The Impacts of Foreign Exchange Rate Volatility on Import and Export of Cars at Turkish Economy: 2001-2018 Period

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Abstract: *This study aimed to achieve different purposes including explaining the relationship between imports/exports of a country and changes of the foreign exchange rate, investigating the presence of the long-term relationship between the changes of the rate of foreign exchange and change in exporting of cars in Turkey, and ensuring the impact of the country's trade on its economy. To achieve these purposes, the researcher applied a widespread ARDL bounds testing method, where the researcher depended on data from the Electronic Data System Website (EVDS) of the Turkish central bank along with the Turkish statistical institute (TURKSTAT). Where this research is an analytical case study using data time series of data from 2001-2016. The results concluded that the foreign exchange rate volatility has a considerable impact on cars exports equations in the dynamics of the long term, indicating that there is a powerful correlation between the rate's volatility and exports of cars in Turkey.*

Keywords: foreign exchange, export, import, car market, the Turkish economy

1. Introduction

Business people and governments, all over the world, are intense about the consequences of foreign exchange rates' decline and rise on various things; for example, imports, exports, domestic prices, household items, etc. It is highly essential to analyze the effect of money variances on the export and import of a certain country. According to The Observatory of Economic Complexity, Turkey is the 29th biggest country in the world in export. In 2016, Turkey exported 156 Billion dollars and imported 186 Billion dollars, subsequent in a negative 29.6 billion dollars trade balance. According to Kandil, Berument & Dincer (2007), if the foreign exchange rate declines the increases in the country money rate, the domestic can import the products with shabby costs. Furthermore, if a state's currency declines because of the exchange rate increase, the nation's imports of origin will diminish and the exports will go up because of foreign exchange rate rises. At the point when foreign exchange rate increments or reduces, the progressions get to the entire business of the country at particularly degree.

2. Literature Review

Ozmen and Furtun (1998) aimed at investigating the hypothesis of "Export-Led Growth", which depended on the quarterly information of 1970-1995 in Turkey. They used such seasonally adjusted series as well as they concluded that there was no cointegration existence with the actual income and the actual export. Upadhyaya (1999) had the models of the Autoregressive Distributed Lag (ADL) for (6) countries in Asia implementing annual data from 1963–1993 and data of GDP, and RER. In addition, they concluded that all the factors are regarded as the initial integration order. The main outcome of this study includes the devaluation, which caused contraction for the long-term in Thailand and Pakistan, and predictive in other states.

The study of Bilgili (2000) examined the impact of the Real Exchange Rate Misalignment (RERMIS) on growth in the Turkish economy. The researcher estimated the regression models of the annual data for 1978–1998. Regarding the model of the textbook, the researcher concluded that database did not present any of negative or positive RERMIS effects on the economic growth and the trade balance, which was not affected by the RER changes. The conclusions showed contradictions with the econometric analysis and theory, which was mainly about the implemented approaches. The author examined the integration level of factor; moreover, she concluded that the entire series is considered the integration's first order. Facing unit root's examination, the study applied the needed level series in the approaches and models of regression. When regression stochastic process and default are regarded as a non stationary root, such regression is referred to as a spurious relationship or regression. The reasons beyond that are standard t-test, which does tend to be presented as spuriously considerable although when regression is mainly dependable on regress and in the OLS. A second contradiction is examining the essential model's coefficients. If the coefficient is not considerable, it cannot be elucidated

Through examining the impact of the volatility and trade terms of RER on the investment and growth in (14) sub-Saharan states with the implementation of GARCH approach, Bleaney and Greenaway (2001) implemented the database from 1980-1995. The study concluded that RER volatility has such a passive effect on investment and growth.

Dincer and Kandil (2011) examined the impact of the rate's fluctuations on the disaggregated database. The study analyzed (21) Turkish exporting sectors. Establishing the theoretical approach of the study, which deteriorates the

rate's movements in the expected and unexpected elements, an investigation that examines the impacts through channels' supplying and demanding. The anticipated appreciation of exchange rate matches up to the movements in the fundamentals, underlying ones, has such important adverse effects, that is contracting the export of growth across various sectors. According to the casual exchange rate's fluctuations, divergence around the steady-state of balance, With the symmetric impact on the sectoral export increase. The study indicated the increased constriction of the export supply and demand for the assessment of currency. Opposite to that, the depreciation effect in the stimulating of the export increase had lost its movement. However, exchange rate fluctuations had a favorable net effect on export growth before 2003 and the effect of the net was unfavorable for the hereafter 2002. Implications anticipated the exchange rate movement, which guided the export strategies and the gesturing process importance of administrating the grounds of another reasonable forecasting. Furthermore, less exchange rate variances developed the sectoral export growth in of Turkey.

Alam and Ahmed (2010) presented a detailed estimation of the effect of exchange rate volatility on import demand in Pakistan during the period lasting from Q1 of 1982 to Q2 of 2008, with the use of the autoregressive distributed lag model (ADLM) for performing data analyses. The study adopted the documentary approach, relying on reviewing a number of previous studies illustrating the changes in exchange rate volatility, macro-economic indicators, and volumes of imports between Q1 of 1982 and Q2 of 2008. The study introduced a number of results, of which the most important were the following: there are significant correlations among real effective exchange rate volatility, real effective exchange rates, relative prices of imports, levels of demand on imports, and rates of real economic growth; there is a significant positive correlation between aggregate import demand and real GDP, which implies that more economic growth is accompanied by demand on imports; and there is no correlation between relative prices of imports and demand on imports.

Bakhromov (2011) examined the impact of exchange rate volatility on importing and exporting in Uzbekistan. The study's adopted methodology was the library descriptive approach, which relied on reviewing previous literature containing macroeconomic data describing real exchange rate volatility and volumes of imports and exports in Uzbekistan during the period 1999-2009. The study presented a number of results, of which the most important are the following: there is a significant positive correlation between the level of both real domestic and foreign income and the level of import/export flows; there is a significant negative correlation between the level of the real exchange rate and volumes of imports; there is a significant positive correlation between the level of real exchange rate and volumes of exports; and there is a significant negative correlation between exchange rate volatility on one hand and import demand and export demand on the other.

Erdal et al. (2012) investigated the relationship between the real effective exchange rate volatility and both agricultural imports and exports in Turkey. In order to achieve the study's main objective, the researchers adopted the documentary approach, relying on reviewing literature providing data on exchange rates and volumes of agricultural imports and exports in Turkey between 1995 and 2007, with the use of the Generalized Autoregressive Conditional Heteroskedasticity model for calculating exchange rate volatility. The study presented a number of key results, the most important of which are that there is a significant positive correlation between the real effective exchange rate volatility and volumes of agricultural exports and that there is a significant negative correlation between the real effective exchange rate volatility and volumes of agricultural imports.

Nazlioglu (2013) examined the effects of exchange rate volatility on the volumes of exports in Turkey. For the purpose of this study, the researcher adopted the historical approach, which relied on reviewing previous studies containing data about the volumes of exports of Turkey's leading 20 industries to leading international trading partners, which involved the use of the panel cointegration method for analyzing the data. The study's most significant results include that the effects of foreign exchange volatility on exports vary by industry, that there is a significant positive correlation between currency depreciation and volumes of exports, and that there is a correlation between the level of foreign income and the level of industrial exports.

Brun-Aguerre et al. (2012) presented a detailed investigation of the effect of exchange-rate pass-through on prices of imports in a number of emerging-economy countries. For that aim, The researchers used the historical research approach, which involved reviewing recent literature providing data on exchange rates, import prices (by local currency), and export prices (by foreign currencies) in (18) emerging-economy countries and (19) developed countries. The researchers presented several results, which include the following: exchange-rate pass-through in emerging-economy countries is influenced by exchange rate volatility, levels of openness, inflation rates and relative wealth; exchange-rate pass-through is influenced by both protectionism (protecting the county's domestic products through imposing taxes on imported products) and output gap in both emerging-economy countries and developed countries.

Nicita (2013) discussed the role foreign exchange rates play in imports/exports movements worldwide by examining the effects of currency misalignment and exchange rate volatility on international trading activities and decision-making processes in governments of a number of countries. The study utilized the documentary approach, which involved reviewing previous literature containing detailed macro-economic data of (100) countries over the period spanning between 2000 and 2009. The study yielded several results, of which the most prominent are that there is an insignificant correlation between exchange rate volatility on the short run on one hand and both importing and exporting volumes on the other, that there is a significant correlation between currency misalignment on one hand and both importing and exporting volumes on the other, and that government policies impact the outcomes of currency overvaluation.

Bahmani-Oskooee et al. (2013) explored the trade relations and movement of imports and exports between Brazil and the United States during the period 1971-2010. The researchers adopted the library descriptive approach, which relied on reviewing previous literature discussing detailed data of international trade activities between Brazil and the United States during the period 1971-2010. The study's most significant results include the following: there is an insignificant correlation between exchange rate volatility and volumes of imports/exports in the long run; increased risk significantly affects volumes of imports/exports; there are statistically significant differences among companies, based on the size variable, in responsiveness to exchange rate volatility-related risks, for the favor of small companies; and the effect of exchange rate volatility differs significantly among economic sectors (e.g., tangible effects on exports of the agriculture sector in Brazil, and no effects on machinery imports in the United States).

Sendilmen (2017) discussed in his study the impact of real effective exchange rate volatility on the trade between the U.S. and Turkey while implementing the ARDL approach. The study analyzed the relationship between the exchange rate volatility and trade using disaggregate monthly data from 2003-2015. The study concluded that there was not strong existence evidence for a long-run co-integrating relationship in all the (20) industries. Among the models used for several industries, two with a long-run relationship. Unsurprisingly, the index of industrial production in Turkey is a considerable regressor for the Turkish imports in most of the country's industries in the long-run relationship. The exports, however, are affected by the real effective rate of exchange on the Turkish Lira. In a short-run relationship, the autoregressive elements have the largest effect on themselves, for instance, the imports and exports, respectively.

3. Impacts of Foreign Exchange Rate Volatility on Car Export

The local and foreign Exchange rates directly affect the real prices of production and goods traded among the nations in the world, as it shows the price paid when every transaction is performed. Similarly, domestic inflation has a vital part in setting the changing prices patterns of tradable goods (Jalil Khan, Parvez, and Shabib, 2014). For the developing nations, the issues concerning trade increase when the external factors appear in the form of "News" or "Shocks" and break the general flow of the international costs paid for the stocks or commodities. Exchange rates usually show highly indeterminable and unstable patterns responding to such news and shocks, causing a pattern known as "Volatility". If this new/shock stays for a long period with a temporal effect that results in a wave in the exchange rates flow where the consequent patterns of trade will heavily disturb the stream of anticipated returns by increasing the loss probability for the concerned traders (Irfan, Irfan, and Awais, 2010). It is essential to understand how regularly these shocks could happen and the time they could persist. This requires the direct formulation of effective policies and strategies to protect the country's exports and interests of its traders. Currency and its evolution in relation with other international currencies are essential for both: the external

stability (The sustainable deficit of current account) and the internal stability of the country's economy (employment, domestic money demand, and supply, price stability, rates of interest). Moreover, exchange rate volatility, exportation inflation, and the nominal exchange rate are generally interdependent factors, which reflect the fundamental evolution of a sustainable and balanced economy (Gherman, Ştefan, and Filip, 2013). The literature presents several results regarding the relationship between exchange rate volatility and exportation. Soleymani, Chua, and Hamat (2017) investigated the part of external exchange rate volatility for the ASEAN-4 countries (Malaysia, Indonesia, Thailand, and Singapore) and their (5) main partners of trades. The results showed a considerable influence of the external exchange rate volatility on the countries' trade. Investigating the volatility role of exchange rate on the exports of (5) East Asian nations, Chit, Rizov, and Willenbockel, (2010) stated that there is a presence of a considerable trade-promoting impact of the external volatility of exchange rate. Implementing French firm-level information, Hericourt and Nedoncelle (2015) confirmed the considerable trade-promoting impact of the external volatility of the exchange rate at the firm-level system.

4. Research Methodology

The volatility of exchange rates became a global phenomenon soon after the collapse of the Bretton Woods system in 1973, with significant impacts on international trade flows becoming a norm. This area has become a major field of interest in international economics and finance trying to identify and understand the underlying relationship between exchange rate volatility and trade flows. This chapter provides details on the research methodology that was applied to achieve the research objective. It shows the research tools, which are Stationarity and Unit Root tests and volatility Estimation. The last section of the current discusses in detail both the ARDL-bound testing approach (Pesaran et al., 2001).

5. ARDL – Bounds Testing Approach

The study applies the ARDL examination method developed by Pesaran et al. (2001) in order to evaluate the long-run model of trade in (33-34). The essential advantage of this method over the other approaches is that it is firm enough to overcomethe stochastic factors' behavior and has no assumptions regarding the factors' integration. This method evades the pre-examination issues linked with the factors' integration that the norms techniques of cointegration generally encounter. It permits the author to differentiate between the short and long-run impact of the factors, which is essential in the analysis (Bahmani-Oskooee and Hegerty, 2007; Pesaran et al., 2001). The model of ARDL includes the variables LAGs. LAGs are shown in the models for various aspect. The LAG includes the decision lag, recognition lag, and the impact lag. The patterns with these LAGs are quite interesting for the standard analysis of the economy (Brooks, 2008). The Error Correction Model (ECM) is a short-term functional pattern including the first-factor variation and a correction term of a certain error. It is an adjusted ARDL state; where the reliant factor (y) with a known purpose and a LAG among other factors:

$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 x_t + \alpha_3 x_{t-1} + u_t$

$\Delta y_t = \alpha_0 + (\alpha_1 - 1)y_{t-1} + \alpha_2 \Delta x_t + (\alpha_2 + \alpha_3)x_{t-1} + v_t$

Moreover, to apply the ECM aspect, the next assumption is needed:

$(\alpha_1 - 1) = -(\alpha_2 + \alpha_3)$

or

$(\alpha_1 + \alpha_2 + \alpha_3) = 1$

Characterizing the mentioned assumption needs the total coefficients in the mentioned equation to be as (1), which is y and x short-term correlation. In order to locate the long-term correlation, it is presumed that the factors are at their constant states and the initial distinguish concept is (0). The above mathematical factors are the long-run correlation between the factors of the model. To apply the approach of ARDL in order to cointegration the approach into the current model, the short-run functions require to be combined with the long-term aspect:

$$\Delta m_t = \beta_0 + \beta_1 \sum_{j=1}^{n1} \Delta m_{t-j} + \beta_2 \sum_{j=0}^{n2} \Delta y_{H.t-j} + \beta_3 \sum_{j=0}^{n3} \Delta p_{t-j} + \beta_4 \sum_{j=0}^{n4} \Delta V_{t-j}$$
$$+ (\lambda_1 m_{t-1} + \lambda_2 y_{H.t-1} + \lambda_3 p_{t-1} + \lambda_4 V_{t-1}) + v_t$$

$$\Delta m_t = \beta_0 + \beta_1 \sum_{j=1}^{n1} \Delta m_{t-j} + \beta_2 \sum_{j=0}^{n2} \Delta y_{H.t-j} + \beta_3 \sum_{j=0}^{n3} \Delta p_{t-j} + \beta_4 \sum_{j=0}^{n4} \Delta V_{t-j} + \beta_5 \sum_{j=0}^{n5} \Delta TCV_{t-j}$$
$$+ (\lambda_1 m_{t-1} + \lambda_2 y_{H.t-1} + \lambda_3 p_{t-1} + \lambda_4 V_{t-1} + \lambda_5 TCV_{t-1}) + v_t$$

Several diagnostic examinations have been done to examine the model's stability. Since several lagged reliant factors are shown in the current model, it is important to examine the autocorrelation existence. The Durbin-Watson stat(DW) test and Q-statistics examinations for the autocorrelation are done for all the mathematical issues and the outcomes are stated in the tables.

6. Statistical Analysis

We have two simple regression models as follows:
Model (I) : Export(unit) t = β0t + β1t (TP_DK) + εt
Model (II) : Export(Dollar) t = β0t + β1t (TP_DK) + εt
where   TP_DK is independent variable
export by dollar and export by unit are dependent variables
εt: Random Error
β0t: Constants (y - Intercepts)

Autoregressive Distributed Lag (ARDL) models, and Bounds Tests

The existence of the long-run relation between the variables under investigation is tested by computing the Bound F-statistic (bound test for cointegration) in order to establish a long run relationship among the variables. This bound F-statistic is carried out on each of the variables as they stand as an endogenous variable while others are assumed as exogenous variables. Table (14) shows the following results:

- In model (I) the value of F-statistics = 4.0302 > 3.51 in I(1), means that there is cointegration between the variable Export by unit and TP-DK at 0.10 significant level.
- In model (II) the value of F-statistics = 4.9380 > 4.79 in I(1), means that there is cointegration between the variable Export by dollar and TP-DK at 0.025 significant level.

Table 14: Autoregressive Distributed Lag (ARDL) models, and Bounds Tests

MODEL	Test Statistic	Value	Signif.	I(0)	I(1)
Model (I)(DV= Export by unit; IV=TP-DK)	F-statistic	4.0302	10%	3.02	3.51
	k	1	5%	3.62	4.16
			2.5%	4.18	4.79
			1%	4.94	5.58
Model (II)(DV= Export by dollar; IV=TP-DK)	F-statistic	4.9380	10%	3.02	3.51
	k	1	5%	3.62	4.16
			2.50%	4.18	4.79
			1%	4.94	5.58

The Distinguishes the Current Study from Previous Studies

In general, and as far as researcher is aware, there is a paucity of the studies that address the existence of a long-run relationship between change in the foreign exchange rate and the change in export and import of cars in Turkey.
- Our study results have two simple regression models as follows:
- Model (I): Export(unit) t = β0t + β1t (TP_DK) + εt
- Model (II): Export (Dollar) t = β0t + β1t (TP_DK) + εt
- Where TP_DK is independent variable
- product(unit), product (dollar) and export are dependent variables

- εt: Random Error
- β0t: Constants (y - Intercepts)

7. Our Research Results

- In model (I) the value of F-statistics = 4.0302 > 3.51 in I(1) , means that there is cointegration between the variable Export by unit and TP-DK at 0.10 significant level .
- In model (II) the value of F-statistics = 4.9380 > 4.79 in I(1), means that there is cointegration between the variable Export by dollar and TP-DK at 0.025 significant level.

- In addition to that, this study concludes the following results:
- A strong correlation is found between exports/imports and foreign rate's changes.
- The development of the country does depend on the economic development which relies on the exchange rate changes.
- There are many factors that affect the vitality of the imports and exports of each country.

8. Recommendation

1) Turkey as an emerging economy, it must take care of the forward market, which reduces of uncertainty level and riskiness of foreign exchange rate fluctuations and encourage business investment and exports.
2) Increase interest in monetary policies and tools that influence the supply of local currency, which contributes balance with foreign exchange rate fluctuations.
3) Promoting investment in the industrial sector as a contributor to the promotion of foreign trade, increase the volume of exports and balance with imports, which in turn helps in economic growth.
4) Underline effective role of macroeconomic policies for achieving a long-run equilibrium for exports and imports, which indicates the importance of managing them.
5) Taking quick and effective responses by central banks to deal with the foreign exchange rate' volatility, which needs an understanding of the factors' nature influencing the foreign exchange rate.
6) Encourage the diversification of investments and trade with both developing and developed countries, which lower the volatility risk of the foreign exchange rate.
7) Conducting studies that measure the possible tolerated foreign exchange fluctuations.

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