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THE INCONSISTENT RESPONSE OF TURKISH EXPORT DEMAND TO REAL EXCHANGE RATE SHOCKS

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ABSTRACT

In this study, we examine the responsiveness of exports to the real exchange rate shocks for different countries. Employing a Vector Autoregressive (VAR) methodology, the effects of different real exchange rate shocks on the Turkish export demand is examined by using quarterly data from the Turkey's 15 major trade partners. The study finds that the depreciation of the aggregate real exchange rate affected the Turkish export demand positively and significantly for three quarters. After accounting for the effect of the aggregate real exchange rate, this study empirically shows that the responses of Turkish exports to individual bilateral real exchange rate shocks are not uniform across countries.

JEL: F17, F31

KEYWORDS: Turkish Exports, Foreign Exchange, Vector Autoregressive Method

INTRODUCTION

The relationship between movement in the real exchange rate and the trade volume is an important one in international trade. According to the Mundell-Fleming Model, for small open economies with an assumption of rigid nominal wages, an exchange rate appreciation would be detrimental to exports and conversely stimulate imports, while exchange rate depreciation would stimulate exports and adversely affect imports. There are a large number of empirical studies that investigate the effect of real exchange rate movements on trade flows (Arize, 1994; Bahmani-Oskooee, 1998; Aydin et al., 2004; Chou, 2004; Alam and Ahmed, 2010; Neyapti et al., 2007; Saygili and Saygili, 2011; Wong and Tang, 2011; Erdal et al., 2012, to name a few). Most of these studies rely on the real effective exchange rate measure, which is a weighted average of a basket of several bilateral exchange rates of a specific currency. The way that the real effective exchange rate is computed does not reveal how each bilateral exchange rate movement affects the bilateral exports. Therefore, the use of real effective exchange rates does not help determine whether country specific characteristics can distort the effect of real exchange rate movements on bilateral exports (Berthou, 2008).

Our study follows the same line of thought at Berthou (2008). We argue that the responses of Turkish exports to individual bilateral exchange rates are inconsistent because the bilateral exchange rate is greatly distorted by the characteristics of importing and exporting countries, such as geographical distance, tariffs, and non-tariff barriers. Ignoring these characteristics biases the true impact of exchange rate movements on export (Auboin and Rutal, 2011). It is also noted that the composition of Turkish exports varies by country (Saygili and Saygili, 2011). Therefore, the price elasticities of exports are different, which could be another reason for the inconsistent behavior of Turkish export demand to bilateral exchange rate movements. The Turkish economy offers several interesting economic characteristics in the context of examining the responsiveness of exports to real exchange rate shocks. First, Turkey is a small and open economy, with total trade making up half of its GDP (OECD, 2011).

Starting in 1980, Turkey changed its inward-oriented development strategies to and export-led, outward-oriented growth policy, which led to sustained export growth (Arslan and Wijnbergen, 1993). Thus, high volatility in exports decreases the chance of a type II error – and error made when an incorrect null hypothesis is not rejected. Second, Turkey has experienced high and persistent inflation along with an unstable economic and political environment since the mid 1970s. A high volatility of exchange rate has been prevalent in the Turkish economy. Therefore, the effect of the exchange rate is visible, which minimizes the type II error, as well. Third, Turkey has relatively well-developed money market, foreign exchange, and bond markets that operate without any heavy distortionary regulations. Finally, Turkey is an important emerging country with the goal of becoming a member of the European Union.

The objectives of this study are twofold. First, this study investigates how a one-standard deviation shock to the aggregate real exchange rate affects the Turkish export demand by employing a Vector Autoregressive model (VAR). Second, utilizing data on Turkey's 15 major trading partners, we examine the effects of a bilateral real exchange rate between Turkey and each trading partner in relation to the aggregate real exchange rate on the Turkish export demand. To the best of our knowledge, this is the first study to examine this. The paper proceeds with a literature review. Section III presents the estimation methodology and data used in this study. The empirical estimation results are tabulated in section IV. We conclude with a discussion of the main findings and their implications.

LITERATURE REVIEW

According to a study by Berthou (2008), the characteristics of the exporting and importing countries can distort the bilateral exchange rate movements. Therefore, the reaction of a country's export demand to each bilateral exchange rate movement can be different. The study employed a gravity model for disaggregated trade data at the industry level (27 industries) for 20 OECD exporters and 52 developed and developing importing countries. The study by Berthou (2008) empirically shows how the geographical composition of exports, trade cost, transportation costs, tariffs and non-tariff barriers such as the quality of institutions, and the efficiency of customs can be contributing factors to the differences in the effect of real exchange rate movements on bilateral exports across exporting countries. The study confirms that the effect of real exchange rate movements on bilateral exports is reduced when the destination country is more distant. In particular, Australia exports to more distant countries than Belgium, which mainly exports to neighboring countries. Therefore, it is found that the reaction of Belgian exports to real exchange rate movements is 50% larger than the reaction of Australian exports, given their differences in the geographical structure of their exports. Thus, the real exchange rate affects trade differently depending on the distance of the country. The study by Flam and Nordstrom (2003) uses bilateral real exchange rate variable in a gravity equation to estimate the effects of the creation of the European currency union on the trade volume. Using a panel data with 20 exporting and importing OECD countries for the period 1989-2002, the study confirms that the elasticity of exports with respect to the bilateral real exchange rate is close to unity, while the elasticity of exports with respect to competitors' real exchange rate is less than one.

DATA AND METHODOLOGY

The benchmark model is a three-variable VAR model including the aggregate real exchange rate, real export values of Turkey, and real-world income. These variables are expressed in natural log form. The Schwarz criterion is used to determine the appropriate lag length for the benchmark VAR. The lag length of 5 was chosen for the estimation. Therefore, the benchmark VAR system consists of these three variables, namely aggregate real exchange rate, real export values of Turkey, and real-world income, the five lags, and a constant term. We have also used a set of dummy variables in our equations to account for seasonal variations in the model. Later, we extend the benchmark model to a four-variable model, including a relative real exchange rate for each trading partner. The relative real exchange rate is the ratio

of the bilateral real exchange rate between Turkey and each trading partner used in this study to the aggregate real exchange rate. This variable is also expressed in a natural log form.

The VAR model is estimated by using quarterly data covering the time span from 1987:Q1 to 2011: Q2. The data, except the aggregate real exchange rate and the bilateral real exchange rates between Turkey and each trading partner are obtained from the IMF's International Financial Statistics (IFS) and the DataStream database. The data are provided in current US dollars. To express the Turkish export values in Turkish Lira, the domestic currency, the data on export values in dollars are multiplied by the nominal exchange rate of Turkish Lira (TL) per US dollar. The data on the Turkish export in Turkish Lira and world income in dollars are deflated by the Turkish consumer price index and the US consumer index to define them in real terms, respectively. This study utilizes data on the Turkey's 15 major trade partners to calculate the aggregate real exchange rate as well as the real bilateral exchange rates between Turkey and the 15 trading countries. Among the Turkey's 15 major trade partners, Germany has the biggest share in the Turkish total exports. It is followed in descending order by Italy, the United Kingdom, Russia, France, Spain, the Netherlands, Romania, Bulgaria, Belgium, Egypt, China, Poland, Switzerland, and Japan. First, the aggregate real exchange rate, RER, is calculated following the approach developed by Togan and Berument (2007). The formula used to estimate the RER is the following:

$$RER = \Pi \left[\frac{CPI_i / E_i}{CPI / E} \right]^{w_i} \quad (1)$$

Where Π is the product sign, CPI_i is the consumer price index of country i and E_i is the nominal exchange rate defined as domestic currency per unit of US dollar of country i . CPI represents the Turkish CPI, E is the TL (Turkish Lira) per US dollar and w_i is the competitiveness weight attached to country i . Second, the real bilateral exchange rate calculated between Turkey and each trading partner used in this study is defined as the following:

$$RER_{TURKEY,i} = \left(\frac{E_{TURKEY,i} * CPI_i}{CPI_{TURKEY}} \right)^{w_i} \quad (2)$$

Where $E_{TURKEY,i}$ is the nominal exchange rate between Turkey and i , trading partner country, CPI_i and CPI_{TURKEY} are the consumer price indices of country i and Turkey, respectively. Among Turkey's 15 trading partners used in this study, Belgium, France, Germany, Italy, the Netherlands, and Spain adopted the EURO as the local currency after the year 1999. So we used the TL/EURO nominal exchange rate for the Euro period. However, in order to eliminate any possible confusion, the study keeps the pre-Euro period currency names for those countries where relevant (e.g. the German Mark). Finally, we use a measure of the relative real exchange rate for each trading partner, in addition to the aggregate real exchange rate to assess whether the relative real exchange rate affects exports. The relative real exchange rate, RRER, can be defined as a ratio of the bilateral real exchange rate between Turkey and each trading partner to the real aggregate exchange rate. After expressing in the logarithm form, the logarithm form of RRER can be expressed as the following:

$$RRER_i = RER_{TURKEY,i} - RER \quad (3)$$

Where all variables in equation 3 are in the natural logarithm form, RRER captures how each individual real exchange rate in relation to aggregate RER affects the Turkish export demand.

EMPRICAL RESULTS AND DISCUSSION

The impulse responses are reported in Figures 1 and 2. In Figures 1 and 2a-2b, we plot the median of impulse responses, as well as the upper and lower bounds representing a one-standard deviation confidence band. Specifically, Figure 1 reports the impulse response function of the Turkish export demand to one-standard deviation shock to the aggregate real exchange rate (RER). If the confidence band includes the horizontal line for a value of zero, the null hypothesis that, there is no effect of the aggregate real exchange rate shock on the Turkish exports demand cannot be rejected. The evidence suggests that the Turkish export demand increased for eight periods when the aggregate real exchange rate depreciated. However, the effect is statistically significant for only three quarters.

Figures 2a and 2b present the results of the impulse response functions of our benchmark VAR model with the relative real exchange rate for each country as an additional variable. The null hypothesis of no effect of one-standard deviation shock to each country's relative real exchange rate on the Turkish export demand cannot be rejected if the confidence band includes zero. We include the relative real exchange rate to assess how each individual real exchange rate in relation to the aggregate RER affects the Turkish export demand. The RRER positive response suggests that the depreciation of individual real exchange rate in question relative to the aggregate RER increases more or less. Figures 2a and 2b demonstrate that the Turkish export demand responds more to the depreciations of both the Japanese Yen and the Russian Rubble in relation to the aggregate RER. On the other hand, the Turkish export demand responds less to the depreciation of this individual exchange rate namely, the Belgian Franc, French Franc, Italian Lira, Netherlands Gulden or Spanish Peseta relative to the aggregate RER.

For example, the contribution of the Belgian Franc depreciation to an increase in the Turkish export demand is less than the contribution resulting from the depreciation of the aggregate RER. Therefore, after accounting for the effect of the aggregate real exchange rate, the responses of exports to individual bilateral real exchange rate shocks are not uniform. Especially, the Turkish exports respond more to a one-standard deviation shock to the Japanese Yen and then Russian Rubble than to the Belgian Franc, French Franc, Italian Lira, Netherlands Gulden, and Spanish Peseta. Finally, each of these currencies, namely the Bulgarian Lev, Chinese Yuan, Egyptian Pound, German Mark, Polish Zloty, Romanian Leu, Swiss Franc and UK Pound shows a very similar pattern to the aggregate RER, concluding that the impulse response function of the Turkish export demand to a one-standard deviation shock to each country's relative real exchange rate is not statistically significant.

Figure 1: The Effects of Aggregate Real Exchange Rate on the Turkish Export Demand

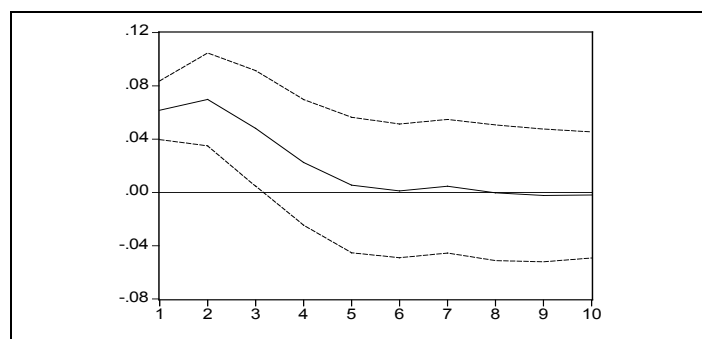


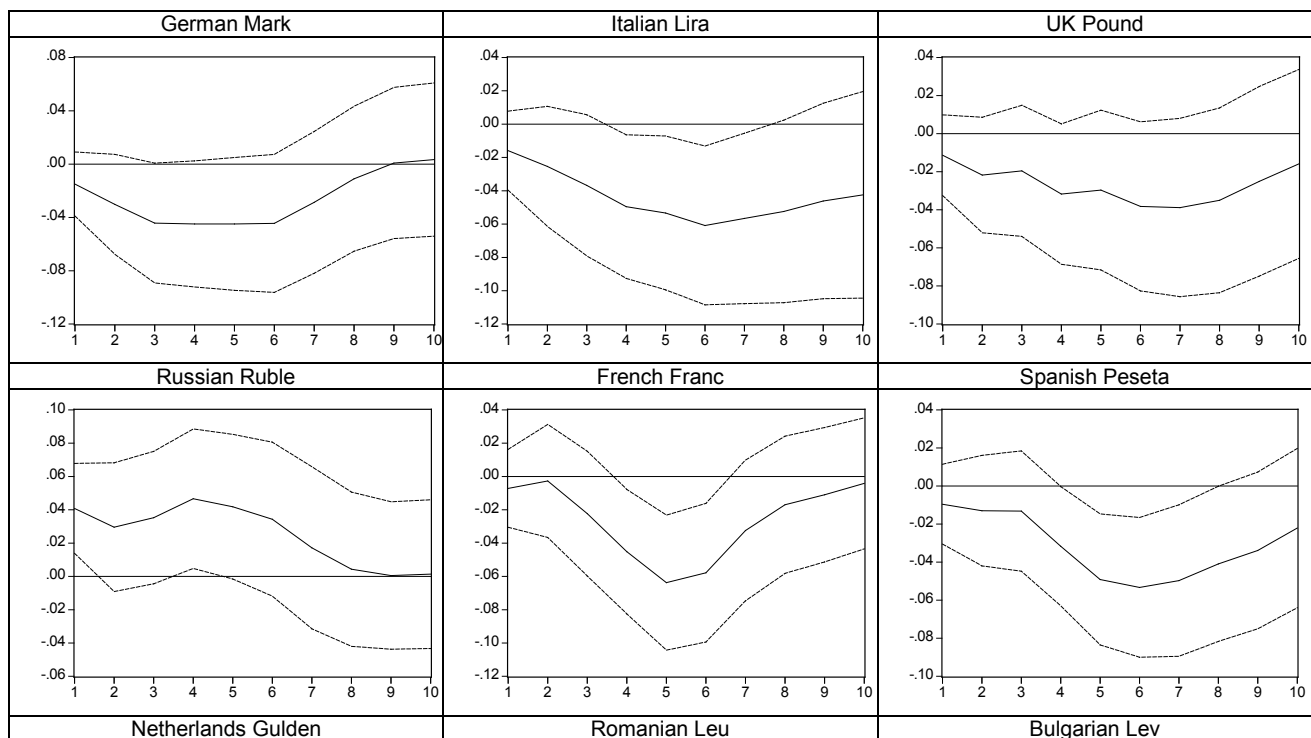
Figure 1 reports the impulse response function of the Turkish export demand to one-standard deviation shock to the aggregate real exchange rate (RER). The middle line in figure 1 represents the impulse response. The upper and lower dotted-lines around the impulse response line represent a one-standard deviation confidence band.

It is important to note that the impulse function of the Turkish export demand to a one-standard deviation shock to the German Mark relative to the aggregate RER is insignificant which is not surprising. The aggregate RER is computed by choosing weights for each country used in this study. The weights are determined based on the importance of these trading partners on the Turkish export demand. Since Germany has been an important market for the Turkish exports, it makes up a big part of the index value. Thus, its deviation from the aggregate RER should be small. Therefore, this is one reason that we could not observe the effect.

CONCLUDING REMARKS

The study analyzes the responsiveness of Turkish exports to the real exchange rate shocks for different countries. Employing a Vector Autoregressive (VAR) methodology, the effects of different real exchange rate shocks on the Turkish export demand is examined by using quarterly data from the Turkey's 15 major trade partners over the period from 1987:Q1 to 2011:Q2. The empirical results are summarized as follows. The depreciation of the aggregate real exchange rate affects the Turkish export demand positively and significantly for three quarters. After accounting for the effect of the aggregate real exchange rate, the response of exports to individual bilateral real exchange rate shocks are inconsistent. The Turkish export demand responds differently to a one-standard deviation shock to the Japanese Yen, Russian Rubble, Belgian Francs, French Franc, Italian Lira, Netherlands Gulden and Spanish Peseta, respectively. The Japanese Yen and Russian Rubble shocks have greater impacts on the Turkish export than shocks to Belgian Franc, French Franc, Italian Lira, Netherlands Gulden and Spanish Peseta. Following the spirit of Berthou (2008), we show the inconsistencies of responses through the real effective exchange rate, which is one of the limitations of this paper. It is possible that inconsistencies might be coming from the import countries' income level. However, the existence of inconsistencies through the real exchange rate as well as the income, makes estimates less reliable.

Figure 2 a: The Effects of Individual Real Exchange Rate on the Turkish Export Demand



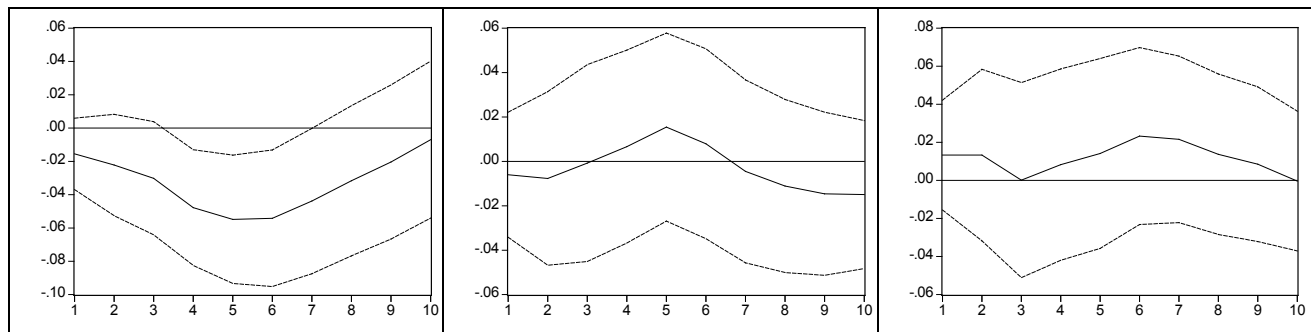


Figure 2a reports the impulse response function of the Turkish export demand to one-standard deviation shock to each country's relative real exchange rate. The middle lines in figure 2a represent the impulse responses. The upper and lower dotted-lines around the impulse responses line represent a one-standard deviation confidence band.

Figure 2b: The Effects of Individual Real Exchange Rate on the Turkish Export Demand (continued)

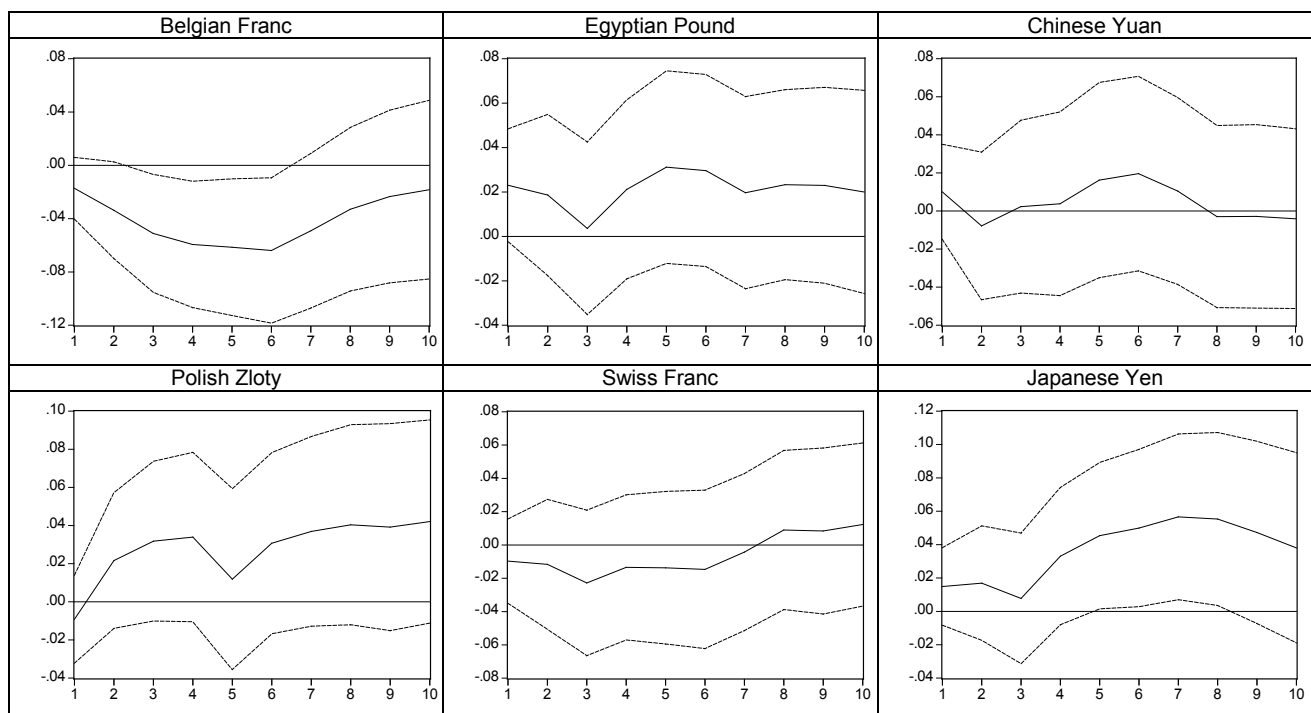


Figure 2b reports the impulse response function of the Turkish export demand to one-standard deviation shock to each country's relative real exchange rate. The middle lines in the figure 2a represent the impulse responses. The upper and lower dotted-lines around the impulse responses line represent a one-standard deviation confidence band.

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