THE BILATERAL J-CURVE OF TURKEY FOR CONSUMPTION, CAPITAL AND INTERMEDIATE GOODS

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
THE DEPARTMENT OF ECONOMICS

JULY 2008

Approval of the Graduate School of Social Sciences

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ABSTRACT

THE BILATERAL J-CURVE OF TURKEY FOR CONSUMPTION, CAPITAL AND INTERMEDIATE GOODS

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June 2008, 69 pages

This study analyzes the J-curve effect for Turkey's bilateral trade with her three main trading partners; Germany, USA and Italy, for consumption, capital and intermediate goods. The bounds test is used to test for cointegration among the trade balance, the real bilateral exchange rate, the real domestic income and the real foreign income. The results show that the real exchange rate is not a significant determinant of trade in the short run. In the long run, it is significant only for trade with USA in consumption goods. Moreover, J-curve does not exist for Turkey's bilateral trade with Germany, USA, and Italy in consumption, capital and intermediate goods. The results support existence of a link between the bilateral trade balances and the real domestic income both in the short run and the long run.

Keywords: J-curve, Bounds test approach, Bilateral trade, BEC definition,Turkey

ÖZ

TÜRKİYENİN TÜKETİM, YATIRIM VE ARAMALI TİCARET DENGESİNDE İKİ TARAFLI J-EĞRİSİ ETKİSİ

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Tez Yöneticisi: Doç. Dr. Elif Akbostancı

Temmuz 2008, 69 sayfa

Bu çalışma Türkiye'nin Almanya, A.B.D. ve İtalya ile ikitaraflı tüketim, yatırım ve aramalı ticaretindeki J-eğrisi etkisini incelemektedir. Ticaret dengesi, reel döviz kuru, yurtiçi reel gelir ve yabancı reel gelir arasındaki eşbütünleşme sınır testi yöntemiyle incelenmiştir. Sonuçlar döviz kurunun kısa dönemde ticaretin belirleyicilerinden biri olmadığını göstermektedir. Uzun dönemde ise döviz kuru yalnızca A.B.D. ile tüketim malları ticaretinde etkilidir. Ayrıca Türkiye'nin Almanya, A.B.D. ve İtalya ile ikitaraflı tüketim, yatırım ve aramalı ticaretinde J-eğrisi etkisi bulunmamaktadır. Sonuçlar hem kısa dönemde, hem de uzun dönemde ikitaraflı ticaret dengesi ve yurtiçi reel gelir arasında bir ilişki olduğunu desteklemektedir.

Anahtar Sözcükler: J-eğrisi, Sınır testi yaklaşımı, İkitaraflı ticaret, BEC tanımı, Türkiye

To my family

ACKNOWLEDGMENTS

I want to thank my thesis supervisor, Assoc. Prof. Dr. Elif Akbostancı, for her close supervision, contributions, and academic support throughout this study. I am especially grateful to her because this study would not have been completed without her encouragement and motivation. I am grateful to the examining committee members, Prof. Dr. Erdal Özmen and Assoc. Prof. Dr. Uğur Soytaş, for their precious contributions and criticisms; to Assist. Prof. Dr. Engin Küçükkaya for his careful review and valuable suggestions, and to Assoc. Prof. Dr. Ramazan Sarı for his guidance for coping with the econometric technique used in this study.

I would like to thank the Scientific and Technological Research Council of Turkey (TÜBİTAK) for their scholarship.

I thank my colleagues from department of Business Administration; Ufuk Kara, especially for his academic and technical support, Ayça Güler-Edwards and Mesrur Börü for their friendship, patience, and encouragement; and my friends from department of Economics; Nutiye Seçkin, for her friendship, motivation and moral support, and Eda Gülşen for her technical help throughout this study.

I express my deepest gratitude to my parents, Nurten and Ali Osman Keskin, for teaching me everything that makes me who I am today. I am indebted to my sister, Sinem Keskin, for being my best friend and being by my side anytime and anywhere. I am sure that nothing will change in the future. Last of all, I want to thank my aunt, Gülten Pamir, for her caring attitude and constant support throughout my life.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION: THE J-CURVE

The exchange rate is an easily observable variable giving clues about the current state of a country's economy, as Mishkin (1999) states. Besides being a crucial determinant of international competitiveness, Mishkin (1999) mentions its role as a monetary policy tool for controlling inflation and maintaining stability of the economy through exchange rate targeting, used for a long period of time. However, increasing capital mobility around the world and developing financial instruments to bypass existing capital controls, have made it difficult and painful for the countries to maintain their control over the exchange rate. Consequently, economies shift to floating rate regimes and accept other monetary policy regimes, such as inflation targeting, to ensure price stability, and this is the case for Turkey as well. Nevertheless, despite these developments, the exchange rate is still a significant monetary variable. In fact, these trends have made the exchange rate more volatile, more unpredictable and more prone to global shocks. Moreover, as Domaç and Mendoza (2004) explain, even under inflation targeting where the exchange rate needs to float, policymakers in emerging markets should have an eye on its movements. Last of all, despite decreased control over the exchange rates, belief in its significance for determining international competitiveness is still widespread. The ongoing debate about insistence of Asian countries to prevent their currencies from appreciating in order to protect their export-led growth strategies is a strong evidence for belief in that linkage.

Undervalued currencies are seen as keys for success stories of trade surpluses whereas overvalued ones are seen as the drivers for deficits. As a result, the relationship between the trade balance and the exchange rate is worth examining.

In the broadest sense, the direction of the long run relationship between the exchange rate (defined as home currency price of one unit of foreign currency) and the trade balance is expected to be positive, assuming that Marshall-Lerner condition holds. In other words, increases in exchange rate, that is deprecation of domestic currency, is expected to make exports cheaper and imports more expensive. As a result, the trade balance is anticipated to improve. Similarly, appreciation of the domestic currency is expected to deteriorate the trade balance. However, as first raised by Magee (1973), the adjustments may not be immediate. As he mentions, the movement in the trade balance depends on the currency denomination of the export and import contracts, on the extent of the pass-through from the exchange rate to the prices of exports and imports, and on the volume adjustments. As a result, he suggests that following devaluation, the trade balance may continue to worsen in the short run before it starts to improve, evolving in a J-like path, named as 'J-curve effect'. Therefore, devaluation used as a policy to boost exports may result in an immediate adverse movement in the trade balance instead. In the short run, this may conceal the long run positive effects of devaluation (or depreciation) on the trade balance. Analysis of J-curve effect may be helpful to prevent distorted judgments about the effect of weakening domestic currency in the long run. Moreover, in order to take appropriate actions, whether the deterioration is temporary resulting from a J-curve effect or permanent resulting from other factors (such as low price elasticities, low product qualities, or income related factors instead of price related ones) should be clarified. This also underlines the importance of empirical investigation of the J-curve effect.

Shortly after the introduction of the J-curve concept by Magee (1973), researchers tested whether the data for different countries and sample periods support the

theory empirically. Some of these empirical studies analyzed trade balance of a country with all its trading partners aggregated together[1]. However, they were criticized for suffering from aggregation problems, stated first by Rose and Yellen (1989). This contribution led to a new trend of bilateral analysis in the literature[2]. While bilateral analysis disaggregated the data with respect to the trading partners, some disaggregated it with respect to the industry or to the product[3].

The studies analyzing the Turkish J-curve, present mixed results about the long run and short run relationship between the trade balance and the exchange rate[4]. However, none of these studies presents evidence for J-curve effect. Except Halıcıoğlu (2007), all the studies are carried at aggregate level. Therefore, this study aims to analyze the J-curve for Turkey by clearing doubts about aggregation bias mentioned by Rose and Yellen (1989) through disaggregating the trade balance data with respect to two dimensions; the trading partner and the nature of the product traded according to Broad Economic Categories (BEC) definition of United Nations. The BEC definition groups the tradable goods into three main categories according to their end use, consumption, capital and intermediate goods. Examination of trade on these goods separately is expected to prevent opposite movements of trade balances on these different types of goods from offsetting each other. In addition, it aims to shed light on the different ways the trade on each group responds to the movement in the exchange rate. Moreover, the analysis is expected to differentiate the response of the production side of the

[1] Miles (1979), Bahmani-Oskooee (1985), Felmingham (1988), Himarios (1989), Rose (1990), Gupta-Kapoor and Ramakrishnan (1999), Narayan and Narayan (2004).

[2] Rose and Yellen (1989), Wilson and Tat (2001), Bahmani-Oskooee and Goswami (2003), Bahmani-Oskooee, Economidou, and Goswami (2006), Bahmani-Oskooee, Goswami, and Talukdar (2008)

[3] Carter and Pick (1989), Doroodian, Jung, and Boyd (1999), Bahmani-Oskooee and Ardalani (2006), Baek (2006)

[4] Rose (1990), Brada, Kutan, and Zhou (1997), Akbostancı (2004), Halıcıoğlu (2007), Bahmani-Oskooee, Goswami, and Talukdar (2008)

economy from the demand side. The trade balance in capital and intermediate goods are expected to follow the production side of the economy and the economic growth closely. The trade balance in consumption goods is anticipated to be affected more by demand side factors whereas the trade balances in capital and intermediate goods are expected to be driven by supply side factors.

For analysis of bilateral J-curve on these goods, bounds testing approach of Pesaran, Shin and Smith (2001) and ARDL approach of Pesaran and Shin (1999) are used. Bounds testing is preferred for testing the existence of cointegration among the variables, as it allows the variables to be stationary, integrated of order one, or a combination of both. It is a simple joint significance test of the one period lagged levels of the variables in the ARDL model. However, two sets of nonstandard critical values are developed by Pesaran et al.. (2001) to compare the calculated F-statistic for each significance level. If the calculated statistic exceeds the upper bound critical value, the null hypothesis of no cointegration is rejected. If, on the other hand, it falls below the lower bound, then no cointegration is not rejected. The results are inconclusive if the calculated statistic lies between the upper and the lower bounds. Following Pesaran et al. (2001), the analysis continues with ARDL approach of Pesaran (1999) after the cointegration test. The ARDL approach enables the examination of both the short run and the long run dynamics, presenting all the information needed for complete J-curve analysis.

The rest of the study proceeds as follows: Chapter 2 presents a review of the literature by both referring to the theoretical background and the empirical results so far for different countries at different levels. Chapter 3 introduces the model, presents the sources of the data and provides a general look into raw data characteristics. Chapter 4 gives an explanation of the econometric technique used and presents the empirical results. Chapter 5 provides a review of the findings and restates important conclusions.

CHAPTER2

LITERATURE REVIEW: THEORY AND EVIDENCE

2.1. A Theoretical Background:

Before looking at the empirical findings about the relationship between the real exchange rate and the trade balance, a reexamination of the underlying theory may be useful. In most of the emprical studies, it is implicitly assumed that export contracts are denominated in domestic currency whereas import contracts are denominated in foreign currency. Moreover, the exchange rate pass-through to export and import prices is assumed to be perfect. These implicit assumptions provide some necessary underlying conditions for a J-curve to be observed. In other words, unless some conditions are met, discussions of the J-curve concept may be totally meaningles, or, no emprical evidence for J-curve may be a result of failure to meet those prerequisites. For instance, as stated by Magee (1973), Arndt and Dorrance (1987), and Carter and Pick (1989), if the trade balance is calculated in foreign currency, and the export and import prices are also quoted in foreign currency and are unaffected by depreciation, the trade balance figure will not respond to any change in the real exchange rate for sure. As a result, in this case, it would be meaningless to talk about the J-curve effect.

An analytical examination of the underlying conditions for a J-curve to be observed is presented by Magee (1973). He explores the situations where an

exchange rate movement can or can not have an impact on the trade balance. He mentions that even in the earlier periods of devaluation, when no quantity adjustment takes place yet; the movement of the trade balance depends on the currency denominations of contracts and the elasticities of import and export demand and supply. Magee (1973) defines two different time periods before the volume adjustments start: "the currency contract period" (p.305) and "the pass-through period" (p.305).

"Currency contract period" refers to the time period when the devaluation occurs but the contracts are already made and can not be changed. In other words, both the quantity of the traded goods and the agreed on price (which may be in domestic or foreign currency) stay the same. However, the value of the imports and exports may be affected, depending on the currency denomination of exports, imports and the trade balance. Analysis of "currency-contract period" (p.305) by Magee (1973) reveals that the deterioration in the trade balance compared to the pre-devaluation period may be possible if:

- The trade balance is already in deficit and is expressed in terms of the domestic currency while both export and import contracts are denomianted in foreign currency.

- The trade balance is already in surplus and is expressed in terms of the foreign currency while both export and import contracts are denominated in domestic currency.

- Regardless of the type of currency denomination of the trade balance, exports contracts are denominated in domestic currency while import contracts are in foreign currency.

After the time period for already signed contracts has expired, in other words, the currency contract period is over, the price adjustment sets in before quantities adjust. Theoretically, the trade balance may move in any direction depending on the changes in the price of the exports and the imports. In discussions of the J-curve, it is implicitly assumed that the foreign currency price of imports stays the same so that imports cost more domestic currency to the devaluing country. In the same manner, the domestic currency price of the exports do not change so that exports to the trade partners cost less in terms of that importing country's currency. In other words, export prices are sticky in terms of the exporter countries' currencies (Arndt and Dorrance 1987, Rose and Yellen 1989). As a result, before volume effect comes in, decreased export revenue in foreign currency and increased import expenditure in domestic currency will result in an inevitable deterioration in the trade balance, denominated in any currency. This is named as perfect pass-through.

However, Magee (1973) questions the perfect pass-through assumptions and instead analyzes which way the trade balance may move depending on the demand and supply elasticities of both exports and imports, for the period he names as the "pass-through period"(p.305). He concludes that if there is perfect pass-through on export and import side, then the trade balance is expected to improve in the long run. However, before the volume adjustments, perfect pass-through causes the trade balance to deteriorate in the short run, regardless of the currency denomination.

According to Magee (1973), after the pass-through period, volume adjustments take place depending on the elasticities of demand and supply. As a combination of the "currency-contract period" (p.305), "pass-through period" (p.305) and the quantity adjustments, final impact on the movement of the trade balance is determined.

Junz and Rhomberg (1973) underline five types of lags to account for the late response of the trade balance to fluctuations in the exchange rate. Recognition lag exists because it takes some time for agents to recognize the change. Decision lag refers to the time elapsing before agents make up their minds about new purchases. Delivery lag is the gap between the ordering time and delivery time. Replacement lag is the time that passes before new inventories become available. Production lag is the time gap before producers realize the new market conditions and shift resources accordingly.

Arndt and Dorrance (1987) bring a new theoretical perspective and claim that the deterioration of the trade balance is important only if it causes a deficit in terms of the foreign currency which should be financed by cutting domestic expenditure. Since decrease in the domestic currency value of the trade balance does not signal more foreign currency outflows, according to Arndt and Dorrance (1987), it should be irrelevant to the discussion of the real effects of devaluation. So they claim that the J-curve phenomenon should only be discussed whenever the trade balance is denominated in foreign currency. Similar to "currency contract period" (p.305) Magee (1973) mentions, they attribute existence of a J-curve mainly to the stickiness in domestic currency prices of exports, causing export revenues to fall in foreign currency. They also claim irrelevance of J-curve for small countries as they are unable to affect foreign currency price of their tradables and accordingly foreign currency value of their trade balance.

Wilson and Tat (2001) agree with Arndt and Dorrance (1987) on the irrelevance of a J-curve discussion for small countries as they have no power in affecting foreign currency price of their tradables. However, they also illustrate an elasticities approach to show that J-curve may be observed even for small countries with trade deficits that have low market power.

Turkey belongs to the category of 'small countries' defined by Arndt and Dorrance (1987) and Wilson and Tat (2001), because it does not invoice its exports in domestic currency, as Berument and Dincer (2005) state.Instead, exports are mostly denominated in Euros and imports are mostly denominated in US dollars (USD). Therefore, the foreign currency value of the trade balance may be unresponsive to the exchange rate movements. In order to neutralize the impact of currency denomination of the trade balance in this study, following Brada et al. (1997), the trade balance is made unit-free and defined as exports over imports. Moreover, in this study, partial reduced form of the trade balance presented by Rose and Yellen (1989) is used. As Doroodian, Jung, and Boyd (1999) state, this model analyzes the movement in the trade balance directly and accounts for both the pass-through and the quantity adjustment effects simultaneously.

2.2. Empirical Studies

The empirical findings regarding the significance of exchange rate movements in determining trade balance vary across studies. A general conclusion is hard to draw. Most of the studies use the partial reduced form of the trade balance, presented by Rose and Yellen (1989)[5]. Instead of analyzing the export and import demand functions seperately, Rose and Yellen (1989) solve those simultaneously to end up with a model determining the trade balance. The model explains the trade balance with the exchange rate, the domestic income and the foreign income. Some studies modify the variables used. For instance, Felmingham (1988) substitues the real exchange rate with the terms of trade. Gupta-Kapoor and Ramakrishnan (1999) prefer to use nominal values of all the variables asserting that J-curve is a totally nominal concept. Singh (2004) augments the model with a variable representing the exchange rate volatility. Despite these

[5] Rose (1990), Brada et al. (1997), Wilson and Tat (2001),Bahmani-Oskooee and Goswami (2003), Akbostancı (2004), Narayan and Narayan (2004), Singh (2004), Bahmani-Oskooee et al. (2006), Baek (2006), Halıcıoğlu (2007), Bahmani-Oskooee,Goswami and Talukdar (2008), Bahmani-Oskooee and Kutan (2008)

minor differences, the majority of the literature on J-curve follows Rose and Yellen (1989).

On the other hand, some studies aim to account for some factors Rose and Yellen (1989) do not consider and thus use some additional variables. For instance, Miles (1979) criticizes the previous studies for overlooking the effects of the fiscal and monetary policy at the time of devaluation. To account for these effects, he includes additional variables representing the monetary and fiscal policies of the home country and the trading partners such as growth rates of the GDPs, domestic portion of the high powered money and the government expenditures, all of which are in nominal terms. Bahmani-Oskooee (1985) adds only the effect of money by including domestic and foreign money variables. Himarios (1989) wants to account for the monetary and fiscal policy effects altogether. Hence, he includes domestic and foreign real government expenditures, domestic and foreign real money balances, domestic and foreign interest rates in his model. Moreover, he also accounts for the effects of anticipated devaluation.

Besides the models chosen, the nature of the analysis differs across studies. Early studies analyze the trade balance at aggregate level, that is the trade with all partners is summed together, proxies are used representing the weighted avarage of the incomes of all those partners and effective exchange rate measures are employed. However, empirical evidence fails to support the J-curve concept in most of these studies. That failure is attributed to the problems brought about by aggregate data (Rose and Yellen, 1989). The view that a J-like movement with respect to one trading partner may be offset with an opposite movement with respect to another country gains popularity. In order to overcome these problems, later studies examine the trade balances at bilateral level. In some papers, the trade balance is analyzed even at industry level or at product level. Next in this chapter, a brief review of the results of all these studies at different levels are presented in historical order.

2.2.1. Studies at Aggregate Level

2.2.1.1. Multi-Country Studies

Junz and Rhomberg (1973) examine manufactured goods' flows from 13 industrial countries. They find that the response of the flows of manufactured goods to the changes in relative prices (including changes resulting from fluctuations in exchange rates) is materialized in a period of four to five years following the change. However, they do not observe a special path that the trade balance follows.

Miles (1979) examines trade balance-devaluation relationship in 14 countries for the period of 1956-1972. He accounts for effects of monetary and fiscal policies on the movement of the trade balance. Consequently, he explains the change in the trade balance with the difference between the income growth rates, difference between the money supplies, difference between the government expenditures of the home country and its trading partner as well as the exchange rate. All the variables chosen are in nominal terms. Two methods are used, one is the residuals test and the other is a direct test of the significance of the exchange rate in the model. The results of the residuals test suggest that devaluation causes the trade balance to deteriorate in 10 cases. Testing the significance of the exchange rate directly, devaluation is found to improve the trade balance of France, Finland and New Zealand and to deteriorate the trade balance of United Kingdom and Guyana. The empirical findings do not even support a positive relationship between exchange rate and the trade balance in majority of the cases, leaving aside the J-curve effect.

Himarios (1989) explains the trade balance with a model including domestic and foreign real incomes, domestic and foreign real government expenditures, domestic and foreign real money balances, domestic and foreign interest rates, expected devaluation and the real exchange rate. Data for two different sample

periods cover different sets of countries. For the period of 1953-1973, 15 countries are examined. The results support that for 80% of the cases, devaluation causes an improvement in the trade balance while a J-pattern is observed only for the UK. The other sample examines another set of 15 countries for the period of 1975-1984. Similarly, the results support a positive relationship between real exchange rate and trade balance for 80% of the cases. Moreover, a J-curve pattern is observed only for Ecuador, France, Greece and Zambia.

Rose (1990) analyzes the real trade balance at aggregate level for 30 countries including Turkey. The real trade balance is explained with the real effective exchange rate, the real domestic and foreign income. Annual data shows that only for Tanzania and Thailand, the coefficients of the different lags of the real exchange rate variable are jointly significant. Only for Thailand, devaluation is found to improve the trade balance. Quarterly data supports joint significance of the lagged exchange rate variables for six countries. However, in this case, cumulative significant and positive effect of devaluation is not found in any of the 30 countries. Therefore, the exchange rate is concluded not to be a significant variable in explaining the trade balance both in the long run and the short run.

Bahmani-Oskooee and Kutan (2008) try to explain the real trade balance with real domestic income, real world income and the real effective exchange rate for 11 countries, which are a combination of new members and candidates of the European Union.They find support for short run effect of the exchange rate on the trade balance in 8 of the countries. The bounds testing results support cointegration for some of the countries while the error correction model based cointegration test support it for all of the 11 countries. Following J-curve definition of Rose and Yellen (1989), stated as existence of negative short run effect together with positive long run effect, Bahmani-Oskoee and Kutan (2008) find evidence for J-curve effect in Bulgaria, Croatia and Russia.

2.2.1.2 Single Country Studies:

While the studies mentioned above concern a couple of countries, Felmingham (1988) examines the J curve phenomenon for a single country, Australia. The trade balance is explained by the terms of trade, expressed as a ratio of price of exports to price of imports, domestic income and foreign income. The data is examined in 3 different sample periods: 1965-1974 covers the period of fixed exchange rate, 1974-1983 covers the period of managed floating and 1974-1985 includes years of free floating additionally. For the fixed exchange rate period, weak evidence for J-curve is found and the improvement in the trade balance is seen in 9 quarters. However, in the managed floating period, no evidence for J-curve is found. Moreover, devaluation is not found to improve the trade balance in the long run for this period. The Chow test reveals no structural change in the third sample period, so the results for the managed floating period are valid for the years of free floating as well. Felmigham (1988) concludes exchange rate not to be a significant determinant of the trade balance. He attributes this unresponsiveness of trade balance to devaluation, mainly to the low substitutability of imports with domestic goods and with high competition from third world exporters on Australian exports.

Gupta-Kapoor and Ramakrishnan (1999) examine Japanese quarterly data for the period covering 1975-1996. The paper is differentiated from the rest of the literature by claiming that the J-curve phenomenon is a nominal concept and by examining the effects of appreciation rather than depreciation. They explain the nominal trade balance with nominal effective exchange rate, nominal domestic income and weighted average of the nominal incomes of Japan's main trading partners. Gupta-Kapoor and Ramakrishnan (1999) find evidence supporting the long-run relationship between the chosen variables. The impulse response analysis reveals that following an appreciation, the ratio of imports to exports (M/X) decreases for four quarters and then recovers in the following two quarters. When

real variables are used, the results do not change much except that the recovery takes five quarters instead of six, in this case. So, they find evidence towards existence of a J-curve for Japan.

Narayan and Narayan (2004) examine the J-curve for Fiji for the period of 1970-2002. They define the Fijian trade balance as the ratio of imports to exports and the explanatory variables as the real effective exchange rate, the weighted average real foreign income and the real domestic income. The coefficient of the real effective exchange rate is expected to be negative in the long run, since a devaluation is supposed to decrease import expenditure and decrease the ratio of imports to exports. The bounds testing approach for cointegration supports the long run relationship between the variables. The results reveal that in the long run the real exchange rate improves the trade balance, that is, the coefficient of the real exchange rate is negative. However, it is significant only at 10% significance level. Analysis of the short run dynamics supports existence of the J-curve. Similarly, impulse response analysis proves that following devaluation, it takes two years before the trade balance starts to improve. In other words, Fijian data supports J-like movement in the trade balance, where the deterioration lasts for 2 years.

Singh (2004) analyzes Indian trade balance by using the real exchange rate, the real domestic income and the real foreign income. He finds that depreciation leads to an improvement in the long run. However, the exchange rate is found to be insignificant in the short run and the trade balance is not found to follow a J-path. As another contribution, he augments the model with a variable representing exchange rate volatility. However, exchange rate volatility is not found to be a significant variable in explaining the trade balance, either.

2.2.2. Studies at Bilateral Level:

All the studies mentioned above use aggregate data. However, Rose and Yellen (1989) underline the drawbacks of using aggregate data such as the difficulty of calculating a proxy for the aggregated foreign income or the failure to account for differences resulting from the nature of the tradables in different countries' bilateral trade basket. Therefore, Rose and Yellen (1989) present analysis of US trade balance both at aggregate level and at bilateral level with UK, France, Canada, Germany, Italy and Japan. The real trade balance is explained by the real domestic income, the real foreign income and the real bilateral exchange rate. The results support the relationship between the real trade balance and the real exchange rate only for Germany and Italy, but still the J-curve effect is not evident. As the results are contrary to the existing theoretical explanations, Rose and Yellen (1989) try to figure out whether the results are distorted by the estimation methods, the choice of the variables or any other factor under the control of the researchers. Changing to different estimation techniques, regressing components of trade balance one by one, changing the sample period, replacing real exchange rate with the real effective rate, and many other remedies fail to fulfill the expectation towards a significant relationship between the exchange rate and the trade balance. The results for the aggregate data are also confusing. OLS estimation results support J-curve effect while instrumental variables technique does not. Attributing the findings to the problem of simultaneity and nonstationarity, Rose and Yellen (1989) conclude that the trade balance do not respond favorably to devaluation in the long run and do not show a J-like movement in the short run, either, both at bilateral and aggregate level.

Wilson and Tat (2001) examine the trade balance between Singapore and its main trading partner, USA, with an ARDL approach. They regress the real trade balance on the real domestic and foreign income and the real exchange rate. They do not find evidence for cointegration in the long run. Moreover, similar to Rose

(1990), the lags of first differenced exchange rates are found to be jointly insignificant indicating the real exchange rate is not a significant variable in the short run. Moreover, a J-curve is not observable; the trade balance follows a cyclical pattern instead.

Bahmani-Oskooee and Goswami (2003) present the analysis of Japanese data at both aggregate level and bilateral level in order to provide opportunity for comparison. They explain the trade balance with the real exchange rate, the real domestic income and the real foreign income using bounds testing approach. The long run coefficient of the real exchange rate is found to be insignificant in the long run and no J-like movement is observed in the short run. However, bilateral data suggests that the trade balance between Japan and Canada, UK and US is positively affected by a depreciation in the long run. The short run dynamics indicate evidence of J-curve in the cases of Germany and Italy.

Bahmani-Oskooee, Economidou, and Goswami (2006) search for the existence and the nature of the relationship between the real exchange rate and the real trade balance for UK and its 20 trading partners. They explain the real trade balance, defined as exports over imports, by the real exchange rate and the domestic and foreign real income variables using bounds testing approach. The results from error correction model (ECM) support J-curve weakly only for Canada and the US. For Ireland, Norway and Switzerland the movement in the trade balance resembled a W. Only for Australia, Austria, Greece, South Africa, Singapore and Spain, a positive and significant effect of the real exchange rate on the trade balance is found in the long run.

Bahmani-Oskooee, Goswami and Talukdar (2008) examine bilateral trade data for Canada and her 20 trading partners throughout 1973-2001. The variables chosen are the trade balance (defined as the ratio of exports to imports), the domestic real income, the foreign real income and the real exchange rate. According to ECM

results, only for Norway and UK, the exchange rate with lower lags have positive coefficients while for higher lags the coefficient is negative, meaning a J-like movement. Bahmani-Oskooee et al. (2008) follow the definition of Rose and Yellen (1989) and regard negative short run coefficients accompanied by positive long run coefficients of the exchange rate as evidence for J-curve. Relying on this definiton, evidence for J-curve is found in 11 cases.

2.2.3 Studies at Industry or Product Level:

Although they are few in number, some studies are conducted at industry or product level. They try to account for different movements in the trade balance resulting from the difference between nature of the products included in the trade basket. While some use a broader perspective and look at industry data, some take a closer look and analyze the products.

Carter and Pick (1989) analyze the J-curve concept with respect to the US trade balance on agricultural products for the period of 1973-1985 using quarterly data. Instead of analyzing the trade balance empirically, they derive mathematical expressions for the final impact of movement in the effective exchange rate on export and import prices. In other words, they formulate the extent of the pass-through. They use variables representing several factors such as the cost of production, the price offered by competitors for goods US exports, the effective exchange rate, the foreign income, the price of US imports charged by other suppliers of US imports. Their empirical findings suggest that 87% of the depreciation is passed over to the import prices while only 32% is reflected to export prices. The trade balance deteriorates for three quarters and then start to increase, supporting the evidence of J-curve with respect to agricultural products.

Doroodian, Jung, and Boyd (1999) assert that the delivery and the production lags suggested by Junz and Rhomberg (1973) are relevant especially for the

agricultural sector. They attribute nonexistence of the J-curve in the previous empirical studies both to the mistake of aggregating the agricultural sector with manufacturing sector and to the heavy weight of the manufactured goods in the trade basket of the analyzed countries. Therefore, they analyze the agricultural trade and the industrial trade separately for USA. Doroodian et al. (1999) use a model similar to Miles (1979), and explain the real trade balance with the difference between the real incomes of the trading countries, difference between their monetary bases, difference between their budget deficits and the real exchange rate. The results support their arguments, evidence for J-curve is found for trade on agricultural products whereas it is not observed for manufactured products.

Baek (2006) examines the bilateral trade balance between US and Canada on forest products in 5 categories which are softwood lumber, hardwood lumber, panel/plywood products, logs and chips, and other wood products. By disaggregating the data with respect to the products, he conducts one of the most specialized version of the J-curve analysis. The real trade balance, defined as imports over exports, is regressed on the real incomes of US and Canada (the real GDP indices), and the real bilateral exchange rate. The bounds testing (Pesaran et al. 2001) results find cointegration for all 5 categories of forest products. Except for chips and logs, the depreciation is found to improve the trade balance in the long run. However, short run effects of the real exchange rate are insignificant in most of the cases, leaving no room for the existence of a J-curve.

To the best of knowledge, Bahmani-Oskooee and Ardalani (2006) present the most disaggregated analysis of US trade as they analyze import and export demand for 66 commodity groups according to Standard International Trade Classification (SITC) grouping. Contrary to most of the literature, they examine export and import data separately, instead of examining the trade balance figures. They explain the export demand with real foreign income and the real exchange

rate; and the import demand with the real domestic income and the real exchange rate. The results of the ECM support cointegration in most of the product groups. In the long run, for export demand, exchange rate is a significant variable for many of the product groups and a devaluation causes exports to increase expectedly. However, for imports, only for a few product groups, exchange rate is significant, in the short run. Nevertheless, no evidence for J-curve is found in any of the 66 product groups.

2.2.4. Emprical Findings For Turkey:

The Turkish data is examined in the articles of Brada, Kutan and Zhou (1997), Akbostancı (2004), Halıcıoğlu (2007) and Bahmani-Oskooee and Kutan (2008). In all four articles, the trade balance, the domestic and foreign (or world) real incomes and the real exchange rate are used. While three of the studies conduct analysis at aggregate level, Halıcıoğlu (2007) examines the bilateral trade between Turkey and her 9 major trading partners[6] The period spanned in each article differs from each other[7].

Brada et al. (1997) examine the data in two sub-samples, pre and post 1980 period, taking into account the policy shift towards export orşented growth strategy in 1980. They find no cointegration relationship in the pre-1980 period while a single cointegration relationship is found for the post-1980 period. For the post-1980 period, the short run dynamics are examined with ECM and the net effect of devaluation on trade balance is found to be positive, however an exact J-curve movement is not supported. Moreover, it is worthwhile to mention that in

[6] These partners are Austria, Belgium, France, Germany, Holland, Italy, Switzerland, UK and USA.

[7] Brada et al. (1997) and Akbostancı (2004) use quarterly data of the period 1969-1993 and 1987-2000 respectively, while Halıcıoğlu (2007) chooses to use annual data for 1960-2000 and Bahmani-Oskooee and Kutan (2008) employs monthly data of 1990-2005.

the long-run, increase in domestic income improves the trade balance; indicating dominance of the supply side factors, while an increase in foreign income deteriorates it.

Similar to Brada et al. (1997), Akbostancı (2004) finds a single cointegration relationship using Johansen cointegration technique. In the long run, only the real exchange rate is found to be significant and devaluation is found to improve the trade balance. In the short run, the foreign income is found to be insignificant whereas the domestic real income is significant and affects the trade balance adversely. The data suggests that the short-run dynamics of the model follow a more complex behaviour instead of a simple J shape. There is feedback between trade balance and the real exchange rate, so devaluation first improves the trade balance; this in turn appreciates the real exchange rate followed by deterioration in the trade balance. Therefore, in the short-run a cyclical pattern is observed rather than a J-shape. The finding is also supported by impulse response analysis.

Turkey is one of the 11 countries Bahmani-Oskooee and Kutan (2008) analyzes monthly for 1990-2005. The coefficient of the error correction term is negative and highly significant suggesting cointegration for all the countries considered. However, the bounds testing approach does not find similar evidence. Moreover, the long run coefficient of the real exchange rate is found to be positive but insignificant. As a result, among 11 countries examined Turkey fails to provide important evidence about the existence of a significant relationship between the real exchange rate and the trade balance.

In all of the studies mentioned above, the trade balance is examined at the aggregate level. An analysis regarding bilateral trade balance of Turkey and its 9 trading partners as well as an aggregate analysis is conducted by Halıcıoğlu (2007). According to the findings, devaluation improves the trade balance at the aggregate level. In addition, the bilateral trade balance between Turkey and the

individual countries Germany, Holland, Italy, Switzerland and the USA also improve with devaluation although the magnitude of the effect is too small. The impulse response analysis does not suggest a general pattern for the trade balance following devaluation. For some countries an initial improvement followed by deterioration is observed while the situation is the reverse for some others. Therefore, following devaluation, while a long run improvement in the trade balance is observed for the countries mentioned above, the movement in the trade balance is difficult to picture as a standard shape, including a J-shape.

CHAPTER 3

THE MODEL AND THE DATA

3.1. Introduction of the Model and the Data Sources

As presented in the introduction chapter, this study analyzes the Turkish trade balance disaggregated with respect to the trading partner and the nature of the product traded according to BEC (Broad Economic Categories) definition of United Nations. For analysis, three main trading partners of Turkey; USA, Germany and Italy are chosen, as they compose 25% of total trade volume of Turkey[8]. Accordingly, the trade balance with USA, Germany and Italy in consumption, capital and intermediate goods are analyzed separately. In order to model the trade balance on these goods with these trading partners, the bilateral exchange rate between Turkey and the trading partner in question and the income proxies for both countries are used. In short, following Rose and Yellen (1989) and other studies that follow them (Rose 1990, Brada et al. 1997, Gupta-Kapoor and Ramakrishnan 1999, Wilson and Tat 2001, Bahmani-Oskooee and Goswami 2003, Akbostanci 2004, Singh 2004, Narayan and Narayan 2004, Halıcıoğlu 2007, Bahmani-Oskooee et al. 2006, Baek 2006, Bahmani-Oskooee et al. 2008, Bahmani-Oskooee and Kutan 2008) the model used will be as follows:

[8] The shares of Germany, USA, and Italy among Turkey's total trade volume are given in the Appendix B.

$$LTBi\_j_t = a_o + a_1 LRER(P)_t + a_2 LY_t^T + a_3 LY_t^j + u_t \quad (1)$$

Here, in order to free the model from the scale effects and interpret the coefficients as elasticities, all the variables are used in logarithms, which is indicated by the letter 'L' in front of them. The letter *i* refers to the type of the good which are used as CON for consumption goods, CAP for capital goods and INT for intermediate goods. The letter *j* refers to the name of the trading partner analyzed, and the shorthands used for the trading partners are 'usa', 'germ' and 'ital'. LRER(P) refers to the logarithm of the real bilateral exchange rate between Turkey and the trading partner *j*.LY^T refers to the income of Turkey and LY^j refers to the income of the trading partner *j*. All the variables are quarterly spanning the period of 1987Q1-2005Q4, for a total of 76 observations.

Similar to Rose and Yellen (1989), Rose (1990), Brada et al. (1997), Wilson and Tat (2001), Bahmani-Oskooee and Goswami (2003), Akbostancı (2004), Narayan and Narayan (2004), Singh (2004), Bahmani-Oskooee et al. (2006), Baek (2006), Halıcıoğlu (2007), Bahmani-Oskooee et al. (2008), and Bahmani-Oskooee and Kutan (2008), all the variables chosen are in real terms. In the light of the discussion in Magee (1973), the units of measurement may play a significant role in leading to a J-effect. Therefore, following Bahmani-Oskooee and Goswami (2003) and Halıcıoğlu (2007), the trade balance figure is made unit-free by being defined as the ratio of exports to imports (X/M). This adjustment eliminates the need to deflate nominal export and import figures with price indices to bring them into real values. Whenever the logarithm of the trade balance (LTB*i*_*j*) exceeds zero, it means that X/M ratio exceeds unity, and hence the trade balance in question is in surplus.

Himarios (1989), Rose and Yellen (1989), Bahmani-Oskooee and Goswami (2003), Halıcıoğlu (2007), Bahmani-Oskooee et al. (2008) calculate the bilateral real exchange (LRER) by adjusting the bilateral nominal exchange rate (NER) with consumer price indices (CPI) of both countries. However, the economic factors affecting buyers of consumption goods and buyers of capital and intermediate goods are quite different. As a contribution of this study, in order to account for the differences in the purchasing power of these different consumer groups, alternative measures of real exchange rate are used. For trade balance in consumption goods, the real bilateral exchange rate is calculated using CPIs; for trade balance in capital and intermediate goods, the real bilateral exchange rate is calculated using PPIs, and named as LRERP. Expressed mathematically:

$$LRER_t = NER_t^j * \frac{CPI_t^j}{CPI_t^T} \tag{2}$$

$$LRERP_t = NER_t^j * \frac{PPI_t^j}{PPI_t^T} \tag{3}$$

The real exchange rate is defined as units of domestic currency per unit of foreign currency. As a result, an increase in LRER or LRERP means depreciation of the domestic currency (YTL) and appreciation of currency of the trading partner *j*. The abbreviations YTL, USD, DM and ITL are used for New Turkish Lira, US Dollars, German Mark and Italian Lira respectively.

Assuming that the Marshall-Lerner condition holds, in equation (1), the long run coefficient a_1 is expected to be positive, meaning that depreciation will lead to an improvement in the long run. However, expectations about the sign of the foreign and domestic income are debatable. Some of the studies (Bahmani-Oskoee 1985, Felmingham 1988, Bahmani-Oskooee and Goswami 2003, Bahmani-Oskooee et al. 2006, Baek 2006, Bahmani-Oskooee et al. 2008) expect increases in domestic

income to trigger imports and cause trade balance to deteriorate. They also expect increases in foreign income to cause increase in demand for imports from home country, which means rise in domestic exports and improvement in the trade balance accordingly. However, following Himarios (1989), Brada et al. (1997), Narayan and Narayan (2004), Halıcıoğlu (2007), Bahmani-Oskooee and Kutan (2008); the direction of the relationship between domestic income and the trade balance and foreign income and the trade balance is hard to predict. As stated in these studies, increase in domestic income may be a sign of economic growth and may result in increased production of exportables as well, leading to an improvement in the trade balance. With the same rationale, the increase in foreign income also means increase in exportables of that country to Turkey, causing Turkish trade balance to deteriorate. Therefore, in this study, no expectations are formed regarding the coefficients of the domestic income and the foreign income.

The data on exports and imports in consumption, capital and intermediate goods are taken from 'Foreign Trade by country and BEC classification' database under the section Foreign Trade Statistics of Turkish Statistical Institute. The nominal bilateral exchange rates are retrieved from electronic database of the Central Bank of Republic of Turkey (CBRT)[9]. For domestic and foreign real income, the GDP volume index (2000=100) of each country taken from International Financial Statistics Online (IFS-Online) database of International Monetary Fund (IMF) is used. To calculate the real exchange rates (LRER and LRERP), the required price indices (CPI, PPI) are also taken form IMF's IFS-Online database as well.

[9]As a result of introduction of Euro, the data for German Mark (DM) -New Turkish Lira (YTL) and Italian Lira (ITL)-New Turkish Lira (YTL) exchange rates are available until 2002Q2. Thereafter, Euro (EUR)-New Turkish Lira (YTL) exchange rate is converted into required exchange rates by using conversion factors accepted by EU Council on January 1, 1999.

3.2. A General Look into the Raw Data

In this section to develop an understanding of the data set, a descriptive analysis of the variables will be presented. Graph of trade balance on type *i* good for country *j* with relevant bilateral real exchange rate (LRER for trade balance in consumption goods and LRERP for trade balance in capital or intermediate goods) are given in the figures below[10].

When figure 3.1 is examined, until 1988Q4, depreciation of the real exchange rate (LRER) improves the trade balance in consumption goods (LTBCON) with USA and appreciation worsens, in line with predictions of the theory. During the period 1988Q4-1990Q4, continuous appreciation of YTL is seen, but no special pattern about the movement in the LTBCON is observed. With the economic crisis of April 1994, a sharp increase in the LRER is seen causing a peak in LTBCON with USA. After 1995Q4, the movement of LTBCON seems more stable. For 1995Q4-1997Q3 a period of little depreciation is evident again, but a certain movement in LTBCON is hardly seen. YTL depreciates sharply in 2000Q4-2001Q3; however it does not cause a major movement in LTBCON. From 2002Q3 onwards, there is a continuous real appreciation of YTL, however, LTBCON does not seem to respond.

As figure 3.2 illustrates, until 1988Q4, the trade balance with USA in capital goods (LTBCAP) seems to follow the movement in the real exchange rate (LRERP). Thereafter, the graph does not suggest a relationship between the movements in the LTBCAP and LRERP, up to 1994Q4. In 1994Q2, while LRERP makes a peak, that movement is not reflected to LTBCAP immediately. So, contrary to LTBCON, that sharp depreciation affects LTBCAP with a lag, two

[10] In order to save space, some abbreviations are used for the variables in the rest of the study. A list of abbreviations used is given in Appendix A.

periods after in 1994Q4. After 2002Q3, continuous appreciation of YTL is evident, but LTBCAP seems to be unresponsive.

Examination of figure 3.3 shows that for 1988Q1-1989Q1, the trade balance with USA in intermediate goods (LTBINT) moves parallel to the real exchange rate (LRERP). Thereafter, the co-movement is not observed any more. Sharp depreciation in 1994Q2 is followed by a sharp rise in LTBINT in the following quarter. During 1995Q2-2001Q3, both LTBINT and LRERP move around an upward trend. LTBINT decreases when YTL depreciated sharply in economic crisis of 2001. After the economic crisis, the two series move in opposite directions.

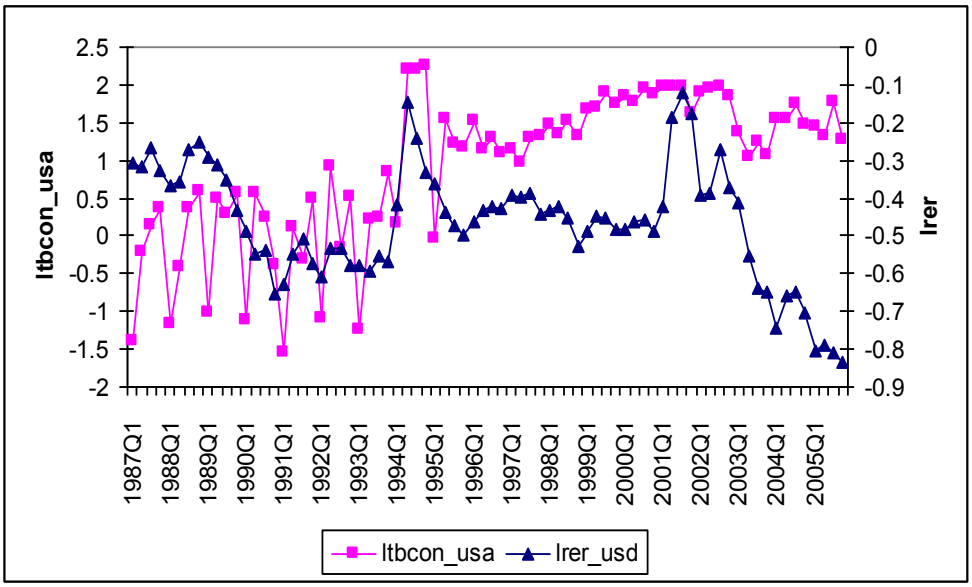

Figure 3.1: Trade balance with USA in consumption goods (ltbcon_usa) and real exchange rate between YTL and USD (lrer)

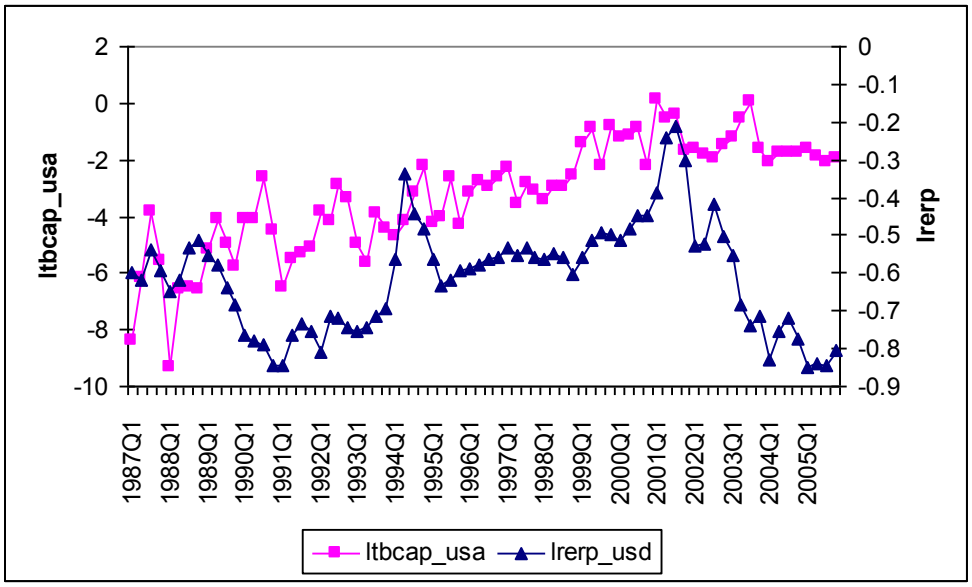

Figure 3.2: Trade balance with USA in capital goods (ltbcap_usa) and real exchange rate between YTL and USD (lrerp)

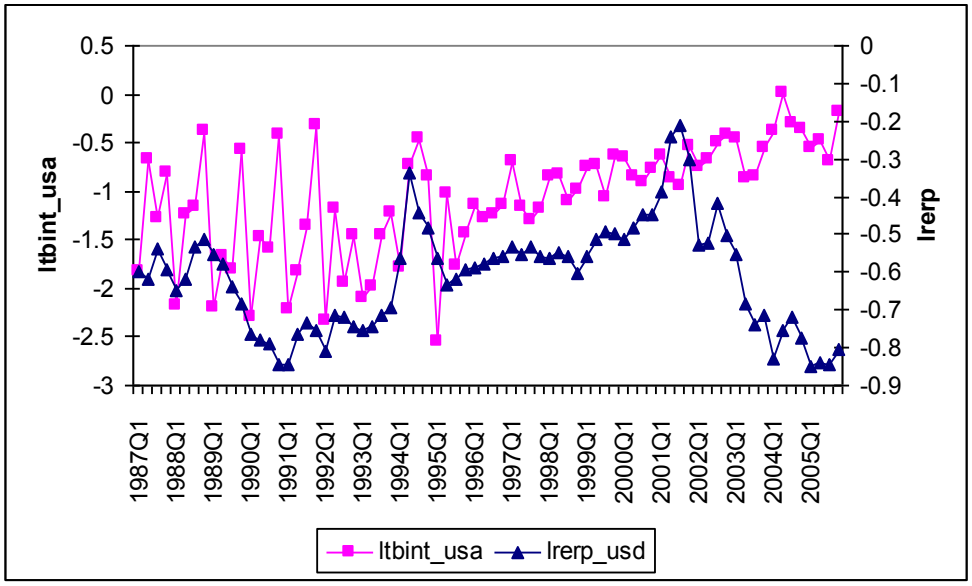

Figure 3.3: Trade balance with USA in intermediate goods (ltbint_usa) and real exchange rate between YTL and USD (lrerp)

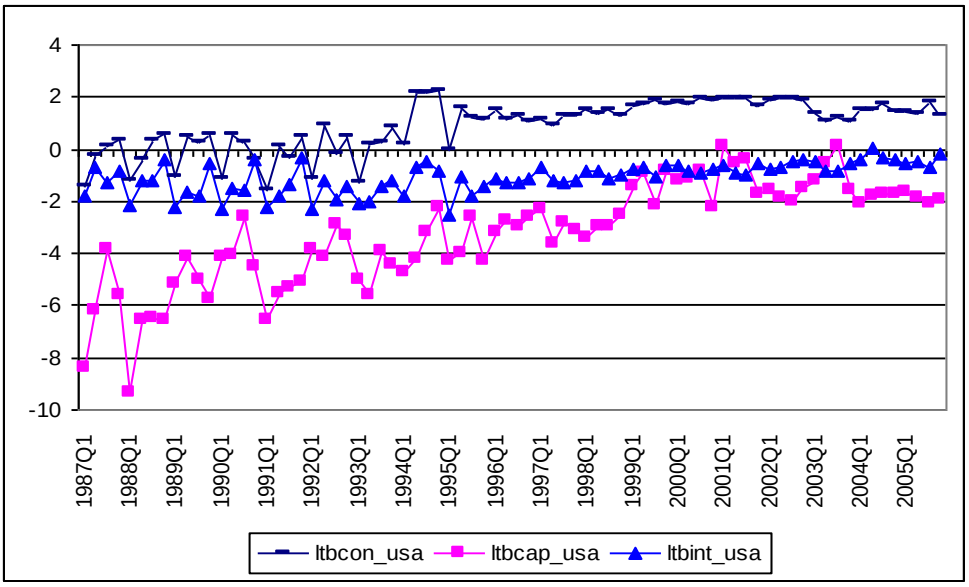

Figure 3.4: Trade balance with USA in consumption, capital and intermediate goods

As seen from figure 3.4, until 1995Q1, it is difficult to make a conclusion about Turkey's position as a net exporter or importer of consumption goods. However, it becomes a net exporter thereafter. As easily observed from figure 2.4, Turkey is a net importer of capital and intermediate goods from USA throughout the period, whereas both the trade balances improve through time. Therefore, the production side of the economy continues to depend on imports of capital and intermediate goods from US.

Figure 3.5 shows that between 1987Q4-1990Q2, the trade balance with Germany in consumption goods (LTBCON) follows the movement in the real exchange rate (LRER). The sharp depreciation in 1994Q4 is followed by a peak in LTBCON in the following quarter. After the crisis of 1994, the two series broadly move together. During the period of depreciation in 2001, the contraction in domestic demand cuts on demand for both domestic products and the imports. As a result, both the imports fall and the exports rise, leading to improvement of LTBCON.

The movement of the trade balance with Germany in capital goods and the real exchange rate is presented in figure 3.6. It is seen that up to 1989Q3, the trade balance with Germany in capital goods (LTBCAP) moves in opposite directions with the real exchange rate (LRERP). Between 1989Q3 and 1994Q1, the two series seem to be parallel. The sharp depreciation in 1994Q2 causes a peak in LTBCAP in the next quarter. After 1994Q2, a general appreciation trend is observed for YTL against DM with the exception of 2000-2001 period. The trade balance in capital goods, on the other hand, fluctuates around a rising trend. During the year 2001, the imports of capital goods from Germany falls on average, as the production side of the economy suffers from a large contraction in the 2001 crisis. This can be seen in figure 2.6 as the upward movement in LTBCAP during the year 2001.

Figure 3.7 illustrates that up to 1994Q4, there seems to be a co-movement between the trade balance with Germany in intermediate goods (LTBINT) and the real exchange rate (LRERP), although the volatility of LTBINT exceeds the volatility of LRERP by a considerable amount. During 1994Q2-2000Q4, a continuous appreciation of YTL against DM is observed; however, LTBINT fluctuates in different directions. Similar to LTBCAP, depreciation during 2001 is accompanied by increase in LTBINT, as the production falls due to the economic crisis. After crisis of 2001, LTBINT and LRERP move in the same direction.

Figure 3.8 reveals that during the sample period Turkey is a net exporter of consumption goods to Germany and confirms Turkey's position as a net importer of capital and intermediate goods from Germany as well. While the trade balance in intermediate goods is somewhat stable, the trade balance in capital goods improves through time and the trade balance in consumption goods decreases.
From figure 3.9, no evidence of a co-movement is seen between the trade balance with Italy in consumption goods (LTBCON) and the real exchange rate (LRER)

up until 1993. During 1993, appreciation of YTL deteriorates LTBCON. Throughout the period of appreciation of YTL between 1994 and 2000, LTBCON follows a decreasing trend first, and then fluctuates. During the crisis in 2001, contraction in domestic demand for both domestic and foreign consumption goods leads domestic producers to export their products to German market more. On the other hand, domestic consumers demand less of German consumption goods, resulting in fall in imports. Consequently, similar to LTBCON with Germany, LTBCON with Italy improves in 2001. After the crisis, LTBCON and LRER broadly move in opposite directions.

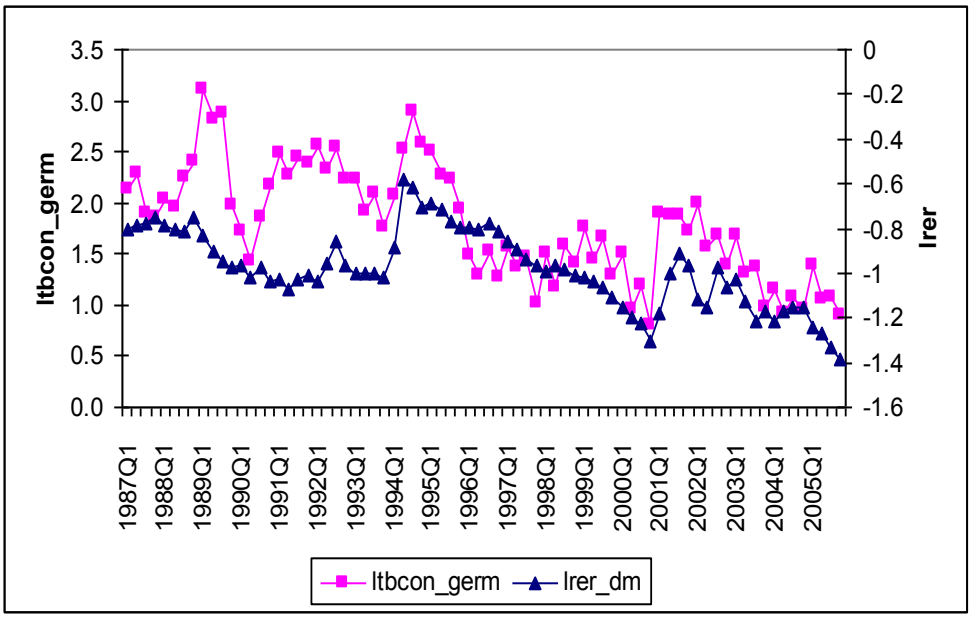

Figure 3.5: Trade balance with Germany in consumption goods (ltbcon_germ) and the real exchange rate between YTL and DM (lrer)

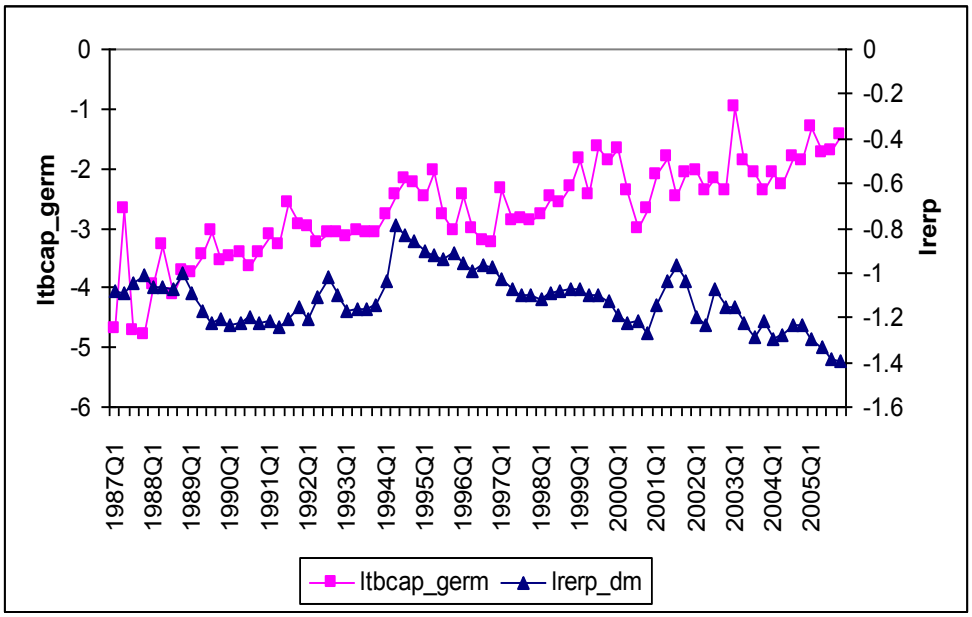

Figure 3.6: Trade balance with Germany in capital goods (ltbcap_germ) and the real exchange rate between YTL and DM (lrerp)

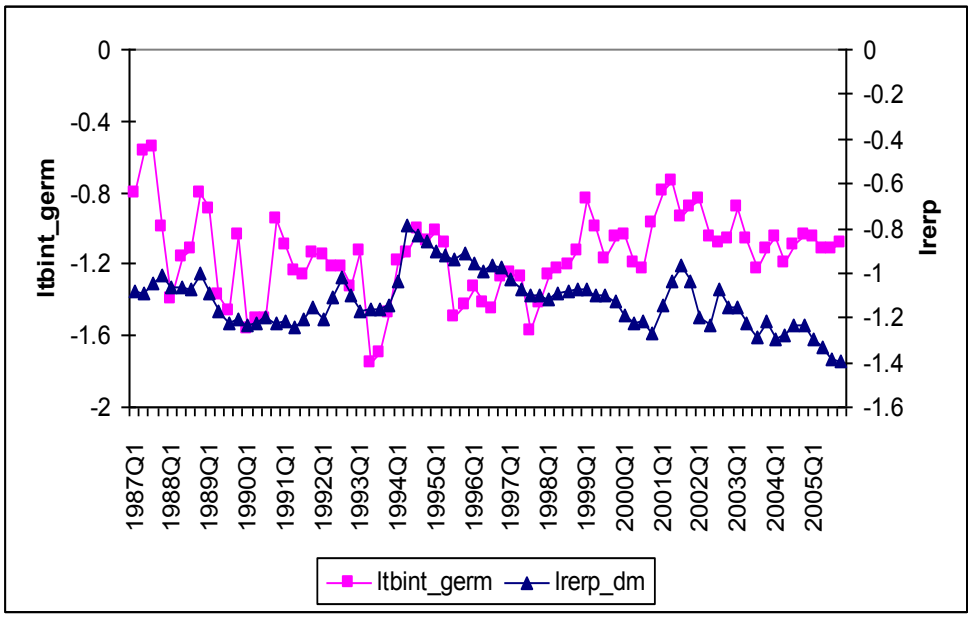

Figure 3.7: Trade balance with Germany in intermediate goods (ltbint_germ) and the real exchange rate between YTL and DM (lrerp)

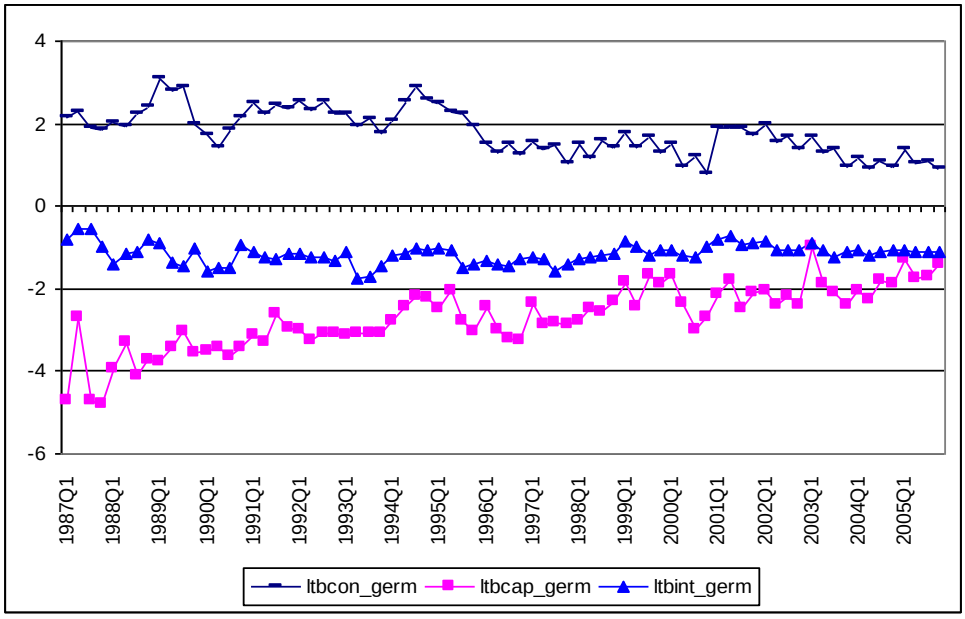

Figure 3.8: Trade balance with Germany in consumption, capital and intermediate goods

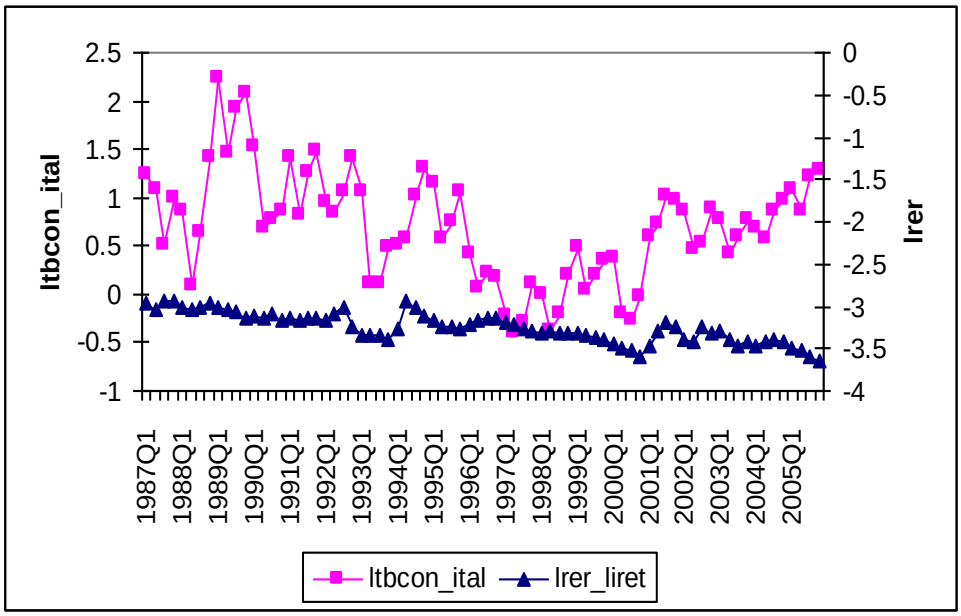

Figure 3.9: Trade balance with Italy in consumption goods (ltbcon_ital) and the real exchange rate between YTL and ITL (lrer)

Figure 3.10 illustrates that until 1991Q1 the trade balance with Italy in capital goods (LTBCAP) moves in the opposite direction to the real exchange rate (LRERP). As the exchange rate appreciates between 1994 and 2001, LTBCAP improves. During 2001, the economic crisis causes production sector of Turkey to contract, resulting in a decrease in imports of capital goods, and an improvement in LTBCAP with Italy similar to the behaviour of LTBCAP with Germany. However, after 2001, the exchange rate continues to appreciate while LTBCAP stagnates.

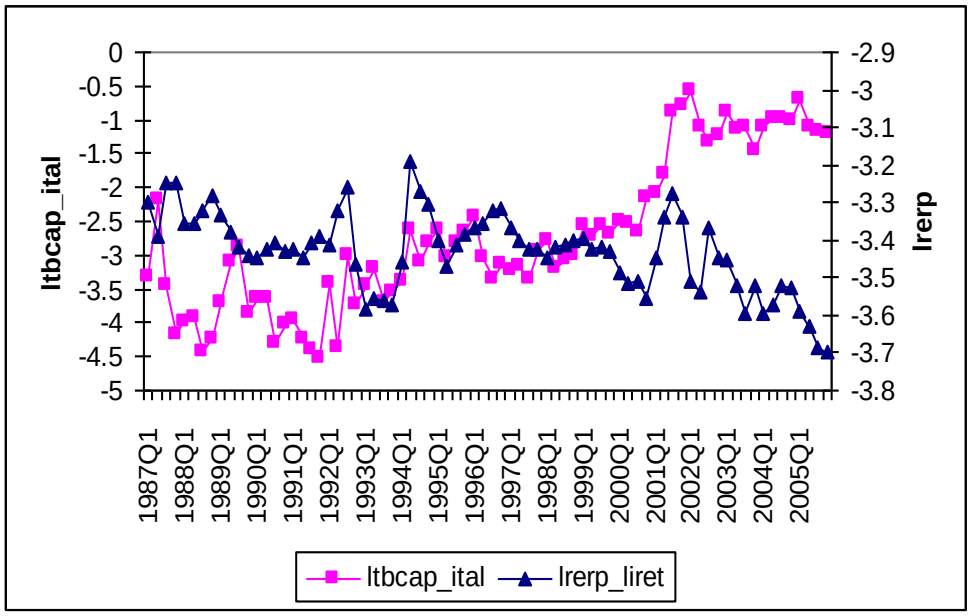

Figure 3.10: Trade balance with Italy in capital goods (ltbcap_ital) and the real exchange rate between YTL and ITL (lrerp)

Figure 3.11 indicates that there is a co-movement between the trade balance with Italy in intermediate goods (LTBINT) and the real exchange rate (LRERP) during 1988Q2-2002Q3. Similar to LTBINT with Germany, the crisis periods reduces the imports of intermediate goods as the domestic production falls, and improves

the trade balance in intermediate goods. After 2003, the co-movement betweeen the two series weakens.

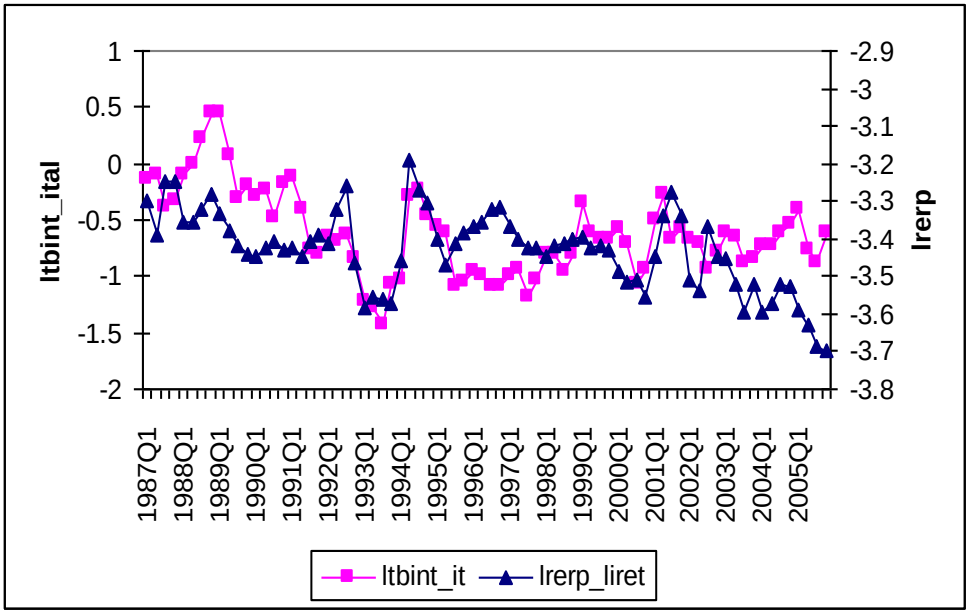

Figure 3.11: Trade balance with Italy in intermediate goods (ltbint_ital) and the real exchange rate between YTL and ITL (lrerp)

As seen in figure 3.12, Turkey is a net importer of capital and intermediate goods from Italy as it is from USA and Germany. The trade balance in capital goods improves through time. For consumption goods, in the period of 1996Q2-2000Q4, the position switches to being a net importer from time to time, however, in general the exports in consumption goods exceed the imports.

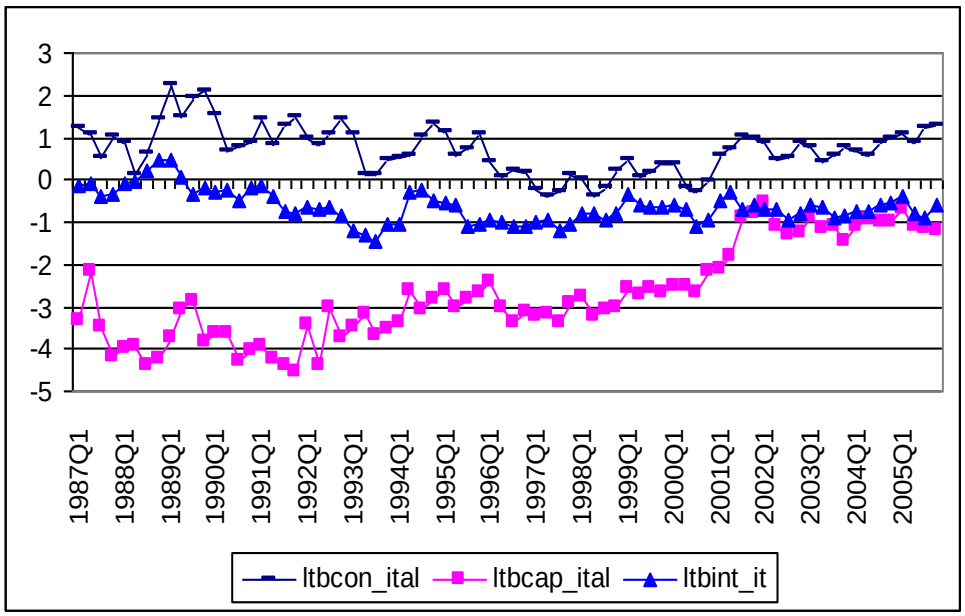

Figure 3.12: Trade balance with Italy in consumption, capital and intermediate goods

In figures 3.13, 3.14, and 3.15, the sizes of the trade with different trading partners on each good are compared. As seen from figure 3.13, except for the beginning of the sample period for USA, Turkey is a net exporter of consumption goods to all three trading partners. Trade balances of all three countries make a peak during the crisis of 1994, as domestic demand gets smaller. As Utkulu and Seymen (2004) explain, with the implementation of Customs Union (CU) from January 1996 onwards, the imports of consumption goods from European countries rise more than the exports to those countries. The main reason for the greater impact on imports rather than exports was, as Utkulu and Seymen (2004) mention, was the parties' signature of Additional Protocol on September 1, 1971, before Customs Union came into effect. This protocol freed exports of some of the industrial products from Turkey into European market from tariffs starting from 1971. Hence, the CU did not boost exports sharply (Utkulu and Seymen 2004). Instead, its effect on imports of consumption goods was more evident. The effect

is seen from figure 3.13 as well. Up to 1996Q1, Turkey's trade in consumption goods with Germany exceeds the other two countries. However from 1996Q1 onwards, trade with USA catches up with Germany. The trade balance in consumption goods with Italy deteriorates during 1996-1997, as well.

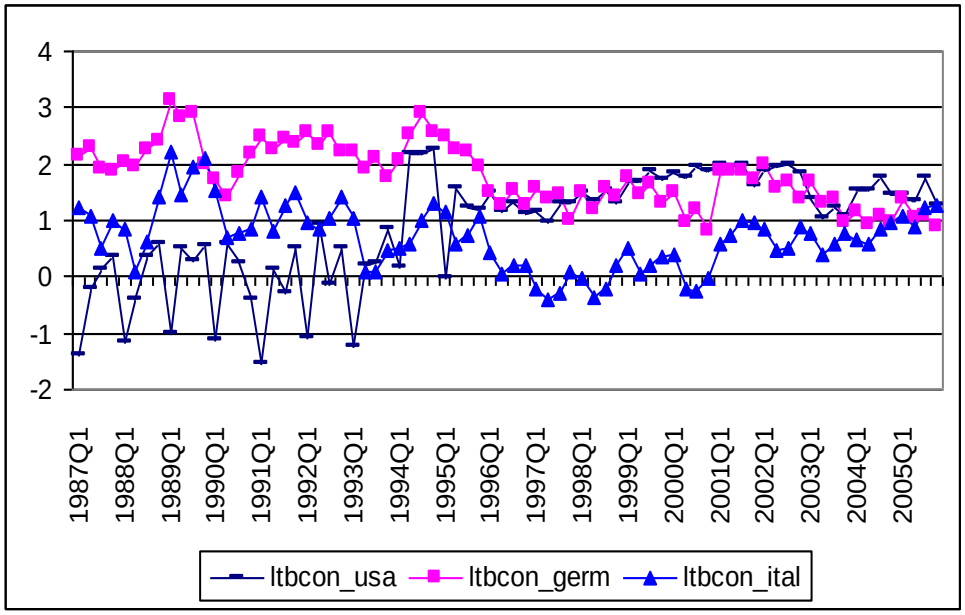

Figure 3.13: Trade balance in consumption goods with USA, Italy and Germany

Figure 3.14 shows that the trade balance in capital goods moves from a deep deficit to a smaller one for all the trading partners. This may be due to less reliance on imports for capital goods or substituting new trading partners in order to meet the need for capital goods. The size of the trade deficit is greater for USA at the beginning but it seems to be equalized for all three trading partners through time. The implementation of CU from January 1996 onwards did not cause a major impact on LTBCAP with Germany and Italy.

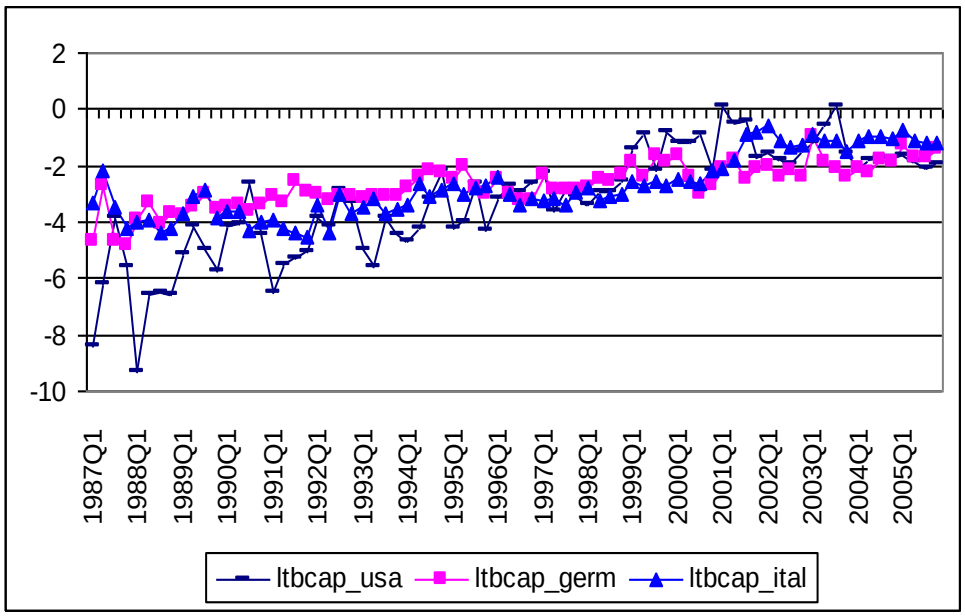

Figure 3.14: Trade balance in capital goods with USA, Italy and Germany

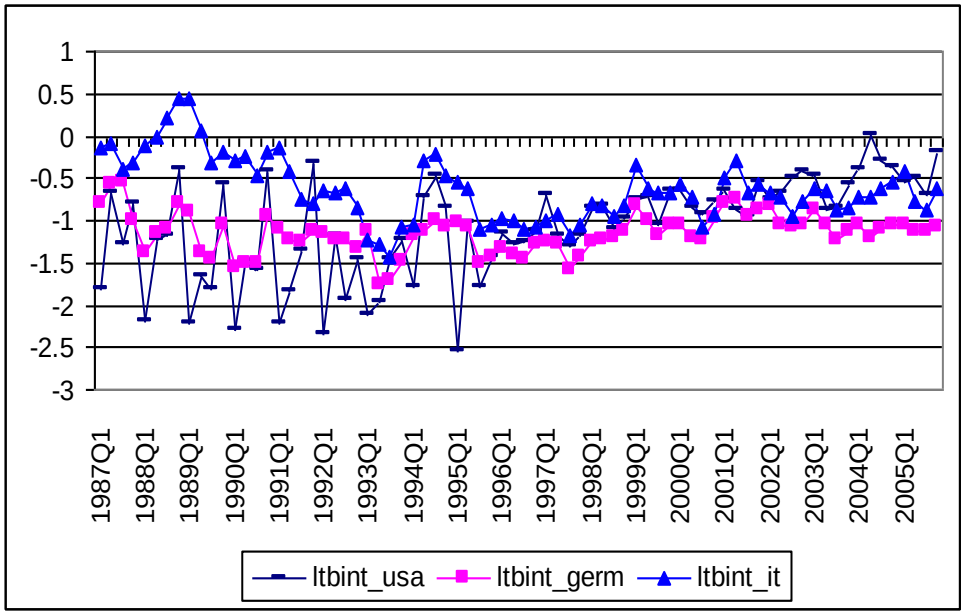

Figure 3.15: Trade balance in intermediate goods with USA, Germany and Italy

The trade balance in intermediate goods is in deficit with USA, Germany and Italy as seen in figure 3.15. However, surprisingly, all three balances have a tendency to improve through the sample period, although the dependency of Turkish producer on imports of intermediate goods does not change much. This improvement may be due to increasing share of other trading partners in the total imports of intermediate goods, such as Russia and China. The trade balance in intermediate goods becomes relatively stable for all three countries after 1995Q4. Still, Turkey is a net importer of the intermediate goods from USA, Germany and Italy.

3.3. Unit Root Tests

The bounds testing approach of Pesaran et al. (2001) allows the variables to be either stationary or integrated of order one. However, bounds testing can not be applied if the variables' order of integration is either two or higher. To determine the order of integration, Augmented Dickey Fuller (ADF) tests are applied to the levels and the first differences. The letter 'D' indicates that the variable is differenced once. The results are given in tables 3.1, 3.2, 3.3, 3.4, 3.5, and 3.6[11]:

As seen from table 3.1, the results support that LTBCAP is stationary and LTBINT is trend-stationary. Table 3.2 supports that all the variables for US are stationary when they are differenced once. Since none of the variables is found to be integrated of order two, bounds testing can be used to test cointegration for trade balance with USA on all types of goods.

Table 3.3 shows that, when trend is included, hypothesis of having a unit root is strongly rejected (at 99%) for LTB_CAP while it can not be rejected when it is excluded. Therefore, LTB_CAP seems to be trend-stationary. Having a unit root is rejected for LTB_INT for 99% confidence level, so LTB_INT is stationary.

[11] The critical values for ADF tests are taken from Greene (2003), Econometric Analysis, New: Jersey: Pearson Education, p.638

Therefore except for LTB_CAP and LTB_INT, the other variables are found to be I(1) as illustrated by Table 3.4.

Since having a unit root is rejected at 99% confidence level for LTB_CAP, LRER and LRERP when trend term is included, LTB_CAP, LRER and LRERP are concluded to be trend-stationary for Italy according to the results in Table 3.5. When Table 3.6 is examined, all variables are found to be stationary when their first differences are taken. Therefore, similar to US and German variables, the variables of Italy are appropriate to conduct a bounds test for cointegration

Table 3.1: ADF test results for levels of variables for USA

	With trend and intercept		With intercept only	
Variables	Lags	Calculated ADF	Lags	Calculated ADF
LTB_CON	4	-2.300	4	-1.727
LTB_CAP	0	-5.856***	0	-3.397*
LTB_INT	4	-3.622**	3	-0.918
LRER	1	-2.571	1	-2.274
LRERP	1	-2.271	1	-2.343
LY	2	-2.357	2	-0.222

Note: The critical values for the models with trend and intercept are -4.04, -3.45, and -3.15 for confidence levels of 99%, 95% and 90% respectively. The critical values with intercept only are -3.50, -2.90, and 2.58 for confidence levels of 99%, 95% and 90% respectively. Rejection of null hypothesis is shown with * for 90%, ** for 95% and *** for 99% confidence levels.

Table 3.2: ADF test results for first differences of variables for USA

	With intercept only		Without intercept and trend	
Variables	Lags	Calculated ADF	Lags	Calculated ADF
DLTB_CON	3	-4.723***	3	-4.676***
DLTB_CAP	1	-10.622***	0	-10.563***
DLTB_INT	2	-13.637***	2	-13.692***
DLRER	1	-7.100***	1	-7.043***
DLRERP	0	-6.999***	0	-7.041***
DLY	1	-3.700***	1	-1.787*
Note: The critical values for the models with intercept only are -3.50, -2.90, and 2.58 for confidence levels of 99%, 95% and 90% respectively. The critical values without an intercept and trend are -2.60, -1.95, and -1.61 for confidence levels of 99%, 95% and 90% respectively. Rejection of null hypothesis is shown with * for 90%, ** for 95% and *** for 99% confidence levels.				

Table 3.3: ADF test results for levels of variables for Germany

	With trend and intercept		With intercept only	
Variables	Lags	Calculated ADF	Lags	Calculated ADF
LTB_CON	5	-3.282*	5	-0.973
LTB_CAP	0	-7.465***	1	-1.699
LTB_INT	0	-4.418***	0	-4.323***
LRER	0	-2.100	0	-1.171
LRERP	0	-2.033	0	-1.684
LY	0	-1.770	0	-3.065**
Note: The critical values for the models with trend and intercept are -4.04, -3.45, and -3.15 for confidence levels of 99%, 95% and 90% respectively. The critical values with intercept only are -3.50, -2.90, -2.58 for confidence levels of 99%, 95% and 90% respectively. Rejection of null hypothesis is shown with * for 90%, ** for 95% and *** for 99% confidence levels.				

Table 3.4: ADF test results for first differences of variables for Germany

	With intercept only		Without intercept and trend	
Variables	Lags	Calculated ADF	Lags	Calculated ADF
DLTB_CON	4	-5.829***	4	-5.816***
DLTB_CAP	0	-14.519***	0	-14.574***
DLTB_INT	6	-5.379***	6	-5.408***
DLRER	0	-7.255***	0	-7.222***
DLRERP	0	-7.615***	0	-7.639***
DLY	0	-8.221***	0	-7.126***
Note: The critical values for the models with intercept only are -3.50, -2.90, and 2.58 for confidence levels of 99%, 95% and 90% respectively. The critical values without an intercept and trend are -2.60, -1.95, and -1.61 for confidence levels of 99%, 95% and 90% respectively. Rejection of null hypothesis is shown with * for 90%, ** for 95% and *** for 99% confidence levels.				

Table 3.5: ADF test results for levels of variables for Italy

	With trend and intercept		With intercept only	
Variables	Lags	Calculated ADF	Lags	Calculated ADF
LTB_CON	9	-0.804	9	-1.465
LTB_CAP	1	-4.304***	1	-0.850
LTB_INT	0	-2.854	0	-2.753*
LRER	1	-4.936***	0	-1.673
LRERP	1	-4.564***	1	-3.195
LY	0	-1.927	0	-2.173
Note: The critical values for the models with trend and intercept are -4.04, -3.45, and -3.15 for confidence levels of 99%, 95% and 90% respectively. The critical values with intercept only are -3.50, -2.90, and 2.58 for confidence levels of 99%, 95% and 90% respectively. Rejection of null hypothesis is shown with * for 90%, ** for 95% and *** for 99% confidence levels.				

Table 3.6 : ADF test results for first differences of variables for Italy

	With intercept only		Without intercept and trend	
Variables	Lags	Calculated ADF	Lags	Calculated ADF
DLTB_CON	8	-3.676***	8	-3.706***
DLTB_CAP	0	-12.468***	0	-12.531***
DLTB_INT	0	-7.837***	0	-7.886***
DLRER	1	-7.337***	1	-7.227***
DLRERP	1	-7.794***	1	-7.760***
DLY	0	-7.651***	0	-6.188***
Note: The critical values for the models with intercept only are -3.50, -2.90, and 2.58 for confidence levels of 99%, 95% and 90% respectively. The critical values without an intercept and trend are -2.60, -1.95, and -1.61 for confidence levels of 99%, 95% and 90% respectively. Rejection of null hypothesis is shown with * for 90%, ** for 95% and *** for 99% confidence levels.				

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CHAPTER 4

THE EMPIRICAL ANALYSIS

As explained in Chapter 2, the analysis of J-curve requires examination of both the long run and the short run dynamics between the real exchange rate and the trade balance. The main concern of the analysis in this chapter is finding answers to some questions summarized below:

- Is there a cointegration among the variables chosen?
- Is there a significant long run relationship between the trade balance with country *j* in good type *i* (LTB*i_j*) and the real exchange rate (LRER(P))
- Is there a significant short run relationship between the LTB*i_j* and LRER(P).
- If the answers to the questions above are affirmative, is the direction of the effect negative for short run and positive for long run, resulting in a J-shape?

To answer all the questions above, bounds testing approach for cointegration developed by Pesaran et al. (2001) is used. Preferring bounds testing approach (Pesaran et al. 2001) for this study mainly depends on two reasons: First of all, it allows the variables to be stationary, integrated of order one or a mixture of both,

which is the characteristics of the data used. Second, as illustrated by Pesaran et al. (2001), bounds testing for cointegration is proceeded with analysis of an autoregressive distributed lag model (ARDL) based on Pesaran and Shin (1999). As a result, the long run and the short run dynamics can be examined as well, fulfilling the main requirement for a J-curve analysis.

The bounds testing approach (Pesaran et al. 2001) tests the null hypothesis of no cointegration. In fact, it is mainly a joint significance test of the one period lagged values of the levels in an unrestricted error correction model (UECM) expressed as follows:

$$\Delta LTBi\_j_t = \alpha + \sum_{k=1}^{p} \beta_k \Delta LTBi\_j_{t-k} + \sum_{k=0}^{p} \gamma_k \Delta LRER(P)_{t-k} + \sum_{k=0}^{p} \lambda_k \Delta LY^T_{t-k} + \sum_{k=0}^{p} \eta_k \Delta LY^j + \delta_1 LTBi\_j_{t-1} + \delta_2 LRER(P)_{t-1} + \delta_3 LY^T_{t-1} + \delta_4 LY^j_{t-1} + u_t \quad (4)$$

In other words, the first step is to test H_0: $\delta_1=\delta_2=\delta_3=\delta_4=0$ (the hypothesis of no cointegration) against the alternative H_1: $\delta_1\neq0$, $\delta_2\neq0$, $\delta_3\neq0$, $\delta_4\neq0$. The calculated F-statistics has a nonstandard distribution such that for each confidence level, two critical value bounds are developed: one assuming that all the variables are stationary and another assuming that all the variables are integrated of order one. These critical values provide upper and lower bounds to compare the calculated F-statistic. If the calculated statistics lies above the upper bound, the null hypothesis of no cointegration is rejected. If the calculated statistic lies below the lower bound, the null hypothesis can not be rejected. If the calculated F-statistic falls between the lower and upper bounds, then a conclusion can not be drawn, the analysis can be carried further into the ECM.

If cointegration is found or at least the results are inconclusive, it becomes meaningful to analyze the ECM and the short run and the long run dynamics associated with it. Therefore ARDL approach of Pesaran and Shin (1999) is

conducted next and the relationship between the levels are examined with the ECM derived from that specific ARDL (q,r,s,t).

As first illustrated by Pesaran et al. (2001), the results of the bounds testing approach are sensitive to the lag length chosen for the first differenced variables. In order to verify this, the calculated F-statistics for different lags chosen for the first differences of the variables are given in Table 4.1. Following Pesaran and Pesaran (1997), the current values of the first differenced explanatory variables are not included at this stage, as it can not be inferred that those variables are totally 'explanatory' rather than being 'dependent'. In other words, calculated F-statistics presented below are namely F(LTB*i* | LRER(P), LY^T, LY^j) for now. To present the full picture, the lag lengths are chosen as many as possible, here as 13, which is the greatest lag length the sample size allows, leaving enough number of observations in order to carry out a bounds test.

As seen from Table 4.1, the hypothesis of no cointegration between the trade balance with USA in consumption goods, the real exchange rate, real domestic income and real foreign income is rejected at different significance levels for lag orders of 1, 2, 10 and 13.The results are inconclusive for lag orders of 7 and 11. The hypothesis of no cointegration between the trade balance with USA in capital goods, the real exchange rate, real domestic income and real foreign income is rejected at different significance levels for lag orders of 1, 2, 13 while no conclusion can be drawn for lag orders of 3, 4, 5 and 10. Last of all no cointegration between the trade balance with USA in intermediate goods, the real exchange rate, real domestic income and real foreign income is rejected at different significance levels for lag orders of 1, 2, 9 and 10 while the results are inconclusive for lag orders of 3, 6, 7 and 11.

Failure to reject the null hypothesis of no cointegration is rarer in the case of Germany. The results either reject no cointegration or at least remain

inconclusive, leaving room to carry the analysis further into error correction model. For lag orders of 2, 4, 5, 6, 7 and 13, no cointegration is rejected for trade balance in consumption goods, and for 3, 8 and 10 lags, results are inconclusive. For lag orders of 1, 3, 4 and 8, no cointegration is rejected for trade balance in capital goods while the calculated statistics fall into the inconclusive region for lag orders of 2, 5, 6, 7, 9 and 12. Last of all, the trade balance in intermediate goods supports cointegration for lags of 1, 2, 3, 4, 8, 10 and 11. The inconclusive region is seen for lag orders of 5, 7 and 13.

Contrary to Germany, the data for Italy does not reject the null hypothesis of no cointegration for most of the cases. Only for lag order of 1, for capital goods; and lag order of 1 and 2 for intermediate goods, no cointegration is rejected. For lag orders of 2 and 10 for consumption and capital goods and 12 for intermediate goods, the results of the bounds test are inconclusive.

Following Pesaran et al. (2001), and also illustrated by Islam (2004), the lag length used for bounds testing is decided by an unrestricted VAR model referring to the different information criteria, which are Akaike's Information Criteria (AIC) and Schwarz Information Criteria (SC). The suggested lag lengths by AIC and SC criteria of the unrestricted VAR model are given in table A.1 in Appendix C. As seen from the table, AIC and SC do not agree on the optimum number of lags to be included[12]. AIC criterion which suggests more lags to be included is taken into consideration for the rest of the study, as the main focus here is to analyze short run effects of the real exchange rate to the possible extent. Therefore, number of lags included for the levels are 8 for LTBCON and LTBCAP; 5 for LTBINT for USA; 6 for LTBCON, 5 for LTBCAP, and 8 for LTBINT for Germany; 5 for LTBCON and LTBCAP, 7 for LTBINT for Italy to carry a bounds test for cointegration.

[12] Except for the case of Italy in capital goods.

Table 4.1: The calculated F-statistics relevant for bounds test for different lag lengths of the first differenced variables.

	USA			GERMANY			ITALY		
Lag Length	LTBCON	LTBCAP	LTBINT	LTBCON	LTBCAP	LTBINT	LTBCON	LTBCAP	LTBINT
1	10.788***	10.1996***	8.8238***	1.9974	5.9659***	8.2484***	2.2846	4.5281**	8.1059***
2	4.1771*	3.8625*	9.286***	11.218***	3.4601*i*	6.6171***	2.9136*i*	3.3577*i*	4.9131**
3	1.2673	2.7486*i*	3.2796*i*	3.7332*i*	4.1802*	4.2232*	1.8225	1.5177	1.9547
4	1.3679	3.3699*i*	2.0955	4.0228*	3.7719*	5.025**	0.74892	1.3207	1.4203
5	1.6831	2.7547*i*	1.8126	4.4881**	3.1874*i*	3.3388*i*	0.89389	1.0129	1.0696
6	1.1319	2.5683	3.4285*i*	5.166**	3.0609*i*	2.6971	0.49136	0.54376	1.7535
7	3.1662*i*	2.5082	2.8719*i*	4.0821*	2.9156*i*	3.3893*i*	0.65417	0.7243	2.4012
8	2.2147	2.0379	2.6669	3.0248*i*	5.3184**	7.4139***	1.2617	1.0461	2.3826
9	2.5585	1.5305	3.9499*	2.459	3.6596*i*	2.6276	0.79747	1.7422	1.824
10	3.8486*	3.5455*i*	4.744**	3.5844*i*	2.226	1.4747	2.742*i*	3.1134*i*	1.8412
11	3.3376i	2.4057	3.1756*i*	2.2841	1.3127	5.5045**	1.824	1.7749	1.5568
12	0.95579	1.5973	1.7828	1.497	2.7217*i*	7.6038***	1.408	0.91452	3.2354*i*
13	5.3869**	3.8148*	1.5081	3.7985*	1.717	3.0078*i*	0.46413	0.36901	1.7269

The critical value bounds to test the null hypothesis of no cointegration are 2.72 and 3.77 for 90%, 3.23 and 4.35 for 95%, 4.29 and 5.61 for 99% confidence levels (Pesaran et al. 2001, Table CI(iii) Case III). Rejection of null hypothesis is indicated with * for 90%, ** for 95%, and *** for 99% confidence levels, and *i* denotes inconclusiveness for 90%. Lag length refers to the lags of the first differenced variables.

Table 4.2: Summary of the results of the bounds test for cointegration

	USA			GERMANY			ITALY		
	CON	CAP	INT	CON	CAP	INT	CON	CAP	INT
Lags	7	7	4	5	4	7	4	4	6
Stat.	3.166	2.508	2.095	4.488	3.771	3.389	0.748	1.32	1.753
Conc.	Inconc.	No coint.	No coint.	Coint.	Coint.	Inconc.	No coint.	No coint.	No coint.

Lags refers to the lags chosen for the first differenced variable. 'Conc.' refers to the results of the bounds test of Pesaran et al. (2001).

After choosing lag length, the next step is to check the result of the F-test for that specific lag length presented in Table 4.1. For convenience, the results of the bounds test for the relevant lag lengths are summarized again in Table 4.2. As seen from Table 4.2, the hypothesis of no cointegration can not be rejected for trade balance with USA in capital and intermediate goods and with Italy in consumption, capital and intermediate goods. However, it is rejected at 95% confidence level for trade balance with Germany in consumption goods and at 90% confidence level for trade balance with Germany in capital goods. The results fall into the inconclusive region at 90% significance level for trade balance with USA in consumption goods and trade balance with Germany in intermediate goods. As no cointegration can not be rejected for trade balance with USA in capital and intermediate goods, and trade balance with Italy in consumption, capital and intermediate goods, the long run and short run behaviours of these variables are not discussed any further.

After determining the possibility of cointegration for USA in consumption goods and for Germany in consumption, capital and intermediate goods, the next step is to determine the "long run forcing" (p.360) variables as Pesaran and Pesaran (1997) stated. In other words, among the four variables, the trade balance, the real exchange rate, the real domestic and foreign income, the ones that affect and the ones that are affected should be discriminated. For this purpose, whether the one

period lagged level variables are jointly significant in explaining the real exchange rate, the real domestic income and the real foreign income is tested separately using bounds testing approach at lag levels determined above. In other words, LRER(P), LY^T and LY^j are chosen as the dependent variable in equation (4), and the bounds test is conducted for each separately. The results are given below:

Table 4.3: The results of the bounds test for different dependent variables

	USA			GERMANY			ITALY		
Calculated F-stat	CON	CAP	INT	CON	CAP	INT	CON	CAP	INT
LRER|LTB*i*,LY^T,LY^j	1.92	1.09	0.77	1.38	1.36	2.78*i*	4.10*	2.34	2.63
LY^T |LTB*i*,LRER,LY^j	0.16	0.60	1.65	0.22	2.21	0.35	5.25**	2.09	1.00
LY^j |LTB*i*,LRER,LY^T	2.54	2.41	1.98	2.61	1.78	1.44	1.33	0.85	1.58
The critical value bounds to test the null hypothesis of no cointegration are 2.72 and 3.77 for 90%, 3.23 and 4.35 for 95%, 4.29 and 5.61 for 99% confidence levels (Pesaran et al. 2001, Table CI(iii) Case III). Rejection of null hypothesis is indicated with * for 90%, ** for 95%, and *** for 99% confidence levels, and *i* denotes inconclusiveness for 90%.									

As seen in Table 4.3, the results support that if cointegration is found, that is a long-run relationship is supported, then among the four variables, it is the trade balance that is 'explained' by the other 3 variables. In other words, the real trade balance is dependent and the real exchange rate, the real foreign income and the real domestic income are the explanatory ones[13].

In the light of Pesaran et al. (2001), for the cases where the results either reject no cointegration or at least fall into the inconclusive region, an ARDL(q,r,s,t) following Pesaran and Shin (1999) is built and the estimates of the relationship

[13] The only exception is for Italy in consumption goods. However, as no cointegration is found for Italy, this result does not have a role on the rest of the study.

between levels is examined. Accordingly, in this study the long run relationship is examined next and the results are presented in Table 4.4.

Table 4.4: The long run estimates of the relationship between the levels

	USA		GERMANY					
	LTBCON		LTBCON		LTBCAP		LTBINT	
Reg.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
Intercept	-14.59***	0.000	10.63***	0.001	-16.95***	0.000	-3.81**	0.026
LRER(P)	1.91***	0.002	0.02	0.964	-0.18	0.802	-0.38	0.252
LY^T	5.93**	0.016	-2.47***	0.009	2.63**	0.045	0.44	0.307
LY^j	-2.19	0.415	1.13	0.719	1.36	0.752	0.11	0.946
'Reg.' refers to the name of the regressors. Significance at 90%, 95%, and 99% is denoted by *,**,and*** respectively.								

The results show that foreign real income is not a significant variable for affecting trade balance on any type of good in the long run. The trade balance seems not to depend on demand or supply side factors from other countries, but instead is mainly determined domestic demand and domestic supply factors.

The real exchange rate (LRER) is only significant for explaining the trade balance in consumption goods (LTBCON) with USA. The behaviour is in line with the expectations of the theory: increase in LRER, i.e. depreciation of YTL, improves the LTBCON with USA in the long run.

The significance of the LY^T varies across different types of tradables. For consumption goods for both USA and Germany, the LY^T is significant. However, the direction of its effect differs. For LTBCON with USA, the supply side factors seem to dominate in the long run, that is, as domestic income rises, supply of exports of consumption goods increases by more than the demand for imports of consumption goods, and trade balance improves accordingly. However, for

Germany, demand side factors seem to dominate, as the increase in LY^T is accompanied by deterioration of LTBCON.

The results are surprising, when trade balance with Germany in capital and intermediate goods are examined. Rise in LY^T triggers increases in the supply of exportable capital goods by more than increases in demand for imports of capital goods. Contrary to expectations, the growth in the economy does not seem to force producers to import more capital goods. Instead, the economic growth causes exports of capital goods to increase. However, the trade balance in intermediate goods with Germany does not depend on domestic real income in the long run.

After examination of the levels relationship, the ECMs derived from the underlying ARDL (q,r,s,t) model given in equation (5) are analyzed for short run dynamics. The variables included and their coefficients are presented in Table.4.5.

$$\Delta LTBi\_j_t = \alpha + \sum_{k=1}^{q} \beta_k \Delta LTBi\_j_{t-k} + \sum_{k=0}^{r} \gamma_k \Delta LRER(P)_{t-k} + \sum_{k=0}^{s} \lambda_k \Delta LY^T_{t-k} + \sum_{k=0}^{t} \eta_k \Delta LY^j \qquad (5)$$

As the results of the ARDL based ECMs show, the error correction term (ECT) is negative and highly significant in all 4 cases, which means deviations from long run equilibrium is corrected through time. Therefore, ECM supports the results of the bounds test for existence of cointegration for the 4 cases above. However, the real exchange rate is insignificant with all its lags in all of the cases considered.

In the short run, trade balance in consumption goods with USA mainly depends on DLY^T. As seen above the DLY^T and its values for lag levels of 1,2, 5 and 7 are highly significant and all have a negative coefficient. In other words, contrary to the long run impact, an increase in domestic income worsens the trade balance with USA in consumption goods in the short run. The difference in the direction of the response of the trade balance in consumption goods may be explained with

the different supply elasticities in the short run and the long run. The increase in domestic income in the short run causes domestic demand for consumption goods to rise. As expected, the supply of goods is more inflexible in the short run, as a result, this excess demand can not be met immediately with domestic resources. Instead, the imports of consumption goods rises, leading to a deterioration in the trade balance in consumption goods. However, in the long run, the passage of time allows the producers to make the necessary preparations to meet this excess demand and to shift more resources to increase production of consumption goods. With this expansion in production, supply of exportable consumption goods increases as well, leading to an improvement in the trade balance in the long run.

The trade balance in consumption goods with USA also depends on 2 and 7 period lagged values of the DLY^{j}. In other words, increase in US income causes LTBCON to increase with a lag of 2 or 7 periods that is 0.5 to 1.5 years approximately. The reasoning may be similar to the case of increased domestic income. As the US income rises, US demand increases. In the short run, it may be impossible to meet this excess demand with home-country resources, so imports from Turkey rises, contributing to the improvement of the Turkish trade balance in consumption goods. However, in the long run, the domestic resources may be adjusted properly to meet increased domestic demand in the US. As a result, in the long run, the movements in the foreign income becomes irrelevant for Turkey's trade balance.

Last of all, the 4 period lagged value of DLTBCON is also a significant variable in the short run. Increases in the difference between current and the previous period's LTBCON affects LTBCON positively in the following fourth period.

The results are more disappointing for LTBCON with Germany. The variables chosen are cointegrated, so there exists a long run relationship between these variables. However, in the short run, neither of these variables seem to have a significant effect on the LTBCON, except for $DLY^{T}(t-3)$. As seen above, only

$DLY^T(t-3)$ is significant and it is negative. So, three quarters after the increase in domestic income, LTBCON deteriorates, similar to its long run response. For trade in consumption goods with Germany, demand side effects dominate both in the short run and the long run. Domestic income growth triggers imports instead of increasing the supply of exports.

For LTBCAP with Germany, the domestic income variable is significant with all of its lags in the short run as it is in the long run. However, while the long run coefficient is positive, the coefficients of all its lags are negative in the short run. Increases in domestic income necessitate increases in production for some sectors. However, this expansion requires more capital goods to be imported in the short run, rationalizing the negative coefficients in front of the domestic income figures. However, in the long run, Turkey seems to increase its production of exportable capital goods to Germany. As a result, the trade balance in capital goods improves. The change in foreign income is significant at its 1 and 2 period lagged values. The one period lagged DLY^j deteriorates the LTBCAP while the 2 period lagged DLY^j improves it.

While the domestic income is insignificant in the long run in explaining LTBINT with Germany, all its lags are found to be significant in the short run. Similar to LTBCAP with Germany, increases in domestic income requires expansion in the production, causing imports of intermediate goods to rise and LTBINT to deteriorate. However, in the long run, fluctuations in domestic income are irrelevant to the movements in the LTBINT. The other variables, the real exchange rate and the foreign income, are found to be insignificant in the short run as they are in the long run.

Table 4.5: Estimated short run coefficients of the variables

	USA		GERMANY					
	LTBCON		LTBCON		LTBCAP		LTBINT	
	ARDL (5,1,8,8)		ARDL (4,2,4,0)		ARDL (2,0,4,3)		ARDL (1,1,5,0)	
Regressors	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
DLTB*i*(t-1)	-0.064	0.727	0.11	0.421	-0.164	0.166		
DLTB*i*(t-2)	-0.016	0.921	0.222	0.101				
DLTB*i*(t-3)	-0.174	0.233	-0.173	0.155				
DLTB*i*(t-4)	0.26014**	0.029						
DLRER(P)(t)	0.371	0.689	0.646	0.126	-0.102	0.804	0.500	0.167
DLRER(P)(t-1)			0.528	0.205				
DLY^T (t)	-3.836**	0.028	-1.076	0.129	-2.039**	0.015	-0.961*	0.055
DLY^T (t-1)	-5.160**	0.016	-1.008	0.225	-3.471***	0.000	-1.736***	0.001
DLY^T (t-2)	-6.488**	0.001	-0.435	0.575	-2.470***	0.004	-1.505***	0.002
DLY^T (t-3)	-1.797	0.319	-1.441**	0.042	-2.284***	0.005	-1.608***	0.001
DLY^T (t-4)	-2.890	0.102					-0.753	0.135
DLY^T (t-5)	-5.039***	0.003						
DLY^T (t-6)	-2.976*	0.052						
DLY^T (t-7)	-5.964***	0.000						
Significance of the variables are indicated with * for 90%, ** for 95%, and *** for 99% confidence levels.								

Table 4.5 (cont'd): Estimated short run coefficients of the variables

	USA		GERMANY					
	LTBCON		LTBCON		LTBCAP		LTBINT	
	ARDL (5,1,8,8)		ARDL (4,2,4,0)		ARDL (2,0,4,3)		ARDL (1,1,5,0)	
Regressors	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
Intercept	-11.581	0.004	4.623***	0.002	-9.466**	0.013	-2.314**	0.048
DLY^j	8.165	0.458	0.493	0.732	-2.28	0.751	0.071	0.946
DLY^j (t-1)	11.805	0.265			-12.417*	0.085		
DLY^j (t-2)	22.008*	0.052			12.870*	0.076		
DLY^j (t-3)	-9.566	0.422						
DLY^j (t-4)	-8.991	0.431						
DLY^j (t-5)	-0.989	0.929						
DLY^j (t-6)	-12.432	0.265						
DLY^j (t-7)	25.781**	0.02						
ECT(t-1)	-0.793***	0.000	-0.434***	0.001	-0.558***	0.000	-0.607***	0.000
Significance of the variables are indicated with * for 90%, ** for 95%, and *** for 99% confidence levels.								

As explained above, depreciation of the real exchange rate causes an improvement only in trade balance with USA in consumption goods. In the short run, the real exchange rate is not found to be a significant factor in any of the four cases considered. Thus, contrary to expectations, the real exchange rate has no role in the short run on trade balance with USA in consumption goods, and trade balance with Germany in consumption, capital and intermediate goods. Hence, discussion of different responses of the trade balance to the movement in the real exchange rate in the short and the long run is totally meaningless. The trade balance with USA in consumption goods and with Germany in consumption, capital and intermediate goods do not support the J-curve. The trade balances even stay unresponsive to fluctuations in the real exchange rate both in the short run and in the long run[14].

[14] Except for the trade balance with USA in consumption goods.

CHAPTER 5

CONCLUSIONS

The exchange rate is one of the easiest ways to make quick overall assessments about the country's position with respect to international competitiveness. Through its effect on relative prices, it is expected to be one of the most important determinants of trade balance in an open economy. While increases in capital mobility, development of new financial instruments against capital controls, and shifts to other price stabilization policies such as inflation targeting from exchange rate targeting reduce countries' control on the value of their currencies, the exchange rate is expected to have a significant role on the trade balances. The fact that domestic currencies of developing countries are more susceptible to global risks and more unpredictable throughout the world is another motivator behind this study which aims to build an empirical link between the real exchange rate and the trade balance.

Besides the significance of the movements of the real exchange rate on the movements of the trade balance, the different responses of the trade balance in the short run and the long run is the main concern of this study. Assuming that the Marshall-Lerner condition holds, weakening domestic currency against trading partners' currencies is expected to boost exports and discourage imports, leading to an improvement. However, as Magee (1973) suggests, the immediate short run response of the trade balance may be to deteriorate due to already signed contracts or low pass-through from exchange rate to the tradable prices. Hence, as he

mentions, the trade balance may follow a path resembling the letter ‘J’, named as J-curve effect. Knowing whether the deterioration is temporary or not, is important for both diagnosis and the remedies of the problem.

Going through the literature in this area, there seems to be a gap in terms of bilateral analysis for Turkey. To the best of knowledge, Halıcıoğlu (2007) is the only study at bilateral level. Hence, this study analyzes the bilateral trade data of Turkey with her three major trading partners; USA, Germany and Italy. Moreover, in order to eliminate problems associated with using aggregate data, the trade balance in different types of goods according to BEC definition of United Nations. This definition classifies the tradables according to their main end use as consumption, capital and intermediate goods. This disaggregation is expected to prevent movements in each group in different directions to offset each other. Moreover, this disaggregation provides a chance to compare the impact of supply side factors and demand side factors as the trade balance in capital and intermediate goods are expected to reflect the production side whereas trade balance in consumption goods is expected to reflect the demand side of the economy.

In the empirical analysis, quarterly data is used covering the trade balance in consumption, capital and intermediate goods with USA, Germany and Italy and spans the period of 1987-2003 for a total of 76 observations. Following Rose and Yellen (1989), which is followed by majority of the literature, the trade balance is regressed on the real bilateral exchange rate, the real domestic income and the real foreign income. Increases in the exchange rate (defined as domestic currency price of the one unit of foreign currency) are expected to improve the trade balance in the long run. However, no expectations are assigned to the signs of the coefficients of the income variables in advance, as the direction of their effects would depend on the dominance of the demand or supply side factors.

Considering that the variables used are either stationary or integrated of order one, the bounds testing approach developed by Pesaran, Shin and Smith (2001) is used. Morover, following Pesaran et al. (2001), the analysis continues with ARDL approach of Pesaran and Shin (1999), which gives both the short run and long run dynamics of the variables. This enables a complete J-curve analysis, as both the short run and the long run response of the trade balance is investigated.

The results of the bounds test (Pesaran et al. 2001), supported cointegration among all the variables included in the model for trade balance with Germany in consumption and capital goods. The results are inconclusive for trade balance with USA in consumption goods and trade balance with Germany in intermediate goods. The case of USA in capital and intermediate goods and Italy in consumption, capital and intermediate goods do not support cointegration among the variables in the model. However, J-curve analysis requires examination of both the short run and the long run dynamics. As the results of the bounds test do not suggest long run relationship among the variables, the short run dynamics are not analyzed any further for the cases mentioned above. The direction of the cointegration is searched next. Following Pesaran and Pesaran (1997), the "long run forcing" variables (p.360) are found to be the real exchange rate, the domestic real income and the foreign real income.

Next, the long run and the short run dynamics are analyzed. The real exchange rate is found to be a significant variable only in explaining the trade balance with USA in consumption goods. As expected, depreciation is found to improve the trade balance in consumption goods. The foreign real income is found to be insignificant in all the four cases. The domestic real income is found to be significant for trade balance with USA in consumption goods, trade balance with Germany in consumption and capital goods; and insignificant for trade balance with Germany in intermediate goods. Increases in domestic income cause demand side factors to dominate for trade balance with USA in consumption goods and the trade balance with Germany in capital goods. In other words, increases in

domestic income improve the trade balances mentioned. However, increases in domestic income deteriorate the trade balance with Germany in consumption goods.

The real exchange rate is totally insignificant with all its lags in the short run for all the four cases analyzed. For trade balance with USA in consumption goods, nearly all the lags of the domestic real income is significant and negative, indicating that income growth causes trade balance with USA in consumption goods to deteriorate in the short run. The two lags of the foreign real income are significant and carry negative signs.

The only significant factor in the short run for trade balance with Germany in consumption goods is three period lagged value of the first differenced real domestic income. Increases in income cause the trade balance with Germany in consumption goods to deteriorate, similar to its long run effect.

Increases in real domestic income are found to worsen the trade balance with Germany in capital goods. Two of the lagged values of the first differences of the real foreign income are significant; however, they affect the trade balance in different ways.

Increases in real domestic income are found to deteriorate the trade balance with Germany in intermediate goods, as expected. No other variable has a short run effect on the trade balance with Germany in intermediate goods.

The empirical analysis suggests that contrary to expectations, the real exchange rate is not a significant variable either in the long run, except for the trade balance with USA in consumption goods, or in the short run. Therefore, J-curve effect is not evident for Turkey's bilateral trade with USA, Germany and Italy in consumption, capital and intermediate goods. This finding implies that the real exchange rate shocks are not reflected to the bilateral trade balances. Another

explanation is that exchange rate pass-through to import and export prices are low so that exports and imports are not responsive to the exchange rate fluctuations. However, this explanation rationalizes results of the short run analysis. In the long run, pass-through is expected to be realized more.

One more reason may be that the period considered (1987-2005) includes several macroeconomic crises and structural shocks that might cause different behaviours of the trade balance in different subperiods. For instance, two serious economic crises of 1994 and 2001, and the earthquake of 1999 caused production to slow down and the economy to contract. Moreover, the introduction of euro in 1999 affected currency denomination of imports. As seen in Chapter 3, the trade balances and the real exchange rates act in different ways for those different subsample periods. For instance, for trade balance with Germany in capital goods and the real exchange rate, the two series move in opposite directions after the crisis of 1994, while co-movement is observed for the period of 1990-1994. Or for the case of Germany in intermediate goods, no pattern can be observed for the period of 1994-2000, while after 2001 crisis, the two series broadly move together. In short, observing sub-sample periods separately may suggest a more important role for the real exchange rate in affecting the trade balance. Further research in this area may try looking at the trade balance-exchange rate relationship in for pre and post crises periods and for the period of transition to euro.

The insignificance of the bilateral real exchange rate may be due to the fact that Turkey exports mostly in euros and imports mostly in dollars, as Berument and Dinçer (2005) explain. Therefore, following their study, the euro-dollar parity may be the significant factor in explaining the trade balances rather than the bilateral exchange rates. On the other hand, the euro-dollar parity may reflect the competition between the largest import suppliers of Turkey; Germany , USA and Italy. Therefore rather than substituting the bilateral exchange rate with the euro-

dollar parity, that rate may be incluede in the model along with the bilateral rates to account for the third country effects as Rose and Yellen (1989) mention.

In short, the results of this study suggest that the real exchange rate is not a significant variable in explaining the behaviour of bilateral trade balance of Turkey in consumption, capital and intermediate goods, both in the long run and the short run. Instead, the only variable that has both the short run and the long run role is the real domestic income. Thus, instead of attributing persistent trade deficit of Turkey to overvalued domestic currency, the structural factors behind the deficit should be examined. As the data illustrates, Turkey is a net exporter of only consumption goods among the three types of goods examined. In order to finance its net importer position with respect to the capital and intermediate goods, it should take actions to improve its trade surplus in consumption goods such as improving product quality. However, as expanding production of exportable consumption goods would require increased imports of capital and intermediate goods, improvement in the trade balance in consumption goods can only be achieved at the expense of further deterioration in the trade balances in capital and intermediate goods. In other words, as Turkey is dependent on imports for intermediate and capital goods, most of the exporting sectors of the consumption goods are doubted to be net importers when the volume of the imports of capital and intermediate goods needed are considered. In order to prevent this, the exporter sectors should become more self-sufficient through appropriate industry reforms. Rather than focusing on the production of the end-product only, the sectors should be considered as clusters with all its backward and forward linkages which might solve the problem of dependency on imported capital and intermediate goods of the Turkish economy.

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APPENDICES

APPENDIX A: ABBREVIATIONS USED FOR VARIABLES

LTBCON: logarithm of the trade balance in consumption goods between Turkey and the relevant trading partner

LTBCAP: logarithm of the trade balance in capital goods between Turkey and the relevant trading partner

LTBINT: logarithm of the trade balance in intermediate goods between Turkey and the relevant trading partner

LRER: Logarithm of the bilateral real exchange rate calculated by adjusting the bilateral nominal exchange rate with CPIs

LRERP: Logarithm of the bilateral real exchange rate calculated by adjusting the bilateral nominal exchange rate with PPIs

LY^T: Logarithm of the real income of Turkey

LY^j: Logarithm of the real income of trading partner *j*

APPENDIX B: SHARES OF TRADE VOLUMES OF EACH TRADING PARTNER

Table A.1: Share of trade with Germany, USA, and Italy among total trade volume of Turkey

Years	GERMANY (%)	USA (%)	ITALY (%)	TOTAL (%)
1986	17.28	9.30	7.79	34.37
1987	17.63	8.55	7.91	34.09
1988	16.17	8.77	7.54	32.48
1989	15.97	11.18	7.47	34.63
1990	18.61	9.21	8.04	35.86
1991	19.18	9.15	8.13	36.46
1992	19.73	9.22	9.43	38.38
1993	18.29	9.69	9.69	37.66
1994	18.32	9.55	9.55	37.41
1995	18.46	9.13	9.13	36.72
1996	19.45	7.71	8.57	35.73
1997	17.74	8.50	7.82	34.06
1998	17.53	8.62	7.93	34.08
1999	16.88	8.20	7.25	32.33
2000	15.04	8.56	7.44	31.05
2001	14.71	8.78	8.01	31.51
2002	14.74	7.37	7.39	29.49
2003	14.53	6.22	7.43	28.18
2004	13.23	5.98	7.16	26.37
2005	12.14	5.41	6.93	24.47

Source:Own calculations based on data from Turkish Statistical Institute

APPENDIX C: LAG LENGTHS SUGGESTED BY INFORMATION CRITERIA

Table A.2: Lag lengths suggested by AIC and SC based on an unrestricted VAR model

	USA						GERMANY						ITALY					
	LTBCON		LTBCAP		LTBINT		LTBCON		LTBCAP		LTBINT		LTBCON		LTBCAP		LTBINT	
Lag	AIC	SC	AIC	SC	AIC	SC	AIC	SC	AIC	SC	AIC	SC	AIC	SC	AIC	SC	AIC	SC
0	-0.8	-0.7	-0.1	0.1	-1.2	-1.1	-3.8	-3.7	-4.0	-3.9	-5.6	-5.4	-2.6	-2.5	-2.8	-2.7	-4.0	-3.9
1	-8.8	-8.1	-8.2	-7.6	-9.5	-8.8	-9.7	-9.0	-9.5	-8.8	-11.4	-10.7	-9.4	-8.7	-8.9	-8.2	-10.5	-9.9
2	-10.3	-9.2	-9.5	-8.3	-11.0	-9.8	-10.8	-9.6	-10.2	-9.1	-12.2	-11.0	-10.3	-9.1	-10.0	-8.8	-11.9	-10.7
3	-10.4	-8.7	-9.5	-7.8	-11.2	-9.5	-11.7	-10.0	-10.4	-8.7	-12.3	-10.6	-10.2	-8.5	-9.9	-8.2	-11.9	-10.2
4	-11.8	-9.5*	-11.1	-8.8*	-12.7	-10.5*	-13.0	-10.7*	-12.0	-9.8*	-14.5	-12.2*	-12.8	-10.6*	-11.8	-9.6	-13.8	-11.6*
5	-12.1	-9.3	-11.3	-8.5	-12.9*	-10.1	-13.3	-10.2	-12.5*	-9.8	-14.8	-12.1	-12.9*	-10.1	-12.6*	-9.8*	-14.2	-11.4
6	-12.0	-8.8	-11.3	-8.1	-12.8	-9.5	-13.4*	-10.3	-12.3	-9.1	-14.7	-11.5	-12.7	-9.4	-12.4	-9.2	-14.1	-10.8
7	-12.2	-8.4	-11.2	-7.4	-12.9	-9.1	-13.3	-9.5	-12.1	-8.3	-14.6	-10.8	-12.5	-8.8	-12.2	-8.5	-14.2*	-10.5
8	-12.6*	-8.3	-11.5*	-7.2	-12.8	-8.5	-13.3	-9.0	-12.1	-7.8	-14.9*	-10.6	-12.6	-8.3	-12.4	-8.1	-14.1	-9.8

Lag length refers to the lags of the levels. AIC refers to the Akaike's Information Criteria and SC refers to the Schwarz Information Criteria.* indicates the lag length suggested by the relevant information criteria.