LUND UNIVERSITY
School of Economics and Management

Department of Economics

Master Thesis in Economics-NEKN01

SHORT-RUN AND LONG-RUN DYNAMICS OF TRADE BALANCE: TESTING FOR THE VALIDITY OF MARSHALL-LERNER CONDITION AND J-CURVE HYPOTHESIS IN TURKEY

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August, 2014

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Abstract

Growing trade deficit has been one of the major problems of the Turkish economy to date. This study aims to provide empirical insights to policy makers about whether real depreciation or devaluation of Turkish Lira is an effective way of improving the trade deficit. The data employed in this study is quarterly and covers the period of 1987:1 and 2013:3. Recently developed Bounds test to cointegration approach based on Auto Regressive Distributed Lag Model (ARDL) and Error Correction of ARDL model are employed. According to the Bounds testing, at %10 significance level, there is found an evidence for long run relationship among the variables which are trade balance, domestic income, foreign income and real exchange rate. Additionally, estimated long run ARDL model approved the validity of Marshall-Lerner condition in Turkish economy. Finally, short term dynamics obtained from the estimation of error correction model showed that there is no J-Curve effect for the case of Turkey.

Keywords: Marshall-Lerner condition; J-Curve Hypothesis; Turkey's trade balance; ARDL Model; Bounds Test**.**

Acknowledgments: I would like to thank my supervisor Martin Strieborny for his crucial guidance and also to Associate Professor Dr. Burcu Kıran, Department of Econometrics/Istanbul University, for her invaluable contributions during my thesis.

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1.Introduction

Many countries in the world depreciated or devaluated their domestic currency as a way of exchange rate based stabilization policy in order to improve their balance of trade or current account. This kind of policy became very popular throughout the fixed exchange rate regime period. The model formulating the policy maker's action is closely derived from Marshall-Lerner condition.

This condition states that for the devaluation or depreciation to be trade balance improving, sum of absolute values of export and import demand elasticities must be greater than unity. This condition is called elasticity approach in the trade balance literature and it has twofold process. First, after the depreciation, exporters will have more money (in terms of domestic currency) once the foreign currency which is earned from exports is converted to the domestic currency. Clearly, this condition will encourage the exporters in a way to export more. Second, after the depreciation, the importers will need more domestic currency for each unit of foreign currency. Obviously, this condition will discourage the importers in a way to import less since the foreign goods become more expensive in terms of domestic currency. Eventually, after the encouragement in export and discouragement in import sectors as a result of depreciation, the balance of trade will be improved in the long run. The empirical studies examining the validity of Marshall-Lerner condition include the classic examples for developed markets, Goldstain and Khan (1974), Krugman and Baldwin (1987), Bahmani-Oskooee and Brooks (1999), for developing countries in Asia, Sinha (2001) and Panagariya, Shan and Mishra (1996), and for Africa, Ghura and Grennes (1994).

It especially gathered the attention of researchers during the deterioration in U.S. trade balance in 1972 despite devaluation of U.S. dollar in 1971, Bahmani-Oskooee and Kantipong (2001). Afterwards, authors tried to distinguish between short-run and long-run effects of devaluation. Eventually, large majority of the literature agreed on that depreciation improves trade balance after passage of some time. Magee (1973) was the first who came up with a solution. He made a detailed currency-contract analysis and explained the phenomenon in two phases. In the first phase, contracts that are already made in specified currencies and at initial prices dominate the short-run response of

trade balance. In the second phase, which is just after the short-run, new contract are made and "pass-through" of the devaluation is achieved. In addition to this, Krueger (1983) contributed to literature and found that elasticities increases in the second phase and so that devaluation or depreciation improves the trade balance. Leonard and Stockman (2001) showed that these two phases proved that the response of imports and exports is not smooth but rather builds up a dynamic form resembling the letter J where trade balance deteriorates at first and then improves. However, Bahmani-Oskooee (1985) showed that there have been some cases that Marshall-Lerner condition was fulfilled but still balance of trade continued to deteriorate. Consequently, he recommended that trade policy should be done under the short-run dynamics which follows the post devaluation time path of the balance of trade.

The time period that is important to take into consideration for our case is post- 1980. Turkey had a structural change in her trade policy during that time in order to liberalize the economy and integrate it to the world economy. These policies included real depreciation of the Turkish Lira and some other export promotion policies. For the pre-1980 period, fixed exchange rate and import substitution polices dominated the Turkish economy. Occasionally, these fixed exchange rate policies led the Turkish Lira to become overvalued. As a result of overvaluations of Turkish Lira, Turkey faced balance of payments crisis and had to devalue its currency for many times in the pre-1980 period. Stabilization policy which is put into effect on 24th of January 1980 was the turning point. Turkey replaced the import substation policy with export oriented industrialization policy and opened the doors of the economy to new era of liberalized foreign trade. In addition to promotion of export sector, import sector was also liberalized to a large extent. Eventually, for a better accordance with liberalized trade, the exchange rate policy was also changed. According to this sharp policy changes, literature divided the foreign trade history into two time periods which are pre-1980 and post-1980. Because the liberalization period better reflects my topic, the interest of this study covers for the period post 1980.

In this study, in order to analyze the effects of depreciation of Turkish Lira for the short run and long run effects on the trade balance, Auto Regressive Distributed Lag Model (ARDL) which is based on the estimation of bound testing Peseran, Shin and Smith (2001) is used. ARDL model has the advantage in the determination of short run and

long run dynamics separately and it is used by Tang (2004) for five ASEAN countries, Tang (2005) for South Korea, Bahmani-Oskooee and Wang (2006) for China, and Bahmani-Oskooee and Harvey (2006) for Malaysia.

For the testing J-curve hypothesis, there have been two approaches in the sense of employing data. First approach includes some studies which tested the phenomenon between one country and the rest of the world using aggregate data. However, some other few researchers employed bilateral data between domestic country and her major trading partners separately, disaggregation by country. Employing the bilateral data based on the idea that a country's balance of trade could be improving with one trading partner, at the same time, deteriorating with another partner. The tradition begins with Rose and Yellen (1989), who analyzed the J-curve of U.S. with her six major trading partners and found no effects in the short-run and long-run on bilateral trade balance after the depreciation of the currency. Other studies include, Bahmani-Oskooee and Brooks (1999) for U.S., Bahmani-Oskooee and Ratha (2004) for U.S. with increased number of trading partners, Marwah and Klein (1996) for Canada, Halicioğlu (2007) for Turkey, Bahmani-Oskooee, Goswamı, Talukdar (2005) for Australia, and all the studies found J-curve effect only for a few number of trading partner countries. This study focuses on total effect of real exchange rate on the balance of trade and handles the 202 trading partners as a whole. Shortly, in order to see the big picture, aggregate data is preferred to be employed.

The study proceeds as follows; in the subsection of 1.1 and 1.2 advancing the introduction with literature review and brief account for the Turkish economy. In section 2, the theoretical background is detail explained. In section 3, theoretical approach is adjusted for the purpose of the study. Section 4 presents the data, empirical methodology, analysis, and discusses the results. And finally, Section 5 concludes and gives suggestions.

1.1 Literature review for Turkey

Foreign trade imbalances set the agenda for economic policy since it has been a growing problem from 1950s to these days. For this reason, exchange rates have been used as an instrument to bring the foreign trade to the targeted levels from time to time. However, the success of these polices in attaining of targets are subject to the empirical studies. However, the success of these polices in attaining of targets are investigated by economists in the empirical studies.

The empirical studies for the case of Turkey show no common pattern in terms of data frequency, sample period, modeled macroeconomic variables and empirical methods. The literature is mainly composed of studies which are based on the direct link between real exchange rate and trade balance that will be mentioned in the model section. It is seen that cointegration tests have been common pattern in the studies. Couple of studies will be compared by classifying on whether the relationship between real exchange rate and trade balance is supported or not.

If we start with empirical studies which yield positive results for the case of Turkey, they have common techniques in the way of employing econometric approach. In the study of Kale (2001) it is found that real depreciation improves the trade balance in the long run. She also showed that an increase in domestic income has negative impact on the trade balance. This result is line with the absorption approach which is mentioned in the theory section. The study used quarterly data covering the period of 1984-1996 and Johansen's cointegration approach. Akbostancı (2002) employed error correction model to differentiate short run and long run dynamics covering the period 1987-2000. Also, she used impulse response function technique to see the response of trade balance to the exchange rate shocks. Although, Marshall-Lerner condition satisfied in the long run, there is not found an evidence supporting J-curve for Turkey. Instead, she found an S-pattern reminiscent. Different from other studies, Togan and Berument (2007) employed annual data covering the period of 1970-2005. Similarly, they adopted Johansen's cointegration approach in their study. They concluded that trade balance can be improved by significant depreciation of real exchange rate. Unlike the previous

studies, Halıcıoğlu (2007) used bilateral trade data to test Marshall-Lerner condition covering the period of 1985-2005. Similar to our analysis, he applied ARDL approach based on the bound testing. There is found positive result for the long run relationship with only two partners (UK and USA) among thirteen trading partners.

On the other hand, there are number of studies which found negative results between real exchange rate and trade balance for the case of Turkey. Like in the previous studies, these studies mostly employed the cointegration analysis. Brada et al (1997) employed quarterly data for the period of 1969-1993. They divided the time period into two sections (pre-1980 and post-1980). They found negative result for the pre-1980 period and positive result for post-1980 period. The results supported the liberalization period's implemented policies. Peker's study (2007) found no empirical validity for Marshall-Lerner condition indicating that there is no long run relationship between real exchange rate and trade balance. His study covered the period of 1992-2006 and also used error-correction model to see short run effects. He found no significant result in line with J-curve hypothesis for short run relationship of real exchange rate and trade balance. Furthermore, Binatli and Sohrabji (2009) found negative exchange rate elasticity for both exports and imports with quarterly data for the period of 1999-2008. Hepaktan (2009) found that Marshall-Lerner condition does not hold in the long run for the period 1980-2008.

While the various studies showed different results, usually, the depreciation or devaluation policies could not show immediate success in the Turkish economy. There are found some reasons for the limited effect of exchange rate on the trade balance by couple of studies. There have been three main reasons among the minor ones in the literature. They are **over dependency of export sectors on the imported imputs**, **incompatible exchange rate policies for long term foreign trade targets**, **and large share of agricultural goods in exports for the pre-1980s and slow industrial development for the past-1980s**.

Taşkın (2003) showed the reason of "over dependency of export sectors on the imported imputs" in his study that capital and intermediate products formed the large part of imports in the Turkish economy. As a result of that, import demand has become inelastic and thus unresponsive to exchange rate changes. On the other hand, government aimed to encourage exporters and eventually create trade surplus but the

policy actions and results were not in line with initial targets. Boğa (2003) showed that most of the time, government could not follow the initially targeted policies and that lead to overvalued currency, thereby, discouraged export and encouraged import demands.

In the sense of shares of the leading sectors in export, the Turkish foreign trade history dived to two main periods which are pre-1980 and post-1980. For the pre-1980 period, agricultural sector was the dominant among the other sectors in export and since agricultural goods have inelastic supply, thereby, exchange rate policies fell behind the targets of improving trade deficit. On the other hand, in the post-1980, there has seen that share of industry has risen while agriculture has decreased. Nevertheless, in the study of sub-sector analysis of Kepenek and Yentürk (2007) mentioned that the composition of export of manufactured goods has not been changed and import demand remained to be inelastic.

1.2 Summary of the Liberalization period 1980-2000

We will look to the Turkish economy briefly to give a clear realization with regards to what kinds of policies are pursued and how well the outcomes are achieved for the last thirty years. This part explicitly presents previous exchange rate and trade balance policies and their results, thus, it will support our empirical part with better understanding of the dynamics of foreign trade and the Turkish economy as a whole.

Due to unsuccessful disinflation policies, Turkish economy experienced relatively high levels of inflation during the 1980s and 1990s.

In 1980, the government put a program into action to liberalize economy, permanently reduce inflation and follow export-led growth policy. Shortly, the aim of this program was to put the economy on a sustainable growth path. The program reached its targets very soon in the sense of lower inflation, relatively liberalized foreign trade, higher GDP

growth and better financial system. The Turkish Lira was depreciated approximately 40 percent in real terms and several tax incentives were given to exporters. As a result of the increased openness of the economy, total exports to real gross domestic product (GDP) ratio increased from 4.1 to 13.3 percent. The total imports to real gross domestic product (GDP) ratio was also increased from 11.3 to 16.4 but the rate of increase was smaller than it was for export. After all, the balance of trade is improved significantly and external deficit decreased sharply from 7 percent to minus 1 percent that means external deficit turned to surplus at the end of the period. There was not any recession and the annual average rate of real GDP was 5.8 percent during the whole period of 1981-1989. The increase in industrial value added was on average 8.1 percent so it was well above the GDP annual growth rate. But level of inflation started to rise again after 1984 due to some internal political unsustainability. The structure of the disinflation policies was mainly based on nominal anchoring and monetary tightening during these years. On the other hand, there were not any actions for public sector borrowing requirements. In 1989, the capital account was fully liberalized and the combined elements of the policy required higher interest rates to secure short term capital inflows.

There has been seen relatively lower average growth rate and higher volatility and it let the Turkey be a suitable example of "boom-bust" growth performance for the period 1990-2000. There has been four recessions and the annual average real growth rate was 3.7. Debt financing policies and unsuccessful disinflationary efforts of the government were the main reasons of the low economic growth for this period. Also, capital account of the balance of payments showed that the economy became dependent on short term capital flows. The Turkish government tried to slow down the depreciation in Turkish Lira and it resulted in appreciation for 22 percent in 1990 and it continued to appreciate at a slower rate in 1991 and 1992. As a result, the rate of increase in exports slowed down and the rate of increase in imports accelerated thereby external deficit increased to 6 percent of the GDP in 1993. The first two recessions were experienced in 1991 and 1994 and the driving forces were unsustainable fiscal policy and the external deficit problem. Afterwards, Turkey's sovereign debt rate was lowered to below investment grade by international credit rating institutions. This event created panic atmosphere in financial markets. In 1994, a new stabilization and a stand-by agreement program with IMF were announced. The Turkish Lira was devaluated twice in 1994. Thus, export was increased and import was decreased and external balance was positive (surplus).

However, the government could not strongly follow the program and it came to an end in 1995. The depreciated nature of the Turkish Lira disappeared and appreciated approximately 22 percent in a very short time. Then, the external deficit started to dramatically rise to 6 percent in 1995 and remained the same in 1996 and 1997. In 1998 another disinflation program was started under the leadership of IMF Staff Monitored Program (SMP). After implementation of this program some improvements are achieved in inflation rate and fiscal imbalances but it could not ease the pressure on the interest rates. The last recession which is experienced in 1999 was mainly caused by Russian financial crisis and a devastating earthquake in Turkey. Due to extremely high interest rates and decreased domestic demand the external deficits were relatively low in 1998 and 1999. All the data are taken form Ertugrul and Selcuk (2001) and Akyurek (2006) and they provided more detailed account for the Turkish Economic history.

2.Theory

2.1 Elasticity Approach

All the approaches developed to explain effects of the exchange rate on the trade balance take the roots from the commonly known elasticity approach. The approach considers the exports and imports depending on the relative prices through the exchange rate. To be more precise, Rincon (1998) stated that the responsiveness of the export and import demand to a change in the value of a domestic currency composes the whole idea of the approach.

The elasticity approach is based on the two direct effects of devaluation/depreciation on the balance of current account. These two direct effects are named as volume effect and price effect. As the domestic currency devaluates or depreciates against the foreign currency, domestic goods get relatively cheaper for both domestic residents and foreigners. On the other hand, imported goods become relatively more expensive. Afterwards, this condition will lead to an increase in the volume of goods exported and decrease in the volume of goods imported and it is named as volume effect. As a result, trade balance will be improved.

On the other hand, due to devaluation/depreciation relatively more money will be spent in order to purchase one item of imported goods and this condition is named as price effect. While the volume effect works as a trade balance improving, the price effect works as a trade balance worsening. Eventually, Pilbeam (1992) mentioned that the net effect of the devaluation/depreciation on the trade balance depends on the that which of the two effects (volume or price effect) dominates the other one and it is decided with the elasticites of imports and exports demand.

The elasticity approach becomes popular with the given contributions by Marshall (1923) and Lerner (1944). It simply states that a real devaluation or a depreciation of the domestic currency will improve the trade balance if the sum of the elasticites, which are in absolute values, of the demand for imports and exports is greater than unity. It will be derived in detail in the following section.

2.2 Mathematical Derivation of the Marshall-Lerner Condition

The derivation is followed from the study of D. Salvatore (2011). Simply, the trade balance is the difference of the values of exports and imports expressed in foreign currency.

$$\mathrm{B} = V_X - V_M = Q_X \cdot P_X - P_M \cdot Q_M \quad \textbf{(1)}$$

Here in the equation above, B is the trade balance, P_X and P_M are the prices of exports and imports expressed in foreign currency, Q_X and Q_M are quantity of exports and imports, and V_X and V_M are the values of exports and imports expressed in foreign currency.

To see the change in trade balance after a small depreciation, differentiate the equation 1 by using product rule of differentials (see Alpha A. Chiang (1984)). That is,

$$dB = P_X \cdot dQ_X + Q_X \cdot dP_X - (P_M \cdot dQ_M + Q_M \cdot dP_M) \quad \textbf{(2)}$$

P_M does not change (dP_M=0) after a small depreciation in Turkish Lira the last term in the equation 2 drops out and then we have

$$dB = dQ_X \cdot P_X + Q_X \cdot dP_X - dQ_M \cdot P_M \quad \textbf{(3)}$$

Since the price elasticity of demand for export is used to measure the percentage change in quantity of exports (Q_X) for a given percantage change in price of exports expressed in foreign currency (P_X),

$$\eta_X = -\frac{dQ_X}{Q_X} \div \frac{dP_X}{P_X} = \frac{dQ_X}{Q_X} \div k\left(\frac{P_X}{P_X}\right) = \frac{dQ_X \cdot P_X}{Q_X \cdot k \cdot P_X} \quad \textbf{(4)}$$

Here, η_X is the price elasticity of demand for exports and k is the percentage of the depreciation of Turkish Lira $(-dP_X/P_X)$. Following the same way, price elasticity of demand for import (η_M) is

$$\eta_M = -\frac{dQ_M}{Q_M} - \frac{dP_M}{P_M} = \frac{dQ_M \cdot P_M}{Q_M \cdot k \cdot P_M} \quad \textbf{(5)}$$

In order to define the equation 3 in terms of price elasticities, required arrangements are needed to be made. From equation 4 we have

$$dQ_X \cdot P_X = \eta_X \cdot Q_X \cdot P_X \cdot k \quad \textbf{(6)}$$

That is the same with the first term in equation 3. For the second term in equation 3,

$$Q_X \cdot dP_X = Q_X \left(\frac{dP_X}{P_X}\right) P_X = Q_X(-k)P_X = -Q_X \cdot k \cdot P_X \quad \textbf{(7)}$$

Equation 5 is rearranged and finally third term in equation 3 is obtained as

$$dQ_M \cdot P_M = -\eta_M \cdot Q_M \cdot dP_M = -\eta_M \cdot Q_M \cdot P_M \cdot k \quad \textbf{(8)}$$

Here k is (dP_M/P_M). As it is mentioned before P_M remains constant (dP_M=0) in terms of foreign currency while it is positive in terms of domestic currency. If we put all the rearranged equations respectively 6, 7 and 8 into the equation 3, we have

$$dB = \eta_X \cdot Q_X \cdot P_X \cdot k - Q_X \cdot P_X \cdot k - (-\eta_M \cdot Q_M \cdot P_M \cdot k) \quad \textbf{(9)}$$

If we simplify equation 9,

$$dB = k[Q_X \cdot P_X(\eta_X - 1) + \eta_M \cdot Q_M \cdot P_M] \quad \textbf{(10)}$$

if

$$B = Q_X \cdot P_X - Q_M \cdot P_M = 0 \quad \textbf{(11)}$$

then

$$dB = k[Q_X \cdot P_X(\eta_X + \eta_M - 1)] \quad \textbf{(12)}$$

If the following inequality (13) is greater than zero, then *dB* becomes greater than zero (*dB*>0) as well.

$$\eta_X + \eta_M - 1 > 0 \; or \; \eta_X + \eta_M > 1 \quad \textbf{(13)}$$

Finally, this inequality satisfies the Marshall-Lerner condition.

2.3 Absorption Approach

A new body of analysis which is called absorption approach is developed against some limitations on the conventional elasticity approach. It was not presented as a rejection to the early Marshallian elasticity approach, opposed to that, it was introduced to integrate the elasticity approach with Keynesian focus on national income (Isard, 1995, p.95). The approach is modeled to investigate effects of devaluation on national income by Robinson (1947), Harberger (1950), Meade (1951), and Alexander (1952) in early 1950s. In general absorption approach entails two outcomes.

First outcome is that, according to absorption approach, depreciation effects real export which also effects real income and that eventually creates feedback effects on trade flows. The approach emphasized that the depreciation would lead to increase in home output and decrease in foreign output since it lowers the price of home goods. It is called substitution effect which allows shift in demand from foreign towards domestic production, Isard (1995).

Second outcome is called income effect which is opposite to the substitution effect. Simply, after a depreciation in home currency, increase in net export also increases home income which leads to increase in import through the marginal propensity to import. The final effect on trade balance is tied to the combination of substitution and income effects. According to Yeager (1970), absorption approach is less improving the trade balance in real terms compared to elasticity approach. In addition to this, substitution effect is expected to exceed the income effect. The logic behind this finding is that increase in net export will lead to increase in real income, and only a portion of this increase in income is expected to be consumed since the marginal propensity to absorb is expected to be less than one.

2.4 Monetary Approach

While the elasticity and absorption approaches regard the current account as central in the analysis of trade balance, the monetary approach designates the capital account at the back of trade balance effects. Robert A. Mundell (1968) was the first to use originally the term "monetary approach" in the literature and later some contributions are made by Whitman (1975), Magee (1976) and Kreinin and Officer (1978). According to the approach, money play crucial role, thereby, the balance of trade is determined by money and asset markets. As a result, changes in supply and demand of real money determine the changes in trade balance. (Buluswar et al., 1996).

According to the monetary approach, in the short run, devaluation increases the relative price of imports which also increases general price level in the home country. The idea is essentially derived from Hume's (1752) specie flow mechanism that is exogenous increase in the money stock leads to increased price level. In the literature, the mechanism is started with real money balances. As a result of the increased general price level after the devaluation, real money supply is reduced. Thereby, there appeared excess demand for money in the economy. Afterwards, the economic agents reestablished the real money balances by reducing spending and lowering consumption, finally, which yielded improved money account and trade balance in the economy, Krugman (1993). After the restored financial holdings is carried out, economic agents will start to increase expenditures and consumptions until the trade surplus is eliminated. Ultimately, monetary approach found that devaluation (nominal) had only temporary effect in the economy and there is no long run relationship between real exchange rate and trade balance, Bilquees (1989).

If we compare the monetary approach and absorption approach, they have exact opposite results regarding income effect for the trade balance. Monetary approach founds that increase in real income is improving the trade balance since increase in real income needs increased money demand by economic agents in order to fulfill higher needs of consumption. The resulting increased money demand exceeds the money supply, and as a result, it yields improved trade balance. On the other hand, absorption approach stated that increased real income, as a result of substitution effect, encourages the economic agents to increase import through the marginal propensity to import, thus, it has worsening effect on the trade balance.

3. Model

Although in the large majority of previous studies the balance of trade is measured by the difference of export and import, in recent years, it is found that working with the ratio of exports to imports or vice versa is more convenient. D. Boyd, G. M. Caporale, R. Smith. (2001) proved in their study that if the ratio method is used, in the logarithmic form it gives exactly the Marshall-Lerner condition rather than an approximation. And, if needed, the results can be transformed back in the form of difference. What is more, Bahmani-Oskooee(1991) stated in his study that the ratio method gave an answer to the long debate of whether the trade balance should be measured in terms of domestic or foreign currency. He also noted two another advantages of using exports to imports ratio as a measure of trade balance. First, it is insensitive to the units of measurement of export and import. And, second, it is insensitive whether exports and imports are in nominal or real terms.

Body and others (2001) based their study of testing the effect of real exchange rate on balance of trade on the model explained below.

In a simple form the ratio can be specified as:

$$B_t = {(P_t X_t)}\Big/{(P_t^* S_t M_t)} \qquad \textbf{(1)}$$

In the equation above the nominal exports to imports which is represented by B_t (trade balance) is given by the ratio of volume of exports, X_t, multiplied by domestic prices, P, and volume of imports represented as M, multiplied by foreign prices which is represented as, P^*, and also the nominal spot exchange rate which is S. An increase in the ratio is interpreted as an improvement while a decrease is interpreted as deterioration in trade balance.

If we take the equation 1 in the logarithmic form,

$$\ln B_t = \ln X_t - \ln M_t - (\ln S_t - \ln P_t + \ln P_t^*) \qquad \textbf{(2)}$$

Under the assumption of fixed foreign and domestic price levels, nominal exports and nominal imports;

$X = P^* \times X_t$ and $M = P \times M_t$

Real effective exchange rate is determined as;

$E = S \times P/P^*$,

where S is nominal effective exchange rate (number of units of domestic currency per unit of foreign currency, Bahmani-Oskooee and Malixi(1987)), P is the domestic price level and P^* is foreign price level. So the term in bracket in equation 2 which is $(\ln S_t - \ln P_t + \ln P_t^*)$ is just natural logarithm of real exchange rate. If we modify this equation, we have

$$\ln B_t = \ln X_t - \ln M_t - \ln E_t \quad \textbf{(3)}$$

Long run export and import demand equations are, respectively,

$$\ln X_t = \alpha_x + \beta^* \ln Y^* + \eta_x \ln E_t + \gamma_x t + \varepsilon_x \quad \textbf{(4)}$$

$$\ln M_t = \alpha_m + \beta \ln Y - \eta_m \ln E_t + \gamma_m t + \varepsilon_m$$

As it is mentioned in the theory section, in order to have improvement on the trade balance after a devaluation or depreciation, sum of absolute values of import and export demand elasticities should be greater than one$(\eta_X + \eta_M > 1)$.

If we put long run export and import demand equations into the equation number 3, for the long run trade balance, we have

$$\ln B_t = (\alpha_x - \alpha_m) + \beta^* \ln Y_t^* - \beta \ln Y_t + (\eta_x + \eta_m - 1) \ln E_t + (\gamma_x - \gamma_m)t + (\varepsilon_x - \varepsilon_m) \quad \textbf{(5)}$$

In case of an increase in $\ln E_t$ (depreciation), the coefficient of natural logarithm of real effective exchange rate which is $(\eta_x + \eta_m - 1)$ is going to yield the same result with as it does in Marshall-Lerner condition. To simplify long run trade balance, we rewrite equation 5 where$(\alpha_x - \alpha_m) = \alpha$,$(\eta_x + \eta_m - 1) = \eta$, $(\gamma_x - \gamma_m) = \gamma$ and $(\varepsilon_x - \varepsilon_m) = \varepsilon$,

$$\ln B_t = \alpha + \beta^* \ln Y_t^* - \beta \ln Y_t + \eta \ln E_t + \gamma t + \varepsilon \quad \textbf{(6)}$$

Eventually, deviation from long run trade balance can be shown as,

$$Z_t = \alpha + \beta^* \ln Y_t^* - \beta \ln Y_t + \eta \ln E_t + \gamma t - \ln B_t \quad \textbf{(7)}$$

In the equation above, it is expected for the parameter of foreign income (income of trading partner) to be positive because of that an increase in the income of trading partner could lead

to an increase in Turkish export. Identically, the parameter of domestic income is expected to be negative since an increase in domestic income could lead to an increase Turkish import. By the same logic, the parameter of real effective exchange rate is expected to be positive since an increase in real exchange rate represents a real depreciation of Turkish Lira. Accordingly, depreciation leads to increase in Turkish export and decrease in Turkish import so a positive effect on the balance of trade. But it should be noted under the consideration of J-curve hypothesis, in the short run, the parameter of real effective exchange rate should be negative.

As it is shown above, there are at least two model specifications in order to test Marshall-Lerner condition. The first one is based on estimating each demand equations separately (equation3). Marshall-Lerner condition will be valid if the summed price elasticities of each exports and imports in absolute terms are greater than one. This way of modeling approach is traditionally based on the theory.

Second, an alternative way is directly estimating the nonstructural equation which is equation 7. The advantage of following this way of modeling is that effect of the changes in the exchange rates on the trade balance can be tested without knowing the structural shape parameters. And it is important to note that the parameter (η) in the equation number 7 should be negative in order to see the validity of Marshall-Lerner condition.

4. Analysis

4.1Data

The data set covers the period from 1987 quarter 1 to 2013 quarter 3 for Turkey. The data is chosen for the period covering post-1980 just because the economy was closed and non-liberalized for pre-1980 period. The starting point which is 1987 quarter 1 is the earliest data available while the ending point which is 2013 quarter 3 is the latest data available for Turkish real GDP in the IMF *International Financial Statistics* database. Owing to the fact that GDP statistics is traditionally computed in every three months, this study used quarterly frequency for each data. Seasonally unadjusted data is used due to some problems induced by seasonally adjustment Ghysels and Perron (1993). One of the biggest problems is that the OLS estimator does not remain consistent in dynamic models after filtering all the series with the same adjustment filter.

The natural logarithm of the series is used in the model. Thereby, the variables are trade balance $\mathbf{ln}\, \boldsymbol{B_t}$ which is the natural logarithm of nominal export to import ratio. $\mathbf{ln}\, \boldsymbol{Y_t^*}$ is the natural logarithm of industrial production index of United States of America because of that in many studies it is used for a simplicity. $\mathbf{ln}\, \boldsymbol{Y_t}$ represents the natural logarithm of real gross domestic product (GDP) of Turkey. All the data for trade balance, foreign income and domestic income are in constant 2010 prices and originally derived from IMF *International Financial Statistics* database. $\mathbf{ln}\, \boldsymbol{E_t}$ is the natural logarithm of real effective exchange rate in constant 2010 prices. The data, in a form of index, is calculated by OECD. As it is mentioned before, simply, $\ln E_t$ equals to $\ln S_t - \ln P_t + \ln P_t^*$. The method employed by OECD based on geometric weighted averages of bilateral exchange rates adjusted by relative consumer prices. Additionally, weights used are determined by looking at the share of trading partners in Turkey's foreign trade.

4.2 Methodology

In this study, bound testing approach based on the estimation of Auto regressive distributed lag model (ARDL) is used to test the long run relationship between our dependent variable which is trade balance ($\ln B_t$) and independent variables which are foreign income ($\ln Y_t^*$), domestic income ($\ln Y_t$), and real effective exchange rate ($\ln E_t$) and also to determine the short run dynamics of the trade balance model. The advantage of Bound testing approach to co-integration analysis compare to other tests is that the long run and the short run dynamics of the model can be estimated separately. Moreover, before the unit root testing, it will be clearly seen from the table 1 in result section that the variables do not provide the cointegration with same levels of stationary. This condition (whether the series are I(0) or I(1)) provides feasibility for bound test cointegration approach based on ARDL model. Eventually, this condition puts away the feasibility of other co-integration tests.

Generalized Dickey Fuller (ADF) and Phillips-Perron (PP) unit root testing are used in order to determine the stationarity of the variables by employing two models, the first one is including only constant and the second one is including constant and trend. Later, the trend is found to be insignificant and removed from the model

Basically, ARDL approach to the co-integration testing requires the estimation of error correction version of ARDL model for the foreign trade balance and its determinants. ARDL approach is based on two stages. The first stage is based upon the bound testing, which is developed by Pesaran, Shin and Smith (2001) in order to specify if the variables are co-integrated or not. Modeling approach developed by Pesaran, Shin and Smith (2001) is followed and z vector can be written as follows,

$$z_t = (lnB_t, \ln Y_t^* , \ln Y_t , \ln E_t)' = (lnB_t, x_t')' \qquad \textbf{(9)}$$

In the equation of z vector above, as it is explained before, lnB_t represents the natural logarithm of the exports to imports ratio, $\ln Y_t$ represents the natural logarithm of domestic income, $\ln Y_t^*$ represents the natural logarithm of foreign income, and finally $\ln E_t$ represents the natural logarithm of real exchange rate.

Error correction model (ECM) for the bound testing can be written as follows,

$$\Delta \ln \beta_t = \alpha_0 + \pi_{bb} \ln \beta_{t-1} + \pi_{bx,x} x_{t-1} + \sum_{i=1}^{p-1} \psi_i' \Delta z_{t-i} + \delta' \Delta x_t + u_t \qquad \textbf{(10)}$$

In the equation above, α_0 is the autonomous parameter, π_{bb} and $\pi_{bx,x}$ represents long run multipliers, in addition to this, the lagged parameters of $\Delta \ln \beta_t$ and Δx_t represents represent short run multipliers, and finally u_t is the white noise error term. Bound testing is based on the assumption that there is no autocorrelation among the error terms. Accordingly, it is very important to decide optimal lag length of the VAR model. Especially, for the case of studies where limited time series data are used, Pesaran, Shin and Smith (2001) stated that it is very important to optimize the number of lags in order to lessen the problem of autocorrelation in the error term and also not to have over parameterized model. Thereby, there is a tradeoff between over parameterized model and autocorrelation problem. It is optimized by deciding on the optimum lag length.

For the testing the existence of relationship between $\ln B$ and x_t vectors, *F*-test (Wald test) is used under the hypothesis of no cointegration among the variables. The bound testing approach is based on the test for the existence of long run relationship, Pesaran, Shin and Smith (2001). Model will be estimated by the least squares method in order to determine whether the optimal number of lags should be added into the model or not.

Without knowing the level of stationarity, H_0 hypothesis (no long run relationship) will be rejected if *F*-statistics exceeds the upper critical value$[I(1)]$. H_0 hypothesis will be accepted if the *F*-statistics cannot exceed the lower limit$[I(0)]$. If the *F*-statistics remains between these critical values, it cannot be concluded. For this case Pesaran et al. (2001) suggested to know the level of stationarity of the variables.

At the second stage of the analysis, after the determination of the existence of long run relationship by using *F*-statistics, ARDL model, which is chosen after deciding on optimum lag length by looking on Akaike information criterion (AIK) and Schwarz information criterion (SC), will be estimated by least squares analysis. Thereby, long run equilibrium model will be created.

Short run dynamics will be available from the error correction specification of the ARDL model. In the time series analysis it is suggested that short run dynamics should be added into the long run relationship. It will only be possible with error correction model specification of the existing models.

4.3Results

For the unit root testing, results are given below in table 1.

Table 1: Unit Root Tests

Variables	ADF	PP
$\ln B$	-4.893[(a)]	-4.483[(a)]
$\ln Y$	-3.990[(b)]	-9.410[(a)]
$\ln Y^*$	-1.460	-1.479
$\Delta \ln Y^*$	-7.167[(a)]	-7.383[(a)]
$\ln E$	-3.284[(c)]	-3.210[(c)]

- for the ADF test, Mac Kinnon (1996) critical values are used.

- (a), (b) and (c) shows the rejection of H_0 hypothesis at 1%, 5% and 10% significance level respectively.

In table 1, the results of the ADF and PP tests show that the variables are stationary from different levels. Obviously, the cointegration tests of Engel-Granger (1987), Johansen (1988) and Johansen-Juselieus (1990) cannot be employed in the testing of long run relationship since these tests demand the variables to be stationary at the same levels.

In the first stage of the analysis, in order to investigate the existence of long run relationship between trade balance and its determinants, equation number 10 is estimated for p=1,2,3 and 4 by least squares technique. Additionally, all the models with different number of lags are tested for the existence of Autocorrelation and Heteroskedasticity. In the table.2 below, results are given for the Akaike information criterion (AIC) and Schwarz criterion (SC). In order to compare the results for the different number of lag lengths, the first four observations in the sample is ignored and the same period is used for all the estimations (1988:1-2013:3).

Correct determination of the lag length is crucial for the method to give correct results. Moreover, Bahmani-Oskooee and Brooks (1999) showed that the results of the F-statistics are sensitive to the determination of the lag length. In order to determine long run relationship, appropriate model should be chosen according to AIC and SC values. In the table.2 below it is showed that the minimum values of AIC and SC are matched to the different lag lengths. According to Akaike information criterion, the model with 4 lags is accurate. On the other hand, according to Schwarz criterion, the model with one lag is accurate. Also, as it is

mentioned before; the most vital assumption of the bound testing approach is that error terms should not have autocorrelation. Accordingly, LM test results are important to give a decision. Results of the autocorrelation test showed that the models do not have autocorrelation and this is in line with the assumption of the approach. On the other hand, ARCH effect is tested and there is found ARCH effect for the model with four lags. Eventually, it is eliminated and the model with one lag is chosen to investigate long run relationship.

Table 2. Statistics for the choice of lag length

p	AIC	SC
1	-2.022	**-1.744***
2	-2.043	-1.687
3	-2.143	-1.708
4	**-2.171***	-1.656

Table 3. F-statistics for the long run co-integration test

p = 1	F-statistics = 5.031

Critical Value Bonds of the F-statistics

k	**90% level**		**95% level**		**97.5% level**		**99%level**	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
4	3.47	4.45	4.01	5.07	4.52	5.62	5.17	6.36

In the table above, there is F-statistics for the long run relation test of the foreign trade model. In the first phase of the bounds testing, result of the F-statistics will be compared with the critical values which are given in the study of Pesaran et al. (2001). Consequently, F-statistics (5.031) which is calculated at k = 4 (number of indebendent variable) exceeds the upper critical value at 10% significance level. Thereby, the null hypothesis that is there is no long

run relationship among the variables will be rejected without taking into account that variables are I(0) or I(1). As a conclusion, it is found that there is long run relationship in foreign trade balance with domestic income, foreign income and real effective exchange rate.

In the second phase of the analysis, the long run ARDL trade balance model which is determined after investigating the optimum lag length is estimated by using least square technique. As it is mentioned before, in order to discuss the existence of long run Marshall-Lerner condition for Turkish economy, Boyd et al. (2001) suggested that η should be lower than zero in the equation number 6. Our least square estimation of the model gave the result of that the coefficient of real exchange rate is statiscally significant and -0.392 which is in line with the theory ($\eta < 0$). Accordingly, there is found an evidence for the validity of Marshall-Lerner condition for the Turkish economy.

Table 4. error correction model specification of the ARDL (1010)

Variable	Coefficient	t-statistics
C	0.005	0.521
ΔlnY	-0.258	-4.546
ΔlnY(-1)	0.212	3.765
ΔlnY*	-0.586	-0.885
ΔlnY*(-1)	-0.200	-0.308
ΔlnE	**-0.474**	**-3.455**
ΔlnE(-1)	-0.293	-2.099
ECT(-1)	**-0.142**	**-1.252**

For the validity of J curve hypothesis, coefficient of ΔlnE should be positive in the error correction specification of the ARDL model. In the table 4 it is given that ΔlnE is statically significant but has negative sign. Therefore, for the period covering 1987:1 and 2013:3, it is found that there is a long run relationship among the variables, an evidence for the validity of Marshall-Lerner condition and no J curve effect after the devaluations in Turkey.

5. Conclusion

In the economics literature, the effect of real exchange rate on the trade balance is analyzed in different countries and country groups by employing various model specifications and econometric approaches. Even though there are a great number of theoretical and empirical studies regarding the effectiveness of the devaluation or depreciation on the trade deficit, there has not been seen a consensus whether devaluation or depreciation is trade balance improving or not. It is found that Turkey, after the structural changes to liberalize and open the economy during 1980s, could not attain the initially set targets, thereby, met with 1994 and 2001 crises which are resulted in long lasting devaluations. The reason is named as weakly coordinated exchange rate, fiscal and monetary policies. Therefore, devaluation/depreciation is seen as an instrument to lessen the trade deficit during the crises.

In this study it is aimed to find short run and long run effects of real exchange rate on the trade balance for the Turkish economy. For this aim, the latest econometric methods in the time series analysis are employed to see the latest results. ARDL approach to cointegration is used in the analysis. In the first stage of the analysis, bound testing which is developed by Pesaran et al (2001) gave the result of that trade balance, real exchange rate, domestic income and foreign income are cointegrated in the long run. Thereby, according to bound testing, at %10 significance level, there is found an evidence for the validity of Marshall-Lerner condition in Turkish economy. On the other hand, error correction specification of the ARDL model showed that there is no validity for J-curve hypothesis in the case of Turkey. This result casts doubt on the elasticity approach which is based on the idea that short run supply and demand elasticities are smaller than it is in the long run.

Liberalization in the foreign trade provided advantage for the domestic economy to use cheaper imported inputs in the industrial sector. With outward oriented growth policies, exports sector gained acceleration. On the other hand, because of the high dependency of exports sector on the imported inputs, import sector also gained acceleration parallel with exports. Thereby, despite the fact that manufacturing sector supported the foreign trade volume, the value added and the effects on the employment remained limited. Eventually, import demand of Turkey is relatively inelastic, thus, it is unresponsive to

the changes in the exchange rate. In addition to this, cyclical increases in the prices of petrol and raw materials caused deteriorations in the trade deficit. It can be concluded that the policies based on the aim of preventing imports will not be effective. Instead, high value added production in the exports sector should be encouraged. Primarily, Turkey should increase its competitiveness in the international trade arena. In order to attain competitiveness target, incentives should be implemented towards research and development activities. In addition to this, policy makers should lay emphasis on the importance of institutionalization for the small and medium sized enterprises to attain the competitive power target. Additionally, in order to preserve the balance of trade and current accounts from the external and internal shocks, diversification of the product and trade partner group should be increased, and also, monetary and fiscal policies should be implemented coordinately.

6. References

- A. Lerner, *The Economics of Control* (London: Macmillan, 1944).

- Akbostancı, E. (2002), Dynamics of the Trade Balance: The Turkish J-Curve, *ERC Working Papers in Economics*, 01/05, pp. 1-19.

- Akyurek, C., (2006), The Turkish Crisis of 2001: A Classic?, *Emerging Markets Finance and Trade*, 42, 5-32

- Alexander, S.S. (1952), Effects of Devaluation on the Trade Balance, *International Monetary Fund Staff Papers*, April, 2, 263-278. Reprinted in Caves, Richard and Johnson, Harry G., eds. (1968). *Readings in International Economics*, Homewood, Ill.: Irwin.

- Alpha A. Chiang, *Fundamental Methods of Mathematical Economics* (Tokyo: McGraw-Hill, 1984), ch.7 (sect.7.2).

- A. Marshall, *Money, Credit and Commerce* (London: Macmillan, 1923).

- Bahmani-Oskooee, M., (1985), "Devaluation and the J-curve: Some Evidence from LDC's*", The Review of Economics and Statistics*, 67, 500-5004.

- Bahmani-Oskooee, M., (1991) "Is There a Long-run Relation between the Trade Balance and the Real Effective Exchange Rate of LDCs?" *Economics Letters*, Elsevier, vol. 36(4), pp. 403-407.

- Bahmani-Oskooee, M., Brooks, T., (1999). Bilateral J-curve between U.S. and her Trading Partners, *Weltwirtschaftliches Archiv*, 135(1), 156-165.
- Bahmani-Oskooee, M., Goswamı, G.G., Talukdar, B.K. (2005), "The Bilateral J-Curve: Australia Versus her 23 Trading Partners", *Australian Economics Papers*, Wiley Blackwell, vol. 44(2), pages 110-120, 06.
- Bahmani-Oskooee, M., Kantipong, T., (2001) "Bilateral J-curve between Thailand and her Trading Partners", *Journal of Economic Development*, 26, 107.117.
- Bahmani-Oskooee, M., Malixi, M., (1987), "Effects of Exchange Rate Flexibility on the Demand for International Reserves", *Economics Letters* 23, 89-93.
- Bahmani-Oskooee, M. and Ratha, A., (2004), "The J-curve Dynamics of U.S. Bilateral Trade", *Journal of Economics and Finance*, vol.28, pp. 32-38.
- Bahmani-Oskooee, M., and Wang, Y., (2006), The J-Curve: China Versus Her Trading Partners, *Bulletin of Economic Research*, 58(4), 323-343.
- Bilquees, F. (1989), Monetary Approach to Balance of Payments: The Evidence on Reserve Flow from Pakistan, *Pakistan Development Review*, autumn, 28(3), 195-206.
- Binatlı, A. O. and Sohrabji, N., (2009), Elasticities of Turkish Exports and Imports, *Izmır University of Economics Working Papers*, No: 0906.
- Boğa, A., (2006), Cumhuriyetimizin 80.Yılında İhracatımız, *Cumhuriyet'in 80.Yılı Sempozyumu Bildirileri*, (23-25 Ekim 2003), Ankara, Gazi ATAUM yayını.
- Buluswar, M. D., Thompson, H., Upadhyaya, K. P., (1996). Devaluation and the Trade Balance in India: Stationarity and Cointegration, *Applied Economics*, 28: 429-432.

- Brada, J. C., Kutan, A. M., and Zhou, S., (1997), The Exchange Rate and the Balance of Trade: The Turkish Economy Experience, *The Journal of Development Studies*, Vol.33, No.5, pp. 675-692.

- D. Boyd, G. M. Caporale, R. Smith. (2001), "Real Exchange Rate Effects on the Balance of Trade: Cointegration and the Marshall-Lerner Condition. *International Journal of Finance and Economics*, 6, 187-200.

- D. Salvatore, *International Economics Trade and Finance*, 10th ed. (Singapore: WILEY, 2011), ch. 16.

- Engel, R., Granger, C. (1987) Cointegration and Error Correction: Representation, Estimation, and Testing, *Econometrica*, 55, 251-276.

- Ertugrul, A., adnd Selcuk, F., (2001), A brief account of the Turkish Economy, 1980-2000, *Emerging Markets Finance and Trade*, 37, 6-30.

- Ghura, D., and Grennes, T., (1994), Aggregate Trade Response to Economy-Wide Distortions in Sun-Saharan Africa, *Journal of African Economies*, 3(3): 359-386.

- Goldstein, M., and Khan, M.S., (1985), Income and Price Effects in Foreign Trade, *In Handbook of International Economics*, Jones, R.W. and Kennen, P.B., Eds., Amsterdam: North Holland, Vol. II, Chapter 20.

- Gysels, E., Perron, P., (1993), the Effect of the Seasonal Adjustment Filters on Tests for a Unit Root, *Journal of Econometrics*, 55(1-2):57-98.

- Halicioğlu, F., (2007), "The Bilateral J-curve: Turkey versus her 13 Trading Partners", *Munich Personal RePEc Archive*, June, 3564.

- Hepaktan, E. (2009), Türkiye'nin Marshall-Lerner Koşuluna İlişkin Parçalı Eşbütünleşme Analizi, *Yönetim ve Ekonomi*, Celalbayar Üniversitesi, Sayı: 1, ss. 39-55.

- Hume, D., (1752), Balance of Trade, *Essays Moral, Political and Literacy*, Vol.1, Reprinted, London: Longman Green.

- Isard, P., (1995), *Exchange Rate Economics*, UK: Cambridge University Press.

- Johansen, S., (1988), Statistical analysis of cointegration vectors, *Journal of Economic Dynamics and Control*, 12(1), 231-254.

- Johansen, S., Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration with application to the demand for money, *Bulletin of Economics and Statistics*, 52, 169-210.

- Kale, P., (2001), "Turkey's Trade Balance in the Short-Run and the Long-Run: an Error Correction Modeling and Cointegration", *The International Trade Journal*, 15, 27-56.

- Kepenek, Y. and Yentürk, N., (2007), *Türkiye Ekonomisi*, 20.Basım, Remzi Kitabevi, İstanbul.

- Kreinin, M.E., L.H. Officer (1978), The Monetary Approach to the Balance of Payments: A Survey, *Princeton Studies in International Finance*, No. 43, International Finance Section, Department of Economics, Princeton University, Princeton, New Jersey.

- Krueger, A.D (1983), *Exchange Rate Determination*, Cambridge University Press.

- Krugman, P. R., (1993), Recent Thinking about Exchange Rate Determination, *Reserve Bank of Australia* (on-line). http://www.rba.gov.au/PublicationsAndResearch/Conferences/1993/Krugman.pdf, (October 8, 2002).

- Krugman, P.R., and Baldwin, R.E., (1987), The Persistence of U.S. Trade Deficit, *Brookings Papers on Economic Activity*, 1: 1-43.

- Leonard, G. and Stockman, A. C. (2001), "Current Accounts and Exchange Rates: A New Look at the Evidence", *NBER Working Paper,* no:8361, NBER.

- Magee, S.P. (1973), "Currency Contracts, Pass Through and Devaluation," *Brooking Papers on Economic Activity*, 1, 3003-325.

- Magee, S.P. (1976), The Empirical Evidence on the Monetary Approach to the Balance of Payments and Exchange Rates, *American Economic Review*, May, 66(2), 163-170.

- Marwah, K. and Klein, L.R. (1996), "Estimation of J-curves: United States and Canada", *Canadian Journal of Economics*, vol. 29, pp. 523-539.

- Mundell, R.A., (1968). Balance of Payments, In Sills, D.L., ed., *International Encyclopedia of the Social Sciences*. Vol. 8. pp. 1-11. USA: Crowell Collier and Macmillan, Inc.

- Panagariya, A., Shan, S., and Mishra, D., (2001), Demand Elasticities in International Trade: Are They Really Low?, *Journal of Development Economics*, 64:313-342.

- Peker, O., (2007), Reel Döviz Kurunun Dış Ticaret Üzerindeki Kısa ve Uzun Dönem Etkilerinin Ekonometrik Analizi: Türkiye Örneği, *8. Türkiye Ekonometri ve İstatistik Kongresi*, 24-25 Mayıs, İnönü Üniversitesi, Malatya.

- Pesaran, M., Shin, Y., Smith, R., (2001), Bounds Testing Approaches to the Analysis of Level Relationships, *Journal of Applied Econometrics*, 16, 289-326.

- Pilbeam, K., (1992), *International Macroeconomics*, London: Macmillan Press, Ltd.

- R. M. Stern, *The Balance of Payments* (Chicago: Aldine, 1973), pp. 62-69.

- Rincon, H., (1998), Testing the Short Run and Long Run Exchange Rate Effect on Trade Balance, *Submitted PhD Thesis*, University of Illinois, Urbana-Champaign.

- Rose, A.K, and Yellen, J.L. (1989), "Is There a J-curve?", *Journal of Monetary Economics,* vol.24, pp.53-68.

- Sinha, D., (2001), A Note on the Trade Elasticity in Asian Countries, *The International Trade Journal*, 15(2).

- Tang, T., (2004), A Reassessment of Aggregate Import Demand Function in the ASEAN-5: A Cointegration Analysis. *International Trade Journal*, 18(3), 239-268.

- Tang, T., (2005), Are Malaysian Exports and Imports Cointegrated ? A Comment. *Sunway Academic Journal*, 2, 101-107.

- Taşkın, M., (2003), 1923-2003 Döneminde Türkiye Cumhuriyeti'nin Dış Ticaret Politikaları, *Dış Ticaret Dergisi*, Özel Sayı, (Ekim-03).

- Togan, S., and Berument, H., (2007), The Turkish Current Account, Real Exchange Rate and Sustainability: A Methodical Framework, *The Journal of International Trade and Diplomacy*, 1: (1), pp. 155-192.

- Whitman, M.N. (1975), Global Monetarism and the Monetary Approach to the Balance of Payments, *Brookings Papers on Economic Activity*, 3, 491-555.

- Yeager, L. B., (1970), Absorption and Elasticity: A fuller Reconciliation, *Economica*, (145):10-68.