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EXCHANGE RATE AND BILATERAL TRADE BALANCE OF TURKEY WITH EU (15) COUNTRIES

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ABSTRACT

This paper investigates the short-run and long-run impact of real exchange rate on the bilateral trade balance of Turkey with EU (15) countries**.** We've employed the bounds testing approach to the cointegration and the error correction modeling. Following Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012), we select the optimal model from the set of those models that satisfy both diagnostic tests and cointegration. Thus, unlike the other studies, it is ensured that a statistically reliable and cointegrated model is picked up for estimation. Based on the quarterly data for 1982-I to 2001-IV period, estimation results indicate no evidence of J-curve in the short run in any of Turkey's bilateral trade with EU(15) countries. In the long run, however, real depreciation of Turkish Lira improves the trade balance of Turkey with Austria, Denmark, France, Ireland, Italy, Sweden and UK.

1. INTRODUCTION

Economists, given the fact that exchange rate is an important price variable, have long been interested in the effect of the exchange rate, particularly the effect of devaluation or depreciation, on the trade balance. In trade theory the long-run impact on trade balance of exchange rate depreciation is characterized by Marshall-Lerner condition.[1] Also in theory the short-run effect of real currency depreciation on trade balance is hypothesized to follow j-curve effect put forward by Stephen P. Magee (1973). According to j-curve effect, as a result of devaluation, the trade balance first worsens and then after the passage of sometime it begins to improve.

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[1] Marshall-Lerner condition states that in order for devaluation or depreciation to improve the trade balance, the sum of export demand and import demand elasticities must must be greater yhan one, under the assunption that both export supply and import supply elasticities are infinite. When this assumption about export and import supply elasticities is not made, Marshall-Lerner condition takes a more complicated form, which can be found in, for example, Salvatore (1999).

Even though in theory the issue of exchange rate effect on trade balance is resolved, how the trade balance of a particular economy is affected by exchange rate is an empirical question to be investigated.

The purpose of this paper is to examine the relation between the exchange rate and the bilateral trade balance of Turkey with EU(15) countries using bounds testing approach with the model selection strategy adopted from Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012).

EU(15) countries is selected for bilateral analysis because Turkey is a candidate-country pursuing to join European Union and such a study will shed light on the trade relations between a candidate country and the Union members. EU(15) countries together have a share of 49.7 % in Turkey's total exports and 47.3 % in Turkey's total imports over 1982-2001.

The rest of the paper is organized as follows; in the following section the relevant literature is reviewed and then the model employed in the estimation of the trade balance is set out. This is followed by the description and the sources of data. The next section presents the empirical results, and the last section contains the key findings and the concluding remarks.

2. LITERATURE REVIEW

Numerous studies have investigated empirically the impact of the exchange rate changes on the trade balance for a variety of countries using different models and different econometric techniques. Results emerging from these studies regarding the impact of the exchange rate on trade balance are mixed, some supporting what the theory predicts others are not. These studies can be classified in terms of at what level the trade balance is considered. There are basically three types of studies, specifically those at aggregate trade balance level, at bilateral trade balance level and at industry or commodity-group trade balance level. Some examples from each category are reviewed in this section.

Examples of studies investigating the impact of exchange rate on aggregate trade balance include Mohsen Bahmani-Oskooee (1985), Anju Gupta-Kapoor and Uma Ramakrishnan (1999), Elif Akbostanci (2004), Mohsen Bahmani-Oskooee and Ali Kutan (2009) and Pavle Petrovic and Mirjana Gligoric (2010).

Mohsen Bahmani-Oskooee (1985) tests J-curve for four developing countries (Greece, India, Korea and Thailand) by imposing an Almon lag structure on the exchange rate variable in a trade balance model. His findings support the j-curve effect in cases of Greece, India and Korea while favorable impact of depreciation on trade balance in the long-run is found only in the case of Thailand.

Anju Gupta-Kapoor and Uma Ramakrishnan (1999) examines the effect of currency depreciation on the trade balance of Japan using Johansen cointegration test and corresponding error correction model and impulse response based on quarterly data from 1975 to 1996. They report that there exists a long-run relationship between trade balance, exchange rate, real domestic income and real foreign income and that depreciation improves trade balance in the long-run. As for the short-run effect of currency depreciation, they report that there exists a j-curve effect.

Elif Akbostanci (2004), using Johansen cointegration method and impulse response function, investigates the J-curve effect in Turkish data and finds no worsening of the trade balance in the short run but finds long-run improvement as a result of domestic currency depreciation.

Mohsen Bahmani-Oskooee and Ali Kutan (2009) investigates the effect of depreciation on the trade balance for eleven East European emerging countries (Bulgaria, Croatia, Cyprus, Czech Republic, Hungary, Poland, Romania, Russia, Slovenia, Turkey and Ukranie). Results, based on monthly data from 1990:1 to 2005:6 and the use of bounds testing approach to cointegration and error correction modeling, show that there exists j-curve effect in Bulgaria, Croatia and Russia, when j-curve is defined as a short-run deterioration combined with long-run improvement.

Pavle Petrovic and Mirjana Gligoric (2010) explores the short run and long run effect of currency depreciation on Serbian trade balance using Johansen method and ARDL approach as well as corresponding error correction model and impulse response function based on monthly data from 2002:1 to 2007:9. They find that currency depreciation in Serbia improves trade balance in the long-run and leads to j-curve effect in the short run.

Among the studies using bilateral data are Andrew K. Rose and Janet L. Yelen (1989), Marwah and Lawrence R. Klein (1996), Swarnjit Arora, Mohsen Bahmani-Oskooee and Gour Goswami (2003) and Mohsen Bahmani-Oskooee and Artatrana Ratha (2004).

Andrew K. Rose and Janet L. Yelen (1989) tests the j-curve at the bilateral level between US and each of its six major trading partners (Canada, France, Germany, Italy, Japan and UK) based on quarterly data from 1960 to 1985. They find no j-curve pattern or a long-run relationship at the bilateral level between trade balance and exchange rate

Kanta Marwah and Lawrence R. Klein (1996) using quarterly data from 1977 to 1992 investigates the J-curve phenomenon between Canada and its five largest trading partners as well as US and its five trading partners. They find that in both US and Canada after currency depreciation trade balance first deteriorates, then improves and then deteriorates again, thus exhibiting an S pattern.

Swarnjit Arora, Mohsen Bahmani-Oskooee and Gour Goswami (2003) using Autoregressive Distributed Lag (ARDL) method or bounds testing approach examines the effect of the depreciation of the rupee on Indian bilateral trade balance with its seven major trading partners (Australia, France, Germany, Italy, Japan, UK and USA). They don't find j-curve effect in bilateral trade with any of trading partners but they find that in the long-run real depreciation of rupee improves bilateral trade balance of India with Australia, Germany, Italy and Japan.

Mohsen Bahmani-Oskooee and Artatrana Ratha (2004) investigates the J-curve effect in US data bilaterally between US and its fourteen developing countries as trading partners. Results based on quarterly data from 1975 to 2000 show that while no specific short-run pattern is detected, currency depreciation improves bilateral trade balance of US with Argentina, Chile, Israel, Korea, Mexico, Singapore and South Africa.

Khosrow Doroodian, Chulho Jung and Roy Boyd (1999), Mohsen Bahmani-Oskooee and Yongqing Wang (2008), Mehmet Yazici and Mushtaq A. Klasra (2010) and Mehmet Yazici and M. Qamarul Islam (2011a) are examples exploring the exchange rate impact at industry level.

Khosrow Doroodian, Chulho Jung and Roy Boyd (1999) investigates the J-curve hypothesis for both US agricultural and manufacturing sectors using the Shiller lag model and finds J-curve effect in agricultural sector but not in manufacturing.

Mohsen Bahmani-Oskooee and Yongqing Wang (2008) consider 88 Chinese industries and investigate how trade balance of each of these industries in bilateral trade between China and US reacts to currency depreciation. They have based their study on annual data from 1978 to 2002 and utilized bounds testing approach to cointegration and corresponding error correction model. Their results show that trade balances of 34 industries improve in the long-run as a result of depreciation and that in the short run j-curve effect is detected in 22 industries.

Mehmet Yazici and Mushtaq A. Klasra (2010) investigates, in the context of two sectors of Turkish economy that use imported inputs at different rates in production, how the response of trade balance to currency devaluation is affected by usage of imported inputs in production of exports. Based on the data covering the period from 1986: I to 1998:III, their results indicate that in neither sector J-curve exists and that the violation of the J-curve effect is more severe in the sector with higher import content.

Mehmet Yazici and M. Qamarul Islam (2011a) explores the impact of exchange rate on trade balances of 21 commodity groups of Turkey with EU(15). They find that exchange rate matters in the determination of trade balances of 13 commodity groups out of 21 in the short-run with no j-curve effect but in the long-run exchange rate has no statistically significant effect on the trade balance of any of commodity groups.

3. MODEL

In modeling the trade balance, we closely follow the previous literature and specify the trade balance as a function of the real domestic income, the real foreign income, and the real exchange rate.[2] The reduced form of trade balance equation in log-linear form is given as follows;

$$\ln TB_{i,t} = a + b\ln Y_{TR,t} + c\ln Y_{i,t} + d\ln RER_{i,t} + \varepsilon_t \quad (1)$$

Where TB_i is bilateral trade balance defined as the ratio of exports of Turkey to trading partner i over Turkey's imports from the same trading partner, Y_{TR} is Turkey's real income, Y_i is the trading partner i's real income, and RER_i is the bilateral real exchange rate between Turkey and trading partner i constructed as nominal exchange rate times trading partner's price index over domestic price index where nominal exchange rate is defined as the amount of Turkish Lira per trading partner's currency.

[2] Details of derivation of this trade balance model can be found in Yazici and Islam (2012).

Our expectations about the signs of the variable coefficients are as follows. Given that the exchange rate is defined as the amount of domestic currency per foreign currency, a rise in the real exchange rate (depreciation) will make exports cheaper and imports more expensive and thus lead to an improvement in the trade balance. As far as the real domestic income is concerned, an increase in real domestic income will lead to higher demand for imports and as a result trade balance will worsen. So we expect the coefficient of domestic income to be negative. If the increase in the domestic income, however, results from an increase in the production of import-substitutes, the domestic income will have a positive impact on tarde balance. As for the trading partner's real income, a rise in it will be expected to lead to higher exports and therefore the trade balance will improve. However, if the increase in the partner's income is due to the increase in the production of import-substitutes, the effect of trading partner's real income on the trade balance will be negative.

Relationship among the variables in equation (1) is a long-run one. However, the short run impact also matters because this is the period in which, as a short-run phenomenon, j-curve effect could arise . Therefore, short-run dynamics needs to be incorporated into equation (1). Following Peseran, Shin and Smith (2001), by employing Autoregressive Distributed Lag Method (ARDL), we express equation (1) in error-correction modeling format as follows;

$$\Delta \ln TB_{i,t} = \alpha + \sum_{j=0}^{k} \beta_j \Delta \ln Y_{TR,t\text{-j}} + \sum_{j=0}^{l} \gamma_j \Delta \ln Y_{i,t\text{-j}} + \sum_{j=0}^{m} \lambda_j \Delta \ln RER_{i,t\text{-j}} + \sum_{j=1}^{n} \theta_j \Delta \ln TB_{i,t\text{-j}}$$

$$+ \delta_1 \ln Y_{TR,t\text{-}1} + \delta_2 \ln Y_{i,t\text{-}1} + \delta_3 \ln RER_{i,t\text{-}1} + \delta_4 \ln TB_{i,t\text{-}1} + u_t \qquad (2)$$

Cointegration among the model variables is determined in the bounds testing approach using F-test. The null hypothesis of no cointegration ($H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$) is tested against the alternative of cointegration ($H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$). Under the null hypothesis, F-statistic exhibits a non-standard disribution. Therefore, in testing the above hypothesis new critical values provided by Peseran, Shin and Smith (2001) is used. In this case the upper bound critical value for F-statistic at 10% significance level is 3.77 (Peseran *et al*. (2001), Table CI, Case III, p.300). The null hypothesis is rejected and cointegration among variables is established if the calculated F-statistic exceeds the upper bound critical value.

Papers other than Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012) utilizing the bounds testing approach proceed in selecting a model as follows. Based on a certain model selection criterion such as Akaike Information Criterion (AIC), they first select the optimum model and then apply the cointegration and diagnostic tests to the selected model. Without any regard to whether or not diagnostics and cointegration are satisfied, they report whatever results come up in the end. However, some or all of the diagnostics may not be satisfied and/or cointegration may not exist in the selected model, thus making the reported model unreliable. In this paper we use the model selection strategy adopted by Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012).

Following them, we first apply the cointegration and diagnostic tests to all possible combinations or models available given a maximum lag length and then determine the subset of models satisfying both the cointegration and the diagnostics. Finally, we apply model selection criterion to this subset in order to come up with the optimal model for estimation. Unlike other studies, this strategy of model selection ensures that the estimated optimum model is cointegrated and passes the diagnostics, thus enabling us to derive reliable statistical inferences from the estimated model.

4. DATA

We use quarterly data that covers the period from 1982:I to 2001:IV. We index all data using 2000 quarterly average as the base and adjust them seasonally. Our data come from the following sources; IMF-IFS Country Tables, Eurostat, Central Bank of Turkey and Statistics Office of Turkey. We obtain data for bilateral export and import with all countries in our study from Statistics Office of Turkey. Data for Gross Domestic Product (GDP), Industrial Production Index, GDP Deflator and Consumer Price Index (CPI), except for Greek CPI, are compiled from IMF-IFS Country tables. Source for CPI of Greece is Eurostat. Bilateral nominal exchange rate data between Turkish Lira and the currency of each of the EU countries except for Finland, Greece, Ireland, Portugal and Spain come from Central Bank of Turkey. The source for bilateral nominal exchange rates between Turkish Lira and the currency of Finland, Greece, Ireland, Portugal and Spain is Eurostat. Bilateral exchange rates between Turkish Lira and the currency of each of these countries are not, however, directly available in Eurostat. We have calculated them using the exchange rate between the currency of each country and ECU, the exchange rate between US dollar and ECU and the exchange rate between Turkish Lira and US dollar.

5. ESTIMATION RESULTS

Before proceeding to the estimation, we have checked the integrating properties of variables involved using Augmented Dicky-Fuller (ADF) (David A. Dickey, and Wayne A. Fuller 1979) test. Because bounds testing approach, unlike two-step residual based approach of Robert F. Engle and Clive W. J. Granger (1987) and system-based reduced rank approach of Soren Johansen and Katarina Juselius (1990), does not require that all variables have the same order of integration, one might be tempted to conclude that no unit-root testing is needed. However, since the distribution of F-statistic used for cointegration test is derived under the assumption that integration order of variables is either I(1) or I(0) or in between, unit-root testing is required to make sure that integration order of variables is not greater than one. ADF unit-root test is used for this purpose and results are reported in Appendix in Table A1. Results indicate that all variables become stationary after being differenced once. Thus, all have an order of integration one, fulfilling the requirement that no variable has an order of integration greater than one.

As we have mentioned earlier, in the present paper, we follow the model selection strategy used in Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012 because this strategy ensures the selection of a model that satisfy both diagnostics and cointegration. As a result, inferences derived from such a model will be statistically reliable and therefore meaningful. An algorithm developed by the second author is used for this purpose and we have proceeded as follows.

First, we set the maximum lag length on each first differenced variable in equation (2) as 10.Then we have estimated models corresponding to each possible lag combination and selected those models that satisfy the diagnostic tests of normality, no serial correlation and no heterescodasticty at least at 10 % level. For each of these selected models or combinations, we have checked whether there exists a cointegration or not. In case no cointegration is established for a combination, we have discarded it. Finally, in order to determine the optimal model, we have applied AIC to the set of those models that satisfy diagnostic tests and at the same time indicate a cointegration.

Having followed this procedure, we have come up with optimal lag combinations given in Appendix in Table A2. We have also determined the optimal lag combinations that would have been selected if the method of the previous literature was adopted and we have reported them in Table A2 as well. In order to see the performance of models picked up by the previous literature in terms of diagnostics and cointegration, we have also provided in Table A2 associated diagnostic tests and cointegration results. When compared with our strategy, only in three cases, namely Austria, Germany and Greece, optimal models selected coincide. This means that these three countries are the cases where all four conditions we impose are satisfied simultaneously. In other cases at least one of the conditions fails with the previous literature. We see from Table A2 that normality assumption fails in three cases, no serial correlation in eight cases, no heteroscedasticity in one case and cointegration in three cases

Having determined the optimal lag combination, we have then proceeded to estimate the model in equation (2) corresponding to optimal lag combinations reported in Table A2 based on quarterly data for the period of 1982:I-2001-IV. Short-run impact of the exchange rate on the bilateral trade balance is inferred from the coefficients of the first-differenced bilateral exchange rate variable. To assess the short-run effect of the exchange rate, estimates of those coefficients are reported in Table A3.

Note that in cases of Austria, Belgium-Luxemburg, Finland, Germany, Italy, Portugal, Spain and Sweden, none of the coefficients of the exchange rate variable is significant. This means that exchange rate does not matter in the short run in Turkey’s bilateral trade with these countries. In the bilateral trade with the remaining countries, namely Denmark, France, Greece, Holland, Ireland and UK, exchange rate does play a role in the short run. As a short-run phenomenon, we are particularly interested whether or not J-curve effect exists in Turkey’s bilateral trade with EU countries. Given the fact that the exchange rate is defined in such a way that a rise in the exchange rate represents the depreciation or devaluation of Turkish Lira, J-curve effect will be observed if the coefficient of the first-differenced exchange rate variable has first negative values and then positive ones. Looking at the Table A3 reveals that in none of the cases such a pattern is observed. Therefore, we can conclude that in Turkey’s bilateral trade with EU (15) countries no evidence is found supporting the J-curve phenomenon.

As for the long-run effect, long-run estimates are reported fully in Table A4. The real depreciation of Turkish Lira has a favorable and significant long-run effect in bilateral trade with Austria, Denmark, France, Ireland, Italy, Sweden and UK. In other cases the bilateral real exchange rate does not carry a significant coefficient, implying that changes in the exchange rate do not affect Turkey's bilateral trade balance in the long run with these countries. In case of Portugal, the exchange rate coefficient has the unexpected negative sign but it is insignificant at conventional 5 % significance level. As far as the effect of the real domestic income on bilateral trade is concerned, only in four cases, namely Finland, Greece, Portugal and Spain does the domestic income have no long-run effect on bilateral trade flow. In all other cases the real domestic income has the expected negative and significant impact on the bilateral trade flow. As for the trading partner's real income, it has significant impact on bilateral trade of Turkey with Austria, Belgium-Luxemburg, Denmark, France, Greece, Holland, Ireland, Italy, Sweden and UK. In case of Greece, however, partner's real income has a negative effect at 10% significance level on Turkey's bilateral trade balance. This negative coefficient can be justified on the basis that the increase in the partner's income could be resulting from the increase in the production of its import substitutes.

When all three determinants of trade balance are evaluated in terms of number of significant cases, we see that each of income, domestic and foreign, are statistically significant in ten cases and real exchange rate in seven cases (The number of cases in which at least either one of incomes is significant is eleven and in nine of these eleven cases both incomes are significant at the same time). In this sense partner's real income and domestic real income are the main determinants of Turkey's trade balance with EU(15) countries and then comes the real exchange rate. When evaluated in terms of sizes of coefficients, which represent elasticities in the current log-linear specification, except in the case of Greece, which is insignificant, domestic income has a coefficient greater than one in absolute value with an average of –1.81. Similarly, except in the case of Germany, which is insignificant, partner's income has a coefficient greater than one as well with an average of 2.18. Thus, we can conclude that Turkish trade balance is income elastic with respect to both domestic and foreign income. On the other hand, real exchange rate has a coefficient, in some cases less than one and in others greater than one, suggesting no specific pattern but with an overall average of 0.96.

In light of these long-run effects, two policy suggestions can be made regarding the improvement of trade balance with the countries studied here. First, by reducing the inflation rate, the real exchange rate can be increased and thus trade balance with those partners where real exchange rate is significant can be improved. Second, negative impact of the growth of domestic economy can be reduced by encouraging industries to use less imported inputs and more domestic resources.

Even though we have required in the model selection phase that diagnostic tests for normality, no serial correlation and no heterescodasticy be satisfied at least at10% level, for the sake of completeness of the presentation of estimation results and more importantly for the comparison with the diagnostic results of the procedure adopted by the previous literature we have reported in Table A5 the diagnostic test results corresponding to the estimated model.

To find out whether estimated coefficients are stable or not, we have conducted CUSUM and CUSUMSQ tests and reported results in Table A5 as well. Test results indicate that in all cases estimated model coefficients are stable according to both tests.

6. CONCLUSION

This paper has examined the effect of exchange rate changes in the short run as well as in long run on the bilateral trade balance of Turkey with EU (15) countries based on the quarterly data over 1982:I-2001-IV period. The impact on the trade balance of the currency devaluation is extensively investigated in the literature. Most of the studies, however, are subject to aggregation bias problem. Realizing this problem, a new body of research has emerged, namely the analysis at the bilateral level. The present paper contributes to the literature by considering the bilateral trade of Turkey with its EU (15) partners, which together constitute about 50% share in total trade of Turkey.

As far as the short-run impact of the real depreciation of Turkish Lira is concerned, no J-curve effect is observed in Turkey's bilateral trade with any of EU (15) countries. As for the long-run effect, our results indicate that real depreciation of Turkish Lira improves the bilateral trade balance of Turkey in cases of Austria, Denmark, France, Ireland, Italy, Sweden and UK. In other cases, real currency depreciation plays no significant role in Turkey's trade balance in the long-run. It is further found that the real exchange rate variable is less important than domestic and trading partner's real incomes in the determination of Turkey's bilateral trade balance with EU(15) countries.

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APPENDIX

Table A1: ADF Unit-Root Test Results

Trading Partner	lnTB		$lnY_{partner}$		lnRER	
	Level	First Diff.	Level	First Diff.	Level	First Diff.
Austria	-2.80 (4)	-11.1 (1)*	-0.25 (2)	-7.70 (1)*	-2.38 (5)	-5.75 (2)*
Bel-Lux	-2.41 (5)	-6.52 (2)*	-0.12 (2)	-4.58 (1)*	-2.39 (5)	-5.83 (2)*
Denmark	-2.67 (4)	-7.97 (2)*	-0.17 (4)	-9.12 (2)*	-2.39 (4)	-4.59 (2)*
Finland	-2.76 (5)	-9.13 (2)*	-0.47 (2)	-6.23 (1)*	-2.06 (2)	-5.75 (1)*
France	-2.52 (4)	-6.47 (2)*	-0.22 (2)	-3.93 (1)*	-2.31 (2)	-5.98 (1)*
Germany	-2.61 (6)	-6.14 (1)*	-1.03 (2)	-6.76 (1)*	-2.23 (2)	-5.75 (1)*
Greece	-2.53 (8)	-6.85 (2)*	-1.43 (2)	-12.6 (1)*	-2.40 (2)	-6.45 (1)*
Holland	-2.61 (4)	-8.37 (1)*	-0.14 (2)	-6.09 (1)*	-2.48 (2)	-5.96 (1)*
Ireland	-2.22 (3)	-10.1 (1)*	-1.27 (2)*	-5.83 (1)*	-2.63 (2)	-6.19 (1)*
Italy	-2.44 (2)	-7.61 (1)*	-1.50 (2)	-5.93 (1)*	-2.57 (2)	-6.15 (1)*
Portugal	-2.14 (5)	-8.84 (1)*	-1.65 (2)*	-5.97 (1)*	-2.06 (2)	-5.84 (1)*
Spain	-1.97 (2)	-7.05 (1)*	-1.57 (2)	-5.38 (1)*	-2.32 (2)	-6.54 (1)*
Sweden	-2.69 (2)	-8.22 (1)*	-1.58 (2)	-9.17 (1)*	-2.02 (2)	-6.26 (1)*
UK	-2.13 (4)	-8.52 (1)*	-0.37 (2)	-5.58 (1)*	-2.38 (2)	-6.06 (1)*

Notes: * indicates statistical significance at conventional 5 % level. Domestic real income (lnY_{Turkey}) becomes stationary as well after the first difference. ADF unit root statistics associated with domestic real income for level and for first difference are –2.29(3) and –6.35(1)*, respectively.

Table A2: Optimal Lag Orders: Our Strategy vs. Previous Literature

Trading Partners	Lag Order with Our Strategy	Lag order and Diagnostic Results with Previous Literature				
		Lag Order	N	S	H	C
Austria	9, 9, 9, 0	9, 9, 9, 0	√	√	√	√
Belg-Lux	6, 3, 1, 0	6, 3, 0, 0	×	√	√	√
Denmark	10, 2, 7, 7	10, 4, 7, 7	√	×	√	√
Finland	10, 8, 6, 0	10,10,10,10	√	×	√	√
France	8, 0, 1, 4	8, 0, 0, 4	×	√	√	√
Germany	2, 6, 3, 0	2, 6, 3, 0	√	√	√	√
Greece	1, 2, 1, 9	1, 2, 1, 9	√	√	√	√
Holland	7,10, 5, 8	7,10, 7, 8	√	×	√	√
Ireland	9, 9, 7, 7	9,10,10, 8	√	×	√	√
Italy	1, 0, 3, 0	9, 5, 6, 2	√	√	√	×
Portugal	8, 3,10, 0	9, 8, 8,10	×	×	√	×
Spain	1, 0, 0, 6	10, 5, 6, 9	√	×	×	×
Sweden	9, 3,10, 0	9,10,10, 0	√	×	√	√
UK	9, 9, 8,10	8, 9,10,10	√	×	√	√

Notes: The order of the optimal lags corresponds to the following order of the variables: $(\Delta \ln TB, \Delta \ln Y_{Turkey}, \Delta \ln Y_{partner}, \Delta \ln RER)$. N: normality, S: no serial correlation, H: no heteroscedasticity, C: cointegration.

Table A3: Short-Run Coefficient Estimates of Exchange Rate Variable

Trading Partners	t	t-1	t-2	t-3	t-4	t-5	t-6	t-7	t-8	t-9	t-10
Austria	-0.12										
	(-0.15)										
Belg-Lux	0.262										
	(0.508)										
Denmark	-1.58*	0.31	-3.24***	1.38*	-1.58*	-1.60*	-0.76	-2.09***			
	(-1.84)	(0.32)	(-3.37)	(1.79)	(-1.95)	(-0.76	(-1.04)	(-2.87)			
Finland	0.99										
	(1.16)										
France	-0.26	-0.48	-1.92***	0.03	-1.14**						
	(-0.44)	(-0.87)	(-3.69)	(0.05)	(-2.14)						
Germany	-0.16										
	(-0.47)										
Greece	-0.50	-0.02	-3.51**	-2.32*	-1.85	0.25	0.03	-1.51	-0.84	-2.91**	
	(-0.38)	(-0.01)	(-2.55)	(-1.92)	(-1.57)	(0.23)	(0.03)	(-1.43)	(-0.83)	(-2.63)	
Holland	0.04	-0.98**	-0.86**	-0.52	-0.18	0.22	0.34	-1.23***	-0.96**		
	(0.10)	(-2.24)	(-2.20)	(-1.29)	(-0.46)	(0.54)	(0.79)	(-2.77)	(-2.23)		
Ireland	-2.57**	-6.41***	-2.48*	-6.15***	-1.28	-4.11***	-2.53**	-1.17			
	(-2.46)	(-4.94)	(-1.79)	(-4.92)	(-1.12)	(-3.72)	(-2.58)	(-1.16)			
Italy	0.29										
	(0.69)										
Portugal	0.99										
	(0.70)										
Spain	0.81	0.44	0.94	-0.69	0.46	0.15	-0.23				
	(0.97)	(0.57)	(1.29)	(-0.94)	(0.63)	(0.21)	(-0.33)				
Sweden	0.37										
	(0.42)										
UK	0.05	-1.97*	-2.46***	-1.74*	-3.30***	-1.58*	-0.78	-0.55	-1.51**	-1.28*	-0.90
	(0.07)	(-2.00)	(-3.18)	(-1.78)	(-3.58)	(-1.94)	(-1.05)	(-0.86)	(-2.39)	(-1.87)	(-1.69)

Notes: *, **, *** indicate significance levels at 10%, 5%, and 1% respectively. Figures in parentheses below each coefficient indicate the value of the t-statistic.

Table A4: Long-Run Coefficient Estimates

Trading Partner	Constant	$\ln Y_{Turkey}$	$\ln Y_{Partner}$	$\ln RER$
Austria	-0.38***	-1.64***	1.46*	0.62***
	(-4.09)	(-4.29)	(1.95)	(4.30)
Belg-Lux	-0.72***	-1.33***	1.26**	0.07
	(-16.23)	(-4.14)	(2.02)	(0.48)
Denmark	-0.03	-2.79**	5.04**	1.02*
	(-0.17)	(-2.45)	(2.55)	(1.94)
Finland	-2.36***	-2.63	6.00	4.82
	(-4.21)	(-1.03)	(1.16)	(1.49)
France	-0.78***	-2.47***	3.84***	0.53***
	(-16.50)	(-8.30)	(5.56)	(3.27)
Germany	-0.24***	-1.02***	0.52	0.04
	(-4.83)	(-3.04)	(1.08)	(0.35)
Greece	-0.33	-0.69	-4.45*	0.33
	(-0.84)	(-0.98)	(-1.73)	(0.26)
Holland	-0.51***	-1.84***	1.42**	0.32
	(-10.32)	(-4.76)	(2.26)	(1.67)
Ireland	-0.77***	-5.25***	1.72***	1.23***
	(-4.83)	(-14.83)	(8.11)	(3.65)
Italy	-1.07***	-3.64***	6.49***	0.59**
	(-11.37)	(-5.64)	(4.36)	(2.31)
Portugal	-1.73	5.60	-7.67	-1.15
	(-0.95)	(1.52)	(-1.50)	(-0.81)
Spain	-0.65*	-1.45	2.82	1.12
	(-1.90)	(-0.75)	(1.15)	(1.13)
Sweden	-0.95***	-4.62***	10.35***	2.09***
	(-3.62)	(-4.61)	(3.81)	(5.38)
UK	-0.35***	-1.54***	1.73**	1.78***
	(-8.98)	(-2.88)	(2.25)	(5.26)

Notes: *, **, *** indicate significance levels at 10%, 5%, and 1% respectively. Figures in parentheses below each coefficient indicate the value of the t-statistic.

Table A5: Diagnostic and Stability Test Results

Trading Partner	Normality[1]	No Serial Correlation[2]	No Heteroscedasticty[3]	CUSUM	CUSUMSQ
Austria	1.65 (0.44)	1.28 (0.86)	0.05 (0.83)	S	S
Bel-Lux	5.00 (0.13)	3.99 (0.41)	0.06 (0.80)	S	S
Denmark	3.43 (0.18)	6.85 (0.14)	0.13 (0.72)	S	S
Finland	0.87 (0.65)	7.56 (0.11)	0.48 (0.49)	S	S
France	3.60 (0.17)	0.91 (0.92)	0.86 (0.35)	S	S
Germany	0.78 (0.68)	5.38 (0.25)	0.19 (0.66)	S	S
Greece	0.05 (0.98)	4.41 (0.35)	0.45 (0.50)	S	S
Holland	1.90 (0.39)	7.17 (0.13)	0.20 (0.66)	S	S
Ireland	0.44 (0.80)	5.94 (0.20)	0.54 (0.46)	S	S
Italy	3.60 (0.17)	0.71 (0.95)	0.01 (0.93)	S	S
Portugal	0.80 (0.67)	6.21 (0.18)	0.01 (0.93)	S	S
Spain	4.39 (0.11)	4.95 (0.29)	2.53 (0.11)	S	S
Sweden	1.90 (0.39)	7.73 (0.10)	0.09 (0.76)	S	S
UK	1.31 (0.52)	5.99 (0.20)	2.45 (0.12)	S	S

Notes: Figures in parentheses indicate p-values of the relevant statistic.

1: Jarque-Bera test statistic is used having a $\chi^2(2)$ distribution.

2: LM test statistic is used having a $\chi^2(4)$ distribution.

3: LM test statistic is used having a $\chi^2(1)$ distribution.