73)	-0.37	(-17.70)
Inactive	-0.007*	(-1.84)	0.003	(0.05)	-0.14	(-3.56)	-0.12	(-5.15)

This table reports the results second-stage regression of TSLS model. The dependent variable is the probability of being poor. We investigate the effect of years of schooling on relative income. z-*statistics* are reported in parentheses.

Source: Author's calculations