EXCHANGE RATE VOLATILITY AND TRADE FLOWS: THE EU AND TURKEY

Zulal S. Denaux, Valdosta State University
Rebecca Falks, Valdosta State University

ABSTRACT

This study empirically examines the effect of exchange rate fluctuation on bilateral trade flows between Turkey and its 5 major trading partners in the European Union. The impact of exchange rate volatility on trade is examined by an Ordinary Least Squares method (OLS) using quarterly data from 1988:Q1 to 2011:Q3. The study finds that exchange rate volatility does not have a statistically significant effect on import demand, that Turkish import demand is determined by income and currency appreciation, and that the 2008 and euro crises did not have a significant effect on imports. **JEL Classifications:** F14, F31, C22

INTRODUCTION

This study examines the effect of exchange rate fluctuation on bilateral trade flows between Turkey and the European Union, in particular the impact these fluctuations have on Turkish import demand. Trade between Turkey and the EU accounts for a large percentage of both parties' trade balances. According to the European Commission, "the EU ranks by far as number one in both Turkey's imports and exports while Turkey ranks 7th in the EU's top import and 5th in export markets". Considering the significant trade flows that this indicates and the current uncertainty present in the EU's predominant currency, an examination of the effects of this uncertainty on trade is relevant and applicable.

Since the founding of the Turkish Republic in 1923 Turkey has politically aligned itself with the West, and particularly the countries which now form the European Union. Turkey began the process of increasing economic integration in 1959 with its application for full membership status in the European Economic Community. Instead of full membership, negotiations with the EEC led to the Agreement Creating an Association between the Republic of Turkey and the European Economic Community, more commonly known as the Ankara Agreement, in September 1963. This agreement forms the basis for continuing processes with

the aim of establishing a customs union and eventual Turkish accession to the EU.

Details for the establishment of the Customs Union where not set down until 1970, with the stated plan being for the abolishment of trade barriers and the free movement of citizens between parties within 12 to 22 years. In actuality the Customs Union did not come into effect until March of 1995, several years after the Republic of Turkey reinstated its goal of European economic integration by applying for full membership in the EU in 1987. The process of EU accession has been controversial and repeatedly delayed, but has encouraged renewed attention to the relationship between the parties and probably facilitated the completion of the customs union establishment.

The conventional theory is that exchange rate volatility will have a negative impact on a country's trade flows as currency fluctuations create uncertainty about the economic environment. Despite the general expectation of negative effects, studies have not conclusively found these results. Exchange rate fluctuations and the accompanying uncertainty have been shown by various studies (Bahmani-Oskooee and Hegerty, 2009; Caglayan and Di, 2010; Ozturk and Kalyoncu, 2009) to have positive, negative, or no significant impact on trade flows. The different findings of these studies indicate that exchange rate volatility is not necessarily negative, but may have positive effects within certain economies and situations. The effect of volatility on trade flows is heavily influenced by the overall risk tolerance of the involved countries. Exchange rate uncertainty may be viewed as an opportunity for higher returns, while some will assume that an acceptable amount of exchange rate risk is to be expected and will not be deterred by this.

Some evidence suggests that the effects on Turkey are positive (Ozturk and Kalyoncu, 2009), indicating that the average risk tolerance is rather high, or that the sensitivity to price in the market is fairly low. The effects on trade flows caused by exchange rate volatility have major implications for the balance of payments and strongly influence appropriate actions in exchange rate regimes and controls as well as governmental trade policy. This study is the pioneer for estimating the effect of exchange rate volatility on long-run import demand function for Turkey including the current Euro crisis. First, long-term import demand for Turkey is estimated by using quarterly data from 1988:Q1, shortly after the Republic of Turkey applied for full EU membership, to 2011:Q3. The effects of exchange rate volatility on the long-run import demand are examined by using an Ordinary Least Squares method (OLS).

Of particular interest is the effect of the Customs Union, which eliminated barriers to trade such as customs duties, quantitative restrictions, and tariff restrictions between the EU and Turkey and implemented the EEC's Common External Tariff for Turkey's trade with third party countries. In addition to the removal of direct barriers to trade, the Customs Union also began the removal of technical barriers, such as standardization of goods and accreditation, as well as changes to regulations concerning the economic environment such as property rights and competition rules. The removal of such barriers means that the Customs Union is much more than a set of changes in tariff structure, and will likely have long term effects on trade behavior and opportunity between Turkey and the European Union. Trade figures indicate that imports from the EU rose by 34.7% from 1995 to 1996 after the signing of the Customs Union. By reviewing data from before and after the CU, more accurate conclusions can be drawn as to the effect of increasing EU economic integration and how this relates to the trade flow response to changing currency valuation.

The organization of the paper will be as follows: The next section will briefly talk about the Turkish economy from 1980-2011. Section 3 will present the
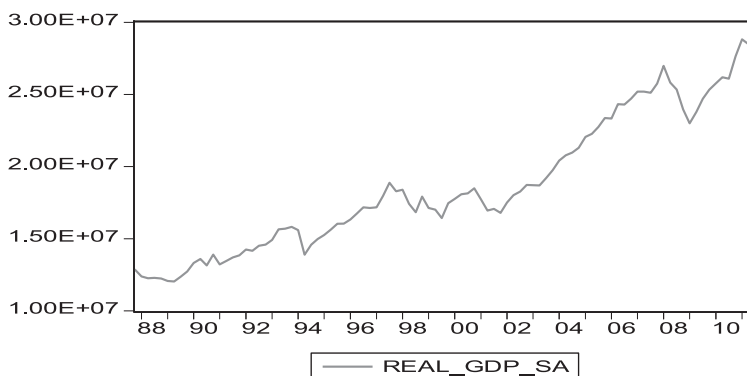
114

existing literature on the import demand function. Section 4 will describe the data and empirical model used in analysis. Section 5 will show our empirical analysis and results. Section 5 concludes and summarizes the findings of the paper.

ECONOMY OF TURKEY 1980-2011

In 1980, in part to facilitate integration with the EU, Turkey changed from the inward-oriented development strategies it held in the 1960s and 1970s to an export led outward-oriented growth policy. This policy shift quickly reached initial targets of lower inflation, GDP growth, and a relatively liberalized external trade and financial system. With the stabilization measures of 1980, Turkey devalued its lira by 100 percent and eliminated the multiple exchange rate system. After May 1981, the exchange rate was adjusted daily against major currencies to maintain the competitiveness of Turkish exports and the government pursued a policy of depreciating the real exchange rate (RER)—on average by about 6 percent annually over the period 1980–88. In August 1988, major reforms introduced a market set foreign exchange rate system and in 1989 foreign exchange operations and international capital movements were liberalized entirely.

From 1990 to 2000, economic crises repeatedly affected the Turkish economy as demonstrated in Figure1. Inflation fluctuated between 55 and 106 percent and public finances deteriorated as extremely high interest rate borrowing from the market were used to finance large public sector deficits. These high interest rates and the prospect of steady real appreciation in the exchange rate attracted significant capital inflows. The government's implied commitment to the appreciation of the real exchange rate insured against currency risk, leading to unsustainable dependence on short-term capital inflows. From January to April of 1994, a balance of payments crisis caused the GDP to shrink by 5.5 percent and the real exchange rate to depreciate by 64 percent. After April, the real exchange rate began appreciating again and by September 1995 had appreciated by about 23.5 percent.

FIGURE1: TURKISH REAL GROSS DOMESTIC PRODUCT 1988-2011

After the crisis in 1994, the economy experienced strong growth until 1998 when it was affected by the shocks of the Russian crisis and the effects of two earthquakes in 1999. The earthquakes, occurring in the Marmara region in August and Bolu in November, sent major shocks through the country socially, politically, and economically. Because of these shocks the GDP shrank 4.7 percent in 1999 and Turkey

began an ambitious stabilization program with the policy of using a predetermined exchange rate path as a nominal anchor for reducing inflationary expectations.

During 2002 the real exchange rate appreciated considerably, aggravating the current account deficits and leading to a severe currency crisis in February 2001. At this point the government discarded the crawling peg regime for a floating currency system and the exchange rate depreciated sharply. In May 2001 the IMF increased its assistance with a program designed to strengthen the balance of public finances and prevent future deterioration. The progress of reforms implemented by Turkey was threatened by the effects of the September 11 attacks, and the government quickly responded with a strengthened program to improve the banking center, consolidate fiscal adjustments and achieve disinflation. In February 2002, the IMF supported the economic program by approval of a three-year standby credit, and considerable economic recovery, as well as appreciation of the real exchange rate, was observed from 2002-2004.

Under the sound monetary and fiscal policies pursued by Turkey after the 2001 crisis, the economy experienced rapid growth from 2002 until it was struck by the global shock of the financial crisis in 2008. Despite Turkey's overall economic strength, several key weaknesses such as a large current account deficit, low domestic saving and high unemployment made the decline in real GDP caused by the crisis the worst since 1945. A rapid resumption of capital inflows came with the stabilization of the global financial market in 2009, and appreciation of the Turkish lira helped to bring the real GDP back to pre-crisis levels by the end of 2010. As of now, the euro crisis that is affecting Turkey's major trading partners has not had the kind of substantial negative impact on the Turkish economy seen in the 2008 crisis.

LITERATURE REVIEW

Many studies have been done to determine the effect of exchange rate volatility on trade using a variety of models and country selections. Despite numerous studies, the results are often conflicting and no solid consensus has been drawn. The conventional theory is that exchange rate volatility will have a negative impact on international trade, and this has been found in empirical studies such as Alam and Ahmed (2010), which investigated the effect of exchange rate volatility as well as import explanatory variables for Pakistan's bilateral import to examine whether bilateral import elasticities are significantly different among external suppliers. Using exchange rate volatility as a determinant of import demand and the real effective exchange rate to construct the measures of exchange rate volatility, they suggest that the effect of exchange rate volatility is negative and statistically significant for bilateral import demand in long run.

Numerous others have examined the effects of exchange rate volatility on trade and found mixed results, with negative, positive, or no significant trade flow effects varying between countries, industries, or time periods. Ozturk (2006) extensively reviews literature on the effects of exchange rate volatility on trade to examine both underlying theory and results of empirical studies and gives an interpretation on the inconsistent results, finding that the results are highly dependent on the selection of the sample period, model specification, proxies for exchange rate volatility and countries considered but that the majority of studies support the conventional view that trade is negatively affected by exchange rate volatility in most situations.

Ozturk and Kalyoncu (2009) examined the effect of exchange rate volatility on trade of flows of 6 countries, finding negative trade flow effects for South Korea,

Pakistan, Poland, and South Africa and positive effects for Turkey and Hungary. They suggest that there is a long term relationship between real export, relative prices, real foreign demand, real exchange rate, and exchange rate volatility. Bahmani-Oskooee and Hegerty (2009) analyzed the short- and long-term effects of peso/dollar exchange rate volatility on import demand between U.S. and Mexico and the effects of NAFTA on the relationship. Their research indicated that volatility has more significant effects on short-term trade flows, and effects are predominantly, but not entirely, negative, dependent on industry. It also suggests that economic integration and inter-industry trade reduce the sensitivity of trade flows to uncertainty in the exchange rate.

Hudson and Straathof (2010) found that exchange rate volatility had a significant negative effect on trade prior to 1985 but that its impact has sharply decreased in significance since the introduction and rapid diffusion of over-the-counter currency swaps. As evidence of this, they show that despite the elimination of exchange rate volatility between member states, trade flows within the eurozone did not considerably increase with the introduction of the euro in 1999. They claim that volatility of exchange rates does not directly impede trade, but that the uncertainty that often accompanies fluctuations negatively affects the appeal of international transactions.

Utkulu and Seymen (2006) analyzed the behavior of the Turkish - EU trade relationship by modeling exports and imports to understand the nature and the driving forces of the competition through classical price and income effects and non-price factors such as product innovation, commodity composition effects, integration of markets, etc., and found that the income elasticity for the import demand equation is significant and very elastic, which might have offsetting effects on the exchange rate adjustments. Karaman and Ozkale (2007) investigated Turkey's import demand function using an econometric panel data application and also found that Turkey's import demand is income elastic and price inelastic.

Görmez and Yılmaz (2007) chronologically review the history of exchange rate policy choices in Turkey, detailing the reasons for and effects of those choices and find that while no exchange rate regime is appropriate in all times and situations, they claim that sustainable financial stability was achieved under a free-float system. Ertuðrul and Selçuk (2001) give an overview of the Turkish economy from 1980 to 2000 and claim that this period of time should be examined in two sections, the first from 1980-1988 characterized by sustained export-led growth, and the second from 1989-1999 in which high volatility was observed based on a dependency on short-term capital flows.

Several of these studies also highlight the negative effects of currency devaluation. Bahmani-Oskooee and Hegerty (2009) found that devaluations correspond with periods of high volatility which hurt trade flows thus having and indirect negative effect on trade flows. Alam and Ahmad (2010) claim that depreciation would have a contractionary effect in the long term on bilateral imports, and Görmez and Yılmaz (2007) give historical evidence that devaluations without effective policy changes may increase volatility and have a negative effect.

DATA AND EMPIRICAL MODEL
In order to assess the effect of exchange rate volatility on Turkey's aggregated import demand, we gather quarterly data from its 5 major trading partners in the European Union-Germany, France, United Kingdom, Spain, and Italy for the period between 1988:Q1 and 2011:Q3. The selected EU countries account for almost half of

Turkey's total imports. The quarterly data used in this study were obtained from the Central Bank of the Republic of Turkey (CBRT) Electronic data Delivery System.

The following conventional long-run import demand function is used to estimate the effect of exchange rate volatility on Turkey's aggregated import demand:

$$1nM_t = \beta_0 + \beta_1 \ln GDP_t + \beta_2 \ln RER_t + \beta_3 1nV_t + \beta_4 Dummy94 + \beta_5 Dummy99 + \beta_6 Dummy08 + \mu_t \quad (1)$$

Where M is real import (nominal aggregated import/import price index); GDP is real gross domestic product of Turkey; RER is the real exchange rate; V is a measure of real exchange rate volatility. Dummy94 is the dummy variable to capture April 1994 currency crisis taking a value of one for the period of 1994:Q1-Q2, zero otherwise. Dummy99 and Dummy08 are included to capture the recession and earthquake for the year 1999 and the 2008 financial and later on the EURO crisis, respectively. Therefore, Dummy99 takes the value of 1 for the second, third, and fourth quarters of 1999. Dummy08 takes value of one for the period of 2008:Q3 and so on, zero otherwise. All variables are expressed in logarithms form except the dummy variables.

It is expected that both the increase in real GDP of the importing country, indicating an increase in per capita income, and real appreciation of the importing country's domestic currency, indicating a rise in the value of the currency against other currencies, will result in greater import demand. The volatility of the real exchange rate V is a proxy for the trader's attitude to risk. The effects of this variable on the import demand depends on whether the trader is risk-neutral or risk-adverse. Table 1 summarizes the theoretical expected signs of the coefficients in Equation1. Table 2 lists the variables used in the regression analysis with summary statistics for the 95 observations.

TABLE1: EXPECTED SIGNS OF COEFFICIENTS:

Variables	GDP	RER	V
Expected Sign	$\beta_1 > 0$	$\beta_2 > 0$	$\beta_3 > < 0$

The exchange rate volatility is constructed as moving sample standard deviation of the growth rate of the real exchange rate which can be defined in Equation 2:

$$\ln V_t = \left[\frac{1}{m} \sum_{i=1}^{m} \left(\ln RER_{t+i-1} - \ln RER_{t+i-2} \right)^2 \right]^{1/2} \quad (2)$$

Where m is the order of moving average which is 4 in this study and RER is the real exchange rate.

TABLE 2: DESCRIPTIVE STATISTICS OF VARIABLES

Variable	Mean	Std.	Min	Max
Dependent Variable				
Real Aggregated Import	5709365974	3838010449	996865643.2	16573730191
Independent Variables				
Real Gross Domestic Price (GDP)	18713465.79	5251079.351	9273120.07	31028947.65
Real Exchange Rate (RER)	136.58	22.53	90.06	177.60
Volatility (V)	0.02	0.02	0.002	0.07
Dummy94	0.02	0.14	1	0
Dummy99	0.03	0.17	1	0
Dummy08	0.14	0.34	1	0

EMPIRICAL RESULTS

Equation 1 is estimated using Ordinary Least Square employing quarterly data from 1988:Q1 to 2011:Q3. The empirical estimation results are reported in Table 3. Only income elasticity to import demand (lnGDP) and real exchange rate elasticity to import demand (lnRER) are statistically significant at the one percent significance level and have the hypothesized sign.

As anticipated, income elasticity of demand was positive, meaning that as income measured by real GDP increases, Turkish import demand also increases. Real exchange rate elasticity was also positive showing that the appreciation of the Turkish Lira increases import demand. The larger estimated coefficient for income elasticity indicates that aggregate import demand is more strongly affected by changes in income as measured by real GDP than by the appreciation or depreciation of the domestic currency.

The elasticity of real exchange rate volatility is positive but not statistically significant. The magnitude of elasticity of real exchange rate volatility is quite small, which implies that Turkey is largely neutral to exchange rate risk and that volatility of real exchange rate does not notably impact Turkish import demand. Dummy94, Dummy99 and Dummy08 are insignificant. Therefore, the currency crisis in 1994, earthquakes in 1999 and the 2008 Financial and later on the EURO crises have no significant impact on the Turkish import demand.

TABLE 3: OLS REGRESSION ESTIMATION RESULTS
DEPENDENT VARIABLE:

	Coefficient Estimate	T-Value
Variables		
Intercept	-8.93 ***	-10.23
lnGDP	2.35***	14.25
lnRER	0.72***	3.07
lnV	0.005	0.17
Dummy94	0.03	0.43
Dummy99	-0.001	-0.03
Dummy08	-0.036	-1.12
Adj-R^2	0.93	
F-Stat	120 (P_value:0.00)	
N	95	

Note: *, **, *** represent significance at 10%, 5%, and 1% level, respectively;

CONCLUSIONS

While the majority of available literature points to a negative trade response to exchange rate volatility, this study found that exchange rate volatility had a positive but statistically insignificant effect on the import demand of Turkey. Furthermore, empirical evidence provided in this study reveals that the Turkish import demand is determined predominately by income, and also by appreciation of the currency.

Other studies have found that the impact of exchange rate volatility on trade has been decreasing in significance since the 1980s and show as evidence that trade flows did not increase significantly between eurozone countries with the introduction of the euro in 1999. It can therefore be assumed that Turkey would not see major changes to trade between itself and the EU countries by adopting the euro as its currency, since the effect of volatility on trade flows is not significant.

Because appreciation of the currency does have a significant positive effect on Turkish import demand, it is important to examine the effects of giving up the ability to appreciate value of the lira against the currency of major trade partners. Increasing economic integration with the EU may have a positive effect on Turkish import demand if this integration does in fact cause a significant rise in real GDP through liberalization of trade in non-industrial sectors and other trade and policy changes.

This study assessed the effect of exchange rate volatility on Turkey's aggregated import demand gathering the data from the selected EU countries that accounts for almost half of Turkey's total imports which is the limitation of the study. So, if it were possible in the future, including data from the entire EU countries would fully explore the effect of exchange rate volatility on Turkish import demand.

REFERENCES

Alam, S. and Ahmad, Q. (2011) 'Exchange Rate Volatility and Pakistan's Bilateral Imports from Major Sources: An Application of ARDL Approach', International Journal of Economics and Finance, Vol. 3, No. 2, pp 245-254

Bahmani-Oskooee, M. and Hegerty, S.W. (2009) 'The Effects of Exchange-Rate Volatility on Commodity Trade between the United States and Mexico', Southern Economic Journal, 2009, 75(4), pp 1019-1044

Caglayan, M. and Di, J. (2010) 'Does Real Exchange Rate Volatility Affect Sectoral Trade Flows?' Southern Economic Journal 2010, 77(2), pp 313-335

Ertuðrul, A. and Selçuk, F. (2001), 'A Brief Account of the Turkish Economy, 1980-2000', Russian and East European Finance and Trade, vol. 37, no. 6, pp.6-30

Görmez, Y. and Yılmaz, G. (2007) 'The Evolution of Exchange Rate Regime Choices in Turkey', Oesterreichische Nationalbank Workshops, No. 13/2008, pp 269-302

Hudson, A. and Straathof, B. (2010) 'The Declining Impact of Exchange Rate Volatility on Trade', De Economist 158, No. 4, 2010, pp 361-372

Karaman, F.N. and Ozkale, N.L. (2006) 'Static effects of the EU-Turkey customs union', Conference Paper presented at European Trade Study Group 8th annual Conference, University of Wien, Austria

Ozturk, I. (2006), 'Exchange Rate Volatility and Trade: A Literature Survey', International Journal of Applied Econometrics and Quantitative Studies, Vol. 3, No. 1, pp. 85-102

Ozturk, I. and Kalyonju, H. (2009) 'Exchange Rate Volatility and Trade: An Empirical Investigation from Cross-Country Comparison', African Development Review, Vol. 21, No. 3, pp 499-513

Rodrik, D. (2009) 'The Turkish Economy After The Crisis', Ekonomi-tek, Vol. 1, No. 1pp 41-61

Sahin, A., Tansel, A. and Berument, M.H. (2011) 'Output-Employment Relationship across Sectors: A Long- Versus Short-Run Perspective', Bulletin of Economic Research 248-Nov-11

Togan, S. and Ersel, H. (2005) 'Macroeconomic Policies for Turkey's Accession to the EU' Turkey: Economic Reform and Accession to the European Union, Ed. B.M. Hoekman and S. Togan. The International Bank for Reconstruction and Development / The World Bank, 2005

Utkulu, U. and Seymen, D. (2004) 'Trade and Competitiveness Between Turkey and the EU: Time Series Evidence' Turkish Economic Association Working Papers no. 2004/8.