

**CHANGES IN EXCHANGE RATES AND THE BALANCE OF TRADE:  
A LITERATURE SURVEY WITH REFERENCE TO TURKEY'S  
FOREIGN TRADE**

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**Abstract:** Growing trade deficit has been one of the major problems of the Turkish economy since 1950s. This study attempts firstly to make a brief review of the theoretical literature on the relationship that exists between the trade balance and exchange rates. Secondly, the main purpose of this study is to compare a group of selected empirical studies on Turkish foreign trade and exchange rates, by considering their sample period, data frequency, econometric methods, modelled variables and empirical results. The survey of the empirical studies refers to that the debate about the effects of exchange rates changes on Turkey's trade balance is inconclusive.

**Key Words:** Exchange rates, approaches to the balance of trade, Turkey's foreign trade.

**DÖVİZ KURLARINDAKİ DEĞİŞİMLER VE DIŞ TİCARET DENGESİ:  
TÜRKİYE'NİN DIŞ TİCARETİNE İLİŞKİN BİR LİTERATÜR  
İNCELEMESİ**

**Özet:** Gittikçe büyüyen dış ticaret açığı 1950'li yıllardan bu yana Türkiye'nin en önemli problemlerinden biri haline gelmiştir. Bu çalışma, öncelikle dış ticaret dengesi ile döviz kurları arasındaki ilişkiye dair teorik literatürün özet biçimde incelenmesini amaçlamaktadır. İkinci olarak çalışmamızın temel amacı, Türk dış ticareti ile döviz kurları ilişkisi üzerine seçilmiş bir grup ampirik çalışmayı, örneklem dönemi, veri frekansı, ekonometrik yöntemleri, modellenen değişkenleri ve ampirik sonuçlarını göz önüne alarak incelemektir. Ampirik çalışmalara ilişkin inceleme, döviz kurlarındaki değişimlerin Türkiye'nin dış ticaret dengesi üzerindeki etkileri konusundaki tartışmada kesin bir yargıya varılmadığına işaret etmektedir.

**Anahtar Kelimeler:** Döviz kurları, dış ticaret dengesine ilişkin yaklaşımlar, Türkiye'nin dış ticareti.

**I. Introduction**

For open economies, the choice of optimal policy tools is of significance when determining their foreign trade policies. Exchange rates, as being among these policy tools, have the ability to influence trade flows. Therefore, the relationship between foreign trade and exchange rates is a fundamental issue in open economy macroeconomics. There exists a wide range of studies concerning this relationship in the literature. Nevertheless, the issue of whether exchange rates are effective policy tools in determining trade flows is debated.

In theory, there are several approaches focusing on this relationship. The elasticity approach is the most commonly known of them and its theoretical

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and policy implications are still at the center of discussions in international trade today. At the same time, its failure to take into account the repercussions of exchange rate changes, the dynamics of the trade balance and other factors that affect relative price changes has led to the rise of many alternative approaches. These alternative approaches have also brought a new insight with regard to the arguments for and against the effects of exchange rate changes on the trade balance.

In Turkey, exchange rates are used as instruments in conducting foreign trade policy from time to time. Growing trade deficit has been one of the major problems of the Turkish economy since 1950s and there have been attempts to correct trade imbalances with the help of exchange rate policies. On the other hand, the success of these policies in achieving trade balance adjustments is subject to empirical research. As in many countries, the problems concerning open economies may call forth a limited possibility for exchange rate policies in directing foreign trade. In case of Turkey, some of these problems, which could also be taken as the factors behind Turkey's persistent trade deficit, can be summarized as follows:

- *Dependence of industrial production largely on imported inputs:* Industrialization policies followed by Turkey display a growing need for imports. Most of Turkey's imports consist of capital and intermediate goods. This dependence makes Turkey's import demand relatively inelastic and unresponsive to exchange rate policies (Taşkın, 2003: 10).
- *Exchange rate policies that are incompatible with the long-term targets of foreign trade:* Though the governments intend to create a trade surplus by encouraging exports, policies applied are not always in line with those targets. An overvalued domestic currency, for example, not only has discouraging effects on exports but also has triggering effects on import demand (Boğa, 2003: 51).
- *For the pre-1980 period, large share of agricultural goods in total exports:* Agricultural goods have inelastic supply. Since Turkey's exports in the pre-1980 period largely consist of agricultural goods, exchange rate policies did not have much effect on the export volume.
- *For the post-1980 period, slow industrial development:* Despite the fact that the volume of trade has grown rapidly in the post-1980 period, the composition of trade flows has remained more or less the same. The main sector analysis proves that the share of agriculture in total exports has decreased to a large extent while the share of industry has risen accordingly. Yet, the sub-sector analysis shows that Turkey's exports of manufactured goods have not changed in terms of their composition (Kepenek and Yentürk, 2007:

332). Due to the low development of industrial sector, Turkey has not yet expanded her product range in favor of technology-intensive products. Consequently, the expected boom in the volume of exports could not be achieved by exchange rate policies whereas import demand has remained relatively inelastic.

All those might, to some extent, be the reasons of why exchange rate policies have limited effects on Turkey's trade balance. Yet, the relationship between exchange rates and foreign trade is an empirical issue and thus subject to data-based research. There are various studies focusing on this relationship. The results of these studies, on the other hand, vary depending on the nature of data used, the method of data analysis and the time period under consideration.

In this paper, we attempt to survey the existing literature about Turkey's foreign trade and exchange rates. In Section 2, we first make brief a review of approaches that focus on the trade balance exchange rate relationship within the theoretical context. After examining them, we go over the selected empirical studies about Turkish foreign trade and exchange rates in Section 3. Those studies are assessed and compared in terms of their empirical models, the variables chosen within these models, testing procedures and the results they arrive. Lastly, in Section 4 we summarize the survey and conclude.

## II. A Review of Approaches to the Balance of Trade

Approaches that focus on the trade balance exchange rate relationship take their roots from the *elasticity approach*. The elasticity approach is the most commonly known of these approaches and emphasizes the role of relative prices in trade balance adjustments by considering imports and exports as being dependent on relative prices through the exchange rate. The elasticity approach considers the responsiveness of export and import demand to a change in the value of a nation's currency. It simply applies the price elasticity of demand principle to international trade. The core idea of the approach is the substitution effect induced by relative price changes caused by a change in the exchange rate (Rincon, 1998: 7). When a domestic currency devalues against foreign currencies, goods that are produced domestically become relatively cheaper for both the residents of the country and the foreigners. On the other hand, foreign goods become relatively more expensive for both the foreign residents and domestic buyers. If, in such a case, the elasticities of demand for exports and imports are large enough, the devaluation will lead to a rise in the volume of exports and a fall in the volume of imports, resulting in an improvement in the balance of trade. The elasticity approach has become popular with the contributions of Marshall (1923) and Lerner (1944). Thus, in the literature, the elasticity approach is reconciled with the commonly known *Marshall-Lerner condition*.

The Marshall-Lerner condition states that a *real* devaluation improves the trade balance of a country if the sum of the elasticities of import and export demand is greater than one (in absolute value). It deals with the direct quantity responses of export and import demand to relative price changes induced by a currency devaluation (or depreciation); that is, as long as an exchange rate change could alter the relative prices (i.e. the price of foreign good in terms of domestic good), expenditure switching effects will occur. Thus, the fundamental idea of the condition is that a change in the nominal exchange rate can affect the trade balance only by changing the 'real' exchange rate (Kenen, 1989: 298-300). This further requires that after devaluation both the domestic and foreign price levels remain constant. This is one of the implicit assumptions required for the validity of the condition. Another implicit assumption behind the Marshall-Lerner condition is that income remains constant after devaluation so there assumed to be no income induced changes on the trade balance resulting from devaluation; that is, only the substitution effect occurs (Salasevecius and Vaicius, 2003: 13).

The *Harberger-Laursen-Metzler Effect* (the HLM effect, in short) is an alternate approach to the exchange rate trade balance relationship. The HLM effect emphasizes the effect of devaluation (or depreciation) on the terms of trade of a country and by this way; it questions the income effects caused by the terms of trade changes. The proposition was developed by Harberger (1950) and Laursen and Metzler (1950) and postulated that a worsening of the terms-of-trade decreases real income and the decrease in real income reduces saving out of a given income, which in turn leads to a deterioration of the trade balance.

The HLM effect, in fact, refers to one of the two effects of exchange rate changes. When a domestic currency devalues, as proposed by the elasticity approach, substitution effect occurs since the domestic buyers switch their expenditures from relatively expensive imported goods towards the domestic ones. Thus, substitution effect contributes to improving the trade balance. On the other hand, devaluation of the domestic currency worsens the terms-of-trade, which, in turn, reduces real income and causes saving to fall. Thus, income effect, as opposed to substitution effect, contributes to deterioration of the trade balance. This income effect is known in the literature as the HLM effect (Yamak and Korkmaz, 2006: 59).

Another alternative to the balance of trade theories is the *absorption approach* which was introduced to the literature by Alexander (1952). The approach views the trade balance as the difference between what the economy produces and what it takes for domestic use or absorbs (Husted and Melvin, 1990: 427). Thus, it focuses on how domestic spending on domestic goods changes relative to domestic output when analyzing the effects of exchange rate changes on the trade balance. As Machlup (1955) stated the expenditures of households, business and the government are the part of the national income that is being absorbed. Thus, we can define *absorption* (A) as being equal to

consumption (C) + investment (I) + government expenditures (G). Then, it follows that;

$$Y \equiv A + NX \quad \text{or equivalently;} \quad (1)$$

$$NX \equiv Y - A \quad (2)$$

where NX is the net exports and Y the national income. The core of the absorption approach is the proposition that any improvement in the trade balance (e.g. after devaluation) requires an increase of income that exceeds the increase in total domestic expenditures (Rincon, 1998: 16); or,

$$\Delta NX \equiv \Delta Y - \Delta A \quad \text{when } \Delta Y > \Delta A \quad (3)$$

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where “ $\Delta$ ” denotes the change in the trade balance, total income and absorption, respectively. The approach argues that changes in relative prices brought about by devaluation shifts both the domestic and foreign demand towards relatively cheaper goods of the devaluing country. The total increase in the demand for domestic goods eventually raises the country’s national income. Nevertheless, the idea particular to the absorption approach is that further income-induced changes in absorption: the rise in the national income creates additional demand for goods, which in turn, causes an induced increase in expenditures. The resultant effect on the trade balance will depend on the relative magnitudes of these initial and induced effects.

According to Alexander (1959), these induced effects, which he called as reversal factors, reduce the effects of devaluation on the trade balance by operating against the initial effects. Similarly, Brems (1957) attempted to show that in a case where domestic output is over-expanded, devaluation may fail to correct trade imbalances. Thus, he concluded that “elasticity optimism does not imply devaluation optimism” (Brems, 1957: 64).

When compared with the elasticity view, the absorption approach is more comprehensive in the sense that it incorporates both the substitution and income effects of exchange rate changes for the trade balance analysis. In this respect, one notable contribution of this approach is to the economic policy area. The absorption approach allows for an analysis that is associated with constructing policy-oriented models to show how expenditure-reducing policies (e.g. tight monetary/fiscal policies) should be adjusted to make room for the expenditure-switching effects of an exchange rate change (Kenen, 1989: 302).

Despite the fact that strong theoretical foundations provide as a guide to understanding how exchange rates act in remedying external imbalances, the debate about the effectiveness of exchange rates as a policy tool still remains. Large and persistent foreign trade imbalances that most of the industrial

countries have been facing might raise doubts about the role of exchange rate changes in the external adjustment processes. All these arguments are referred to what has known in the literature as the *exchange rate pessimism*.

Pessimism about the ineffectiveness of exchange rates traces back to the belief that external imbalances can not be corrected by exchange rate changes because export and import demand elasticities are quite low. Estimation of these elasticities is subject to empirical research. There exist substantial empirical studies on this issue, yet empirical evidence shows no common pattern of the size of trade elasticities. Estimations seem to differ depending on the country, level of development, length of estimation period and the estimation method. This view, namely, the *elasticity pessimism*, was first introduced to the literature by Machlup (1950) and has become commonplace as being one of the main causes of exchange rate pessimism today.

Another strand of exchange rate pessimism includes concerns about whether there exists a stable relationship between the exchange rates and the prices of traded goods. Within the conventional view, as long as demand elasticities are large enough, exchange rates can be used as effective policy tools in external adjustment. However, the conventional view suggests that trade prices should change one-to-one along with a currency devaluation. That is a one-to-one increase in the prices of imported goods for the home country (and a corresponding fall in the prices of exported goods for the rest of the world) is crucial for expenditure switching effects and trade balance improvement. On the other hand, responsiveness of trade prices to exchange rate changes is a controversial issue.

Conventional open economy models assume that changes in exchange rates completely *pass through* to the prices of imports and exports (Irandoost, 1999: 355). Degree of pass through is of importance to evaluate the expenditure switching effects of exchange rate changes from the point of view of the foreign trade policy. In this respect, the extent of pass through being other than unity makes sense in explaining the inefficacy of exchange rates. Studies carried out in the 1980s proved that the Marshall-Lerner condition was fulfilled in most of the developed economies, yet external imbalances in those countries could not be offset by currency depreciations. Consequently, these empirical findings have shifted the attention of researches from the elasticity considerations (i.e. responsiveness of trade flows to changes in real exchange rates) to pass through effect (i.e. success of nominal exchange rate changes in affecting real exchange rates) as of 1990s (Aldemir, 2007: 54-55).

Kenen (1989) asserts that a change in the nominal exchange rate can affect the trade balance only by changing the real exchange rate. Nonetheless, in reality, the correspondence between the nominal and real exchange rate movements, as opposed to what the theory suggests, is said to be less than perfect even in the short run (Krugman and Obstfeld, 2003: 465). In case of an *incomplete* pass through, the full proportion of the exchange rate change is not

reflected in trade prices, so expenditure switching effects do not arise. This occurs especially when foreign sellers of imported goods lower their foreign currency price to residents of a devaluing country. In periods of a depreciated currency, a fall in the foreign currency prices of imports weakens the expected negative effects of this exchange rate policy on imports. If there exists a correlation between the real exchange rate changes and the foreign currency prices of imports, this points to the fact that the price advantage of domestic sellers acquired by the movements of real exchange rate is absorbed (partially or fully) by foreign sellers. This fact neutralizes the benefits of real exchange rate movements which aims the profitability of foreign trade (Zengin, 2000: 29).

The emergence of new open economy models has exacerbated the arguments about beneficial role of exchange rate changes in promoting international adjustments. These micro-founded intertemporal models allow for a rigorous analysis of exchange rate policies. Contrary to the conventional ones, these models have been established in consistence with the recent evidence that market imperfections, price rigidities and strategic interactions among firms are of significance in explaining trade flows (Irاندoust, 1999: 356). Obstfeld (2002) states that strategic interactions among domestic producers and competing producers of imports could cause import prices to be unresponsive to exchange rate changes. This practice, which is known in the literature as *pricing-to-market* (PTM), is possible especially when markets are internationally segmented, so that resale arbitrage is limited (Obstfeld, 2002: 27). PTM is a type of third-degree price discrimination that enables firms to charge different prices in different export destinations.

### III. Empirical Studies on Turkey's Foreign Trade and Exchange Rates

Turkey has experienced a radical change in her foreign trade strategy in 1980. From this point of view, examining the history of the Turkey's foreign trade within two separate time periods (pre- and post-1980 period) is commonplace in the literature. In the pre-1980 period, fixed exchange rate regimes and import-substitution policies were prevalent in the Turkish economy. On the other hand, following fixed exchange rates caused an overvaluation of the Turkish lira from time to time. This, in turn, induced Turkey to face balance of payments crisis and to devalue its currency for several times in the pre-1980 period. However, with the stabilization program that came into effect in the January 24<sup>th</sup> 1980, Turkey left the import-substitution policies for the sake of adopting export-oriented industrialization policies and entered a new era of liberalized foreign trade. The aim of these policies was to support the industrial sectors that Turkey had relatively higher competitive power within the world market. This meant a structural change in Turkey's foreign trade policy. Not only exports would be promoted but also imports would be liberalized to a large extent. In the post-1980 period, the exchange rate policy was also changed in accordance with a more liberalized financial system. These

decisions included not only short-term measures for economic stability but also a development strategy that was required to be maintained in the long-term. For this reason, the January 24<sup>th</sup> decisions were, in general, a turning point for Turkey in terms of economic policies.

The literature on the empirical studies of the relationship between exchange rates and foreign trade is rich and varied. Generally, the role of exchange rates in affecting the trade balance or, more specifically exports and imports is examined empirically in different groups of studies. There is a vast amount of the literature focuses on the direct link between those variables. In this study, we attempt to make a brief review of a group of selected studies of this kind in case of Turkey. Findings of these studies exhibit no common pattern regarding the role of exchange rates in determining trade flows. Instead, they vary depending on their sample period, data frequency, empirical methods and modeled macroeconomic variables (See: Table 1 on page 12). We classify and compare the studies selected depending on whether they support the relationship between the changes in exchange rates and the trade balance, trade volume or the volume of exports and imports, or not .

The first group of studies selected consists of the examples that yield, one way or the other, positive results in terms of the exchange rate –foreign trade relationship. It is very common to employ cointegration tests in studies of this sort but other different econometric techniques are also used. Kale (2001), in her article, uses quarterly data for the period 1984:(I)-1996:(II) and examines the relationship between the balance of trade, the real exchange rate and domestic and foreign income for the Turkish economy. The results of her cointegration analysis imply that a real depreciation improves the Turkish balance of trade in the long run. She also finds that an increase in the domestic income, in the long run, has an unfavorable effect on the trade balance. This result is in accordance with the postulates of the absorption approach that a rising income increases the demand for imports and weakens the positive impacts on the trade balance. Akbostancı (2002), too, uses the quarterly Turkish data in the period of 1987-2000 and studies the long-run behavior of the trade balance and real exchange rate through cointegration analysis. She also uses the generalized impulse-response analysis in order to estimate the response of trade balance to real exchange rate shocks and thinks that it brings further insight to the short-run dynamics of the trade balance in general (Akbostancı, 2002: 5). Her analysis exhibits a long-run relationship between the trade balance and real exchange rate. The results show that the Marshall-Lerner condition holds for Turkey in the long-run, supporting the idea that a real depreciation of Turkish lira improves the trade balance. A similar study carried out by Şimşek et al. (2007) uses quarterly data for the period 1987(I)-2006(III) and investigates the main factors that affect Turkish trade deficits. Findings of their cointegration analysis show that there exists a long run relationship between the trade deficits and real effective exchange rates. So they conclude that real effective exchange

rates can be used effectively to reduce Turkish trade deficits in the long-run. Barışık and Demircioğlu (2006), on the other hand, use the monthly data and test the relationships between exports, imports and the exchange rates in Turkey during the 1980-2001 period. The results obtained from Engle-Granger and Johansen cointegration tests confirm the long run relation of these variables. They also apply Granger causality test and conclude that there exists a stronger causality from exchange rates to imports relative to exports.

Ata and Arslan (2003), unlike the former studies, use the annual data for the period 1980-2000 and test the relationship between the volume of foreign trade and the exchange rate for Turkey. By employing cointegration and Granger causality test, they find a stable long-run relationship between these two variables. Also, their results indicate that depreciation of Turkish lira positively affects the volume of trade. Similarly, Togan and Berument (2007) consider the annual data for the period 1970-2005 and adopt Johansen's cointegration estimation method in their study. The results show that the trade balance improves following a real depreciation of the domestic currency, as indicated by the Marshall-Lerner condition. So they conclude that current account sustainability for the Turkish economy would require a significant depreciation of the real effective exchange rate (Togan and Berument, 2007: 190).

Halicioğlu (2008), on the other hand, uses bilateral data unlike the formers and tests the validity of the Marshall-Lerner condition for Turkey and her 13 trading partners. He applies a different ARDL-based (Autoregressive Distributed Lag) cointegration procedure, which is also known as bounds testing, upon the data over 1985:(I)-2005:(IV) period. His results provide evidence of a positive response of the trade balance with only two of the trading partners (UK and USA) in the long-run, which in turn support the validity of the Marshall-Lerner condition. İrhan et al. (2011) also apply the same bounds testing methodology for the quarterly data over the period 1990:Q(I)-2007:Q(III) and try to analyze the determinants of the Turkish trade balance. Their estimation results indicate that real exchange rate depreciations improve the trade balance in a strong and significant way, and that domestic real income affects the trade balance negatively, and so, support the evidence for both the elasticity and absorption approaches.

There are also studies which use different econometric procedures other than cointegration but yield similar results. Among them, the study of Arslan and Wijnbergen (1993) rests upon simulation analysis. They investigate the driving forces behind what they call "the Turkish export miracle" in the 1980-1987 periods. Simulation results suggest that the striking increase in the export growth was mainly due to the sustained depreciation of the Turkish lira resulted from the macroeconomic policies and trade reform of the post-1980 periods. Aydın et al. (2004) estimate the export supply and import demand for the Turkish economy based on the quarterly data covering the period from 1987:(I)

to 2003:(IV). They use both single equation and vector auto regression (VAR) frameworks. Their results indicate that imports can be explained to a wide extent by the real exchange rate and the national income. They take it as an indicator of the fact that the effects of the real exchange rate on trade deficit basically work through the imports. So, they reach the conclusion that a real depreciation of Turkish lira will reduce the size of the trade deficit by decreasing the volume of imports significantly, although it will not induce a large increase in exports.

Baldemir and Keskiner (2004) investigate the response of the trade balance to changes in three major macroeconomic variables (i.e. real exchange rate, money supply, real GDP) of the Turkish economy for the period 1987-2001. Their study is quite different from the others in the sense that it is based on a panel data analysis that investigates bilateral trade between Turkey and her five major trading partners (namely; Germany, Italy, U.K., Holland and U.S.A). They find that the trade balance negatively responds to any increase in the real income while the depreciation of the domestic currency causes a positive response of it. Yazıcı (2008), on the other hand, investigates and compares the response to the exchange rate changes of trade balances of three Turkish sectors; agriculture, manufacturing and mining based on the quarterly data from 1986:(I) to 1998:(III). He employs a polynomial distributed lag model in the analysis. Findings from his sector-based analysis reveal a similar pattern of reaction to the exchange rate change in the short run, however, long-run or overall response of trade balance differs across the sectors; while trade balances of both manufacturing and mining improve in the long run, agricultural trade balance worsens as a result of domestic-currency depreciation.

The second group of studies selected, on the other hand, consists of the examples that yield negative results in terms of the exchange rate –foreign trade relationship. Like the previous studies, most of them are based on cointegration analysis. The study of Brada et al. (1997), among them, is of particular importance in the sense that they use the quarterly data for the period 1969:(I)-1993:(I). From this perspective, like Togan and Berument (2007), they include the pre-1980 data into their analysis and examine the responsiveness of Turkish trade balance to real devaluations both in the pre-1980 and in the post-1980 period. The cointegration results of their standard trade model refer to that for the pre-1980 period, there seems to be no role for the real exchange rate in affecting Turkey's trade balance. However, in the post-1980 period, the real exchange rate, domestic and foreign income have significant impacts on the balance of trade in the long run, reflecting the effect of liberalized trade regime on this relationship.

Fidan (2006), similarly, uses a data set from 1970 to 2004 on annual basis and investigate the dynamic interactions of the agricultural export and import, and the real effective exchange rate. He uses the impulse-response functions, Granger's causality as well as Johansen's cointegration for

estimation. He finds that the effect of the real effective exchange on the agricultural export and import is quite weak, especially in the short run, compared to the long-run.

Similar to the studies of Fidan (2006) and Yazıcı (2008), Albeni et al. (2005) investigate the effects of real exchange rates on the exports of the Turkish manufacturing industry. Based on the monthly data from 1997:(1) to 2003:(9), the estimation results of their sectoral analysis indicate that there exists a statistically significant relationship between real exchange rates and the exports only for 8 out of 22 manufacturing sectors. Karagöz and Doğan (2005) also use monthly data for the period 1995:(1)- 2004:(6) and analyze the relationship of export and import variables with the exchange rate. Their cointegration results point to no econometric relation between the exchange rate and each of these foreign trade variables while the impact of 2001 devaluation on them is found to be significant. Yamak and Korkmaz (2005) attempt to determine the effect of real exchange rate changes on the trade balance with regard to different commodity groups by using the monthly data for the period of 1995:(01)-2004:(04). The results obtained from the Granger causality test suggest no long-run relationship between real exchange rate and trade balance. In addition, they find that in the short-run, a real appreciation of the Turkish lira increases the trade deficit by worsening the trade balances of consumption and capital goods. In a similar study, Gül and Ekinci (2006) investigate the interactions between the real exchange rates and the export and import by using the monthly Turkish data for the period 1990:(01)-2006:(08). They find a unidirectional causality from the export and import to the real exchange rates. Their findings suggest that the real exchange rate can not be used as an effective policy tool in trade balance adjustments.

In Peker's study (2007), the long run and short run relationship between the trade balance and changes in the real effective exchange rate of Turkey is examined for the period 1992:(I)-2006:(IV) based on the quarterly data. Findings from the cointegration test do not support the empirical validity of the Marshall-Lerner condition, indicating that devaluations do not improve the trade balance in the long run. He also sets up an error-correction model and reports that the short run effects of the real effective exchange rate change on the trade balance are not significant either. Similarly, Binatlı and Sohrabji (2009) use quarterly data from 1999:(I) to 2008:(III) and analyze the exchange rate elasticity of Turkish imports and exports by the help of cointegration. They find that the exchange rate elasticity is negative for both exports and imports indicating that depreciation of the Turkish lira will have a negative effect on them. Hepaktan (2009), on the other hand, uses the quarterly data for the period 1980–2008 and test the validity of the Marshall-Lerner condition based on the fractional cointegration analysis. Like Peker (2007), he reports that the Marshall-Lerner condition doesn't work properly for Turkey in the long run.

More recently, Yazici and İslam (2011) investigate the short-run and long-run impact of real exchange rate changes on the trade balance of Turkey with 15 European Union (EU) countries. By using the quarterly data for 1982:(I) to 2001:(IV) period and the bounds testing approach to the cointegration, they find that the exchange rate has no significant effect on the trade balance of Turkey with EU (15) while domestic income has significant negative effect on it. Yapraklı (2011), too, employs bounds testing approach and investigate the effects of exchange rate policies on foreign trade deficit of Turkey. Based on the monthly data for the 2001:(III)-2009:(VI) period, their analysis yield no statistically significant effect by real effective exchange rate both in the long run and in the short run.

Table 1: *Selected Empirical Studies on Turkish Foreign Trade and Exchange Rates*

Author(s)/ Publication Year	Data Period and Frequency	Econometric Method(s)	Variables Included in the Model	Empirical Results
Arslan and Wijnbergen (1993)	Annual data for the period 1980-1987	Ordinary Least Squares (OLS), simulation analysis	Exports, export subsidies, real exchange rate, export prices	Export subsidies moderately contribute to the export growth in Turkey. Export boom is triggered mainly by real depreciation of the Turkish lira.
Brada et al. (1997)	Quarterly data for the period 1969:I-1993:I	Error-correction model, Johansen and Engle-Granger type cointegration analysis	Real exchange rate, real domestic and foreign income, real balance of trade	For the pre-1980 period, there seems to be no role for the real exchange rate in affecting Turkey's trade balance. After the liberalization of trade, (i.e. in the post-1980 period) the real exchange rate, domestic and foreign income have significant impacts on the balance of trade both in the <u>long run and in the short run.</u>
Kale (2001)	Quarterly data for the period 1984:I- 1996:II	Cointegration analysis, error- correction model	Real trade balance on merchandise exports and imports, real Turkish income, (GDP), real foreign income, real	Estimation results indicate that the long run elasticities satisfy the condition: the Turkish trade balance improves following a real depreciation in the long run. On the other hand, domestic income has an unfavorable effect on the trade balance. The short run results indicate

			exchange rate	a deterioration of the Turkish trade balance following an initial improvement.
Akbostancı (2002)	Quarterly data for the period 1987:I-2000:IV	Cointegration analysis, vector error-correction model, impulse-response analysis	Real trade balance, domestic and foreign income, real exchange rate, nominal exchange rate, foreign and domestic price levels	The analysis exhibits a long-run relationship between the trade balance and real exchange rate. Marshall-Lerner condition holds for Turkey in the long-run: a real depreciation of Turkish lira improves the trade balance.
Ata and Arslan (2003)	Annual data for the period 1980-2000	Regression analysis, cointegration and Granger causality test	Volume of foreign trade, exchange rate	There is a stable long-run relationship between the volume of foreign trade and the exchange rate for Turkey. Depreciation of Turkish lira positively affects the volume of trade.
Baldemir and Keskiner (2004)	Annual data for the period 1987-2001	Panel data analysis	Real exchange rate, money supply, real domestic and foreign GDP, trade balance	Trade balance negatively responds to any increase in the money supply and the real income. However, depreciation of the domestic currency causes a positive response of it.
Aydın et al. (2004)	Quarterly data for the period 1987:I-2003:IV	Single equation and vector auto regression (VAR) models	Exports, imports, real exchange rate, real domestic output (real GDP), export price index, unit labor cost index	Imports can be explained to a wide extent by the real exchange rate and the national income and exports are mostly determined by unit labor cost, export prices and national income. A real depreciation of Turkish lira will reduce the size of the trade deficit by decreasing the volume of imports significantly, although it will not induce a large increase in exports.
Yamak and Korkmaz (2005)	Monthly data for the period 1995:I-2004:IV	Regression analysis, Granger causality test, impulse-response functions	Export and import price index, real exports, real imports, real trade balance	There is no long-run relationship between real exchange rate and trade balance. In the short-run, a real appreciation of the Turkish lira increases the trade deficit by worsening the

			(total and different commodity groups), real effective exchange rate	trade balances of consumption and capital goods.
Albeni et al. (2005)	Monthly data for the period 1997:I-2004:VI	Multivariate regression analysis	Real exchange rate, export price index, sectoral real wage index	There exists a statistically significant relationship between real exchange rates and the export price index only for 8 manufacturing sectors.
Karagöz and Doğan (2005)	Monthly data for the period 1995:I-2004:VI	Cointegration	Real effective exchange rate, exports and imports	No econometric relation between the exchange rate and exports or imports.
Gül and Ekinci (2006)	Monthly data for the period 1990:I-2006:VIII	Granger causality test	Real exchange rate, exports and imports	There is a unidirectional causality from the export and import to the real exchange rates. Real exchange rate can not be used as an effective policy tool in trade balance adjustments.
Fidan (2006)	Annual data for the period 1970-2004	Autoregressive causality of Granger, Johansen type cointegration, impulse-response functions	Import quantity index, export quantity index, real effective exchange rate index	Effect of the real effective exchange on the agricultural export and import is quite weak in the short run, compared to the long-run.
Barışık and Demircioğlu (2006)	Monthly data for the period 1980-2001	Engle-Granger and Johansen type cointegration analysis, piecewise linear regression analysis, Granger causality test, variance decomposition based on the VAR model	Exchange rate, exports and imports	Exchange rate has a significant impact both on exports and imports. There exists a weak relationship between exports, imports and the exchange rate regime.
Togan and Berument (2007)	Annual data for the period 1970-2005	Johansen's cointegration	Real effective exchange	The trade balance improves following a real depreciation of the domestic currency, as

			rate, real exports, real imports, GDP	indicated by the Marshall-Lerner condition.
Şimşek et al. (2007)	Quarterly data for the period 1987:I-2006:III	Johansen type cointegration	Real GDP, real effective exchange rate, money supply, exports, imports, consolidated budget balance	There exists a long run relationship between the trade deficits and real effective exchange rates.
Peker (2007)	Quarterly data for the period 1992:I-2006:IV	Error correction model, Engle-Granger cointegration test	Real effective exchange rate, real domestic and foreign income, real balance of trade (ratio of exports to imports)	Empirical validity of the Marshall-Lerner condition is not supported. That is, devaluations do not improve the trade balance in the long run. The short run effects of the real effective exchange rate change on the trade balance are not significant.
Halıcıoğlu, (2008)	Quarterly data for the period 1985:I-2005:IV	ARDL-based cointegration approach (bounds testing), error correction model, cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) stability tests	Real trade balance, real foreign and domestic income, real exchange rate	The results provide evidence of a positive response of the trade balance with only two of the trading partners in the long-run, which in turn support the validity of the Marshall-Lerner condition.
Yazıcı (2008)	Quarterly data for the period 1986:I-1998:III	Polynomial distributed lag model	Real trade balance, real world and domestic income, real domestic and world high-powered money, nominal exchange rate,	Sectoral analysis reveals a similar pattern of reaction to the exchange rate change in the short run, however, long-run or overall response of trade balance differs across the sectors; while trade balances of both manufacturing and mining improve in the long run, agricultural trade balance worsens as a result of domestic-currency

			domestic price level	depreciation.
Binatlı and Sohrabji (2009)	Quarterly data for the period 1999:I-2008:III	Johansen type cointegration	Domestic and foreign GDP, total exports, total imports, consumer goods exports and imports, capital goods exports and imports and intermediate goods export and imports	Exchange rate elasticity is negative for both exports and imports indicating that depreciation of the Turkish lira will have a negative effect on them.
Hepaktan (2009)	Quarterly data for the period 1980–2008	Fractional cointegration analysis	Exports, imports, domestic and foreign GNP, export and import price indices	The Marshall-Lerner condition doesn't work properly for Turkey in the long run.
İrhan et al. (2011)	Quarterly data for the period 1990:I-2007:III	ARDL-based bounds testing	Real exchange rate, exports, imports, domestic and foreign real income, domestic and foreign price indices, crude oil prices	Real exchange rate depreciations improve the trade balance in a strong and significant way and domestic real income affects the trade balance negatively.
Yapraklı (2011)	Monthly data for the period 2001:III-2009:VI	ARDL-based bounds testing	Real trade deficit, real budget deficit, real money supply, real effective exchange rate	No statistically significant effect by real effective exchange rate on foreign trade deficit of Turkey both in the long run and in the short run.
Yazıcı and İslam	Quarterly data for the	ARDL-based bounds	Real effective	The exchange rate has no significant effect on the trade

(2011)	period 1982:I- 2001:IV	testing	exchange rate, exports, imports, foreign and domestic real income	balance of Turkey with EU (15) while domestic income has significant negative effect on it.
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Abbreviations: ARDL: Autoregressive Distributed Lag, GDP: Gross Domestic Product, GNP: Gross National Product, VAR: Vector Auto Regression.

#### IV. Conclusions

The reaction of the trade balance to exchange rate changes is a fundamental issue in open macroeconomics. The growing need to understand the dynamic relationship that exists between foreign trade and exchange rates lead researches to carry out numerous theoretical and empirical studies. In this paper, we try to shed light on the theoretical facets of this relationship and provide some experimental results for Turkey in this area of research.

The theoretical and empirical literature on the trade balance exchange rate relationship is vast and miscellaneous. In Section 2, we attempt to build a theoretical framework by a survey of approaches that focus on the balance of trade. Historical background of these approaches rests upon the elasticity approach. Though its theoretical and policy implications are still important for understanding foreign trade behaviors today, its oversimplified assumptions and theoretical deficiencies has led the development of alternative approaches through time.

We classify and compare the studies selected in Section 3 depending on whether they support the relationship between the exchange rates and the trade balance, or not. We also group together the studies that are similar in terms of their sample period, data frequency and econometric methods. The survey of the empirical studies refers to that the debate about the effects of exchange rates changes on Turkey's trade balance is inconclusive. Within this context, one may conclude that there is no concurrence whether the exchange rate is an effective policy tool to achieve trade balance or even it has a role in determining trade flows in Turkey. After all, other macroeconomic policies, apart from exchange rates may also contribute to the understanding of the dynamics of foreign trade. This, in turn, calls for further empirical research.

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