Real Exchange Rate and Foreign Trade Relationship: The Case of Hungary

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Abstract

Hungary's foreign trade has scored progress in recent years. The result of this progress has brought a positive effect on the country's trade deficit. This situation also raised the question of whether foreign trade is affected by exchange rates. The purpose of this study is to evaluate the factors affecting the real exchange rate in Hungary from 1995 to 2020. In this study, the Granger causality analysis is used to measure the effects of macroeconomic factors on the real exchange rate. This study considers macroeconomic factors like exports and imports. Data of the study have been collected from the World Bank. The results show that there is a significant and positive effect of exports on real exchange rate. Also, there is a bidirectional causality relationship from exports to imports.

Keywords: real exchange rate, exports and imports.

Introduction

Hungary's foreign trade volume has made important progress in recent years and has increased rapidly. Also, the Hungarian Forint has become relatively valuable in recent years. So how much real exchange rate is affected by foreign trade, it is becoming an important issue. The estimation of the domestic currency coincides with the increase in the level of imports. Meanwhile, the devaluation of the domestic currency leads to an increase in the level of exports, a factor that positively affects the trade deficit. The goal of each country is for the number of exports to be higher than the number of imports. Governments often undertake reforms that affect the value of the domestic currency, thus maintaining trade deficit balances.

After 1990 the state sector of the economy began to be privatized when its greatest development was after the Second World War. The agricultural and industrial sectors are quite developed, mainly the industrial sector, which has expanded since 1945 (International Monetary Fond, 2019). Hungary has an export-oriented trading economy, making it the 35th largest exporter in the world. Specifically, in 2015, the Hungarian economy had over 100 billion USD exports, where 79% of the level of exports went to EU countries and the rest ton on-EU countries (Hungarian Central Statistical Office, 2016).

In this study real exchange rate, which is an important issue will be examined with macroeconomic variables. Therefore, indicators like real exchange rate, exports and imports data are used for this analysis based on the timeline of the years 1995-2020. The study tends to consider two macroeconomic factors that affect real exchange rate. The plan of study is divided into sections. It begins with an introduction as the first part. Furthermore, the study continues with the second section, which gives information on literature. The third section focuses on methodology and data analysis. Finally, the

fourth section embodies the empirical results and conclusions.

1. Literature Review

Kang & Dagli (2018) did a research about international trade and exchange rates. It was concluded that increased participation in GVCs lowers the impact of the exchange rate on exports and could be a contributing factor to weakening links between rates and trade.
Özdemir (2013) did research about the relationship between exchange rates and foreign trade, the case of Turkey. In this research, it was concluded that an increase in exchange rates causes an increase in exports and a decrease in imports. Also, it was concluded that the increase in imports is related to higher demands in the domestic market, the increase in exports is related to the increase in the number of foreign markets and economic development in these markets.

Bahmani- Oskooee & Ltaifa (1992) concluded that developed countries exports are found to be less sensitive to exchange rate than that of developing countries.
Karaçor and Gerçeker (2017) concluded that there is a causal relationship between real exchange rates and foreign trade volume in the short and long term. Also, it has been determined that there is only a short term causality for real exchange rates to foreign trade volume.
Yaman (2018) concluded that a 1% unit increase in exchange rate increased exports by 0.23% and imports decreased by 0.38%. Also; the 1% increase in GDP has increased imports by 1.32%. Within the results of working, it was concluded that single currency adjustment would not be enough to affect foreign trade.
Asseery ve Peel (1991) concluded that there is no significant relationship between exchange rate and exports. Nyeadi J., Atiga O. and Atogenzoya Ch., (2014) concluded that exchange rate has no impact on exports of goods and services in Ghana.
Arize (2006) concluded that the real exchange rate has a negative effect on exports in the short run as well as in the long run. De Vita & Abbott (2004) concluded that exchange rate has a negative and significant influence on UK exports to EU countries.
Chou (2000) concluded that exchange rate variability has a long-run negative effect on total exports, exports of manufactured goods, and exports of mineral fuels.
Ngondo and Khobai (2018) did a research about the impact of exchange rate on exports in South Africa during the period 1994 -2016. Also it was concluded that exchange rate has a significant negative relationship with exports.
Thi Thuy & Thi Thuy (2019) did a research about the impact of exchange rate on exports in Vietnam. In this study it was concluded that exchange rate affects negatively exports in the long run. Also, a depreciation affects exports negatively in the short run and positively in the long run.

2. Data Analysis and Methodology

The data used in the analysis includes quarterly data for the period 1995Q1-2020Q2. In the study real exchange rate, exports and imports data are taken from the World

Bank database. The real exchange rate, exports and imports values used in the scope of the study are discussed in terms of currency.

Granger Causality Test is used to determine the factors affecting variables. In the Granger method the relationship between independent variables and dependent variables is examined. Real exchange rate is used as dependent variable in the study. The independent variables of the study are determined as exports and imports.

Table 1 Variables and Abbreviations used in the study.

Variable Name	Variable Type	Abbreviation
Real Exchange Rate	Dependent Variable	xrate
Exports	Independent Variable	expt
Imports	Independent Variable	impt

Source: Author's construct.

The study is intended to examine the effect of exports and imports variables on real exchange rate. Also this study contain econometric models, which causality between variables is determined.

Descriptive statistical values of Hungary's real exchange rate, exports and imports data are presented between 1995 Q1 - 2020 Q2 periods. The values presented are the natural logarithm of the variables.

Hypotheses for the Jarque-Bera test are as follows:

H0: Error terms are suitable for normal distribution.

H1: Error terms are not suitable for normal distribution.

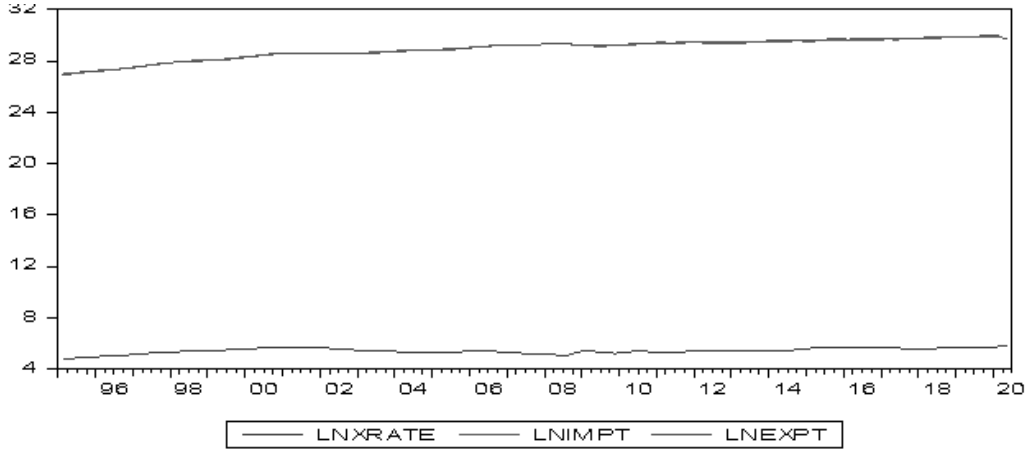

Table 2 Descriptive Statistics of Variables

	lnxrate	lnexpt	lnimpt
Mean	5.401516	28.92114	28.94078
Median	5.409332	29.19216	29.21262
Max	5.767309	29.89117	29.93246
Min	4.729490	26.99569	26.88629
St. Deviation	0.216020	0.758570	0.790369

Skewness	-0.666479	-0.956213	-0.848698
Kurtosis	3.334771	3.016913	2.775976
Jarque-Bera	8.027602	15.54506	12.45819
p	0.018065	0.000421	0.001971
Number of Observations	102	102	102

The H0 hypothesis can be rejected with a 95% confidence level for all variables used in the study when the significance values of Jarque-Bera are less than 0.05.

3. Empirical Results

The econometric models used in this study include VAR lag order selection criteria, ADF unit root test and Granger causality analysis.

In this study the causality analysis of real exchange rate was examined by Granger causality analysis. Implementation of the Granger Test (1969) requires determining of the lag length with the help of the VAR model. In the second step the highest degree of integration (dmax) is added to lag length (p). In this case the relevant VAR model can be written as follows:

$$Y_t = \alpha_0 + \sum_{i=1}^{p+d_{max}} \alpha_{1i} X_{t-i} + \sum_{i=1}^{p+d_{max}} \alpha_{2i} X_{t-i} + u_t \quad (1)$$

$$X_t = \beta_0 + \sum_{i=1}^{p+d_{max}} \beta_{1i} X_{t-i} + \sum_{i=1}^{p+d_{max}} \beta_{2i} Y_{t-i} + v_t \quad (2)$$

The hypotheses used for equation (1) and (2) are as follows:

H0: there is no causality relationship from Y to X ($\beta_{21} = \beta_{22} = \ldots\ldots = \beta_{2p} = 0$).

H1: there is causality relationship from Y to X ($\exists \beta_{2i} \neq 0$ i = 1,2, …… p).

The lag length in the model was obtained by VAR analysis. According to the results obtained, it was determined that the optimal lag length was 3.

Table 3 VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	99.25372	NA	2.81e-05	-1.964362	-1.885230	-1.932355
1	570.4288	903.8868	2.26e-09	-11.39651	-11.07998*	-11.26848
2	586.8850	30.56156	1.94e-09	-11.54867	-10.99475	-11.32462*
3	596.9677	18.10771*	1.90e-09*	-11.57077*	-10.77945	-11.25070
4	601.0152	7.021232	2.11e-09	-11.46970	-10.44099	-11.05361

Source: Author's construct. * indicates lag order selected by the criterion

In Granger Causality, the relationship between time series can be examined even the time series were not stationary. Also, to determine the lag of VAR model stationary time series must be executed to determine the maximum degree integration of the variables. The variables used for AFD unit root test are given in table 4 as below:

Table 4 AFD Unit Root Test Results

Variables	Difference t-statistic	p	t-statistic	p
xrate	0.865288	0.8949	-6.934108	0.000
expt	1.525554	0.9682	-5.382093	0.000
impt	2.059481	0.9904	-5.526111	0.000

Source: Author's construct.

As seen in Table 4 the variables of xrate (real exchange rate), expt (exports) and impt (imports) became stationary in their first differences. Also the maximum degree integration of stationary time series was dmax=1. The p+dmax level required for Granger causality analysis was **3+1= 4**. The results of Granger causality analysis are given in table 5 as below:

Table 5 Granger Causality Analysis

Dependent variable: xrate

Excluded	Chi-sq	Prob.
expt	8.353375	0.0495*
impt	6.088511	0.1926

* it shows the existence of causality relationship at 95% confidence level

Dependent variable: expt

Excluded	Chi-sq	Prob.
xrate	1.890840	0.7558
impt	10.86317	0.0281*

* it shows the existence of causality relationship at 95% confidence level

Dependent variable: impt

Excluded	Chi-sq	Prob.
xrate	3.824442	0.4303
expt	10.81596	0.0287*

* it shows the existence of causality relationship at 95% confidence level

According to Granger Causality Analysis, there was a bidirectional causality relationship from exports to imports. Also, there was a one –way causality relationship from real exchange rate to exports on a 5% level significance.

Conclusions

In this research it was empirically analyzed the effect of macroeconomic factors on real exchange rate also the causality relationships between real exchange rate and macroeconomic factors (exports, imports).

According to Granger causality analysis conducted on Hungary's data it is determined that there was a one-way causality relationship from real exchange rate to exports. So, it shows that there is a significant and positive effect of exports on real exchange rate. Also there was a bidirectional causality relationship from exports to imports. In the subsequent studies different macroeconomic factors such as gross domestic product and inflation can be added to the analysis.

References

Arize A. C., (2006), "The Impact of Exchange-Rate Uncertainty on Export Growth: Evidence from Korean Data", *International Economic Journal, Vol.10, Issue 3.*

Asseery, A. and Peel, D. A., (1991), "The Effects of Exchange Rate Volatility on Exports: An Empirical Investigation", *Southern Economic Journal, Vol: 62, pp. 34-43.*

Bahmani-Oskooee M. and Ltaifa N., (1992), "Effects of exchange rate risk on exports: Crosscountry Analysis", *World Development Vol: 20, Issue 8, pp. 1173-1181.*

Chou W.L. (2000), "Exchange Rate Variability and China's exports", *Journal of Comparative Economics Vol: 28, Issue 1, pp. 61-79.*

De vita G. and Abbott A., (2004), "The Impact of Exchange Rate Volatility on UK Exports to EU Countries",*Scottish Journal of Political Economy.*

Ghulam Mujtaba Chaudhary, (2016), "Exchange Rate and Foreign Trade: A Comparative Study of Major South Asian and South-East Asian Countries", *Procedia - Social and Behavioral Sciences, pp. 230.*

Granger C.W.J., (1969), "Investigating Causal Relations by Econometric Models and Corss-Spectral Methods", *The Econometric Society, Vol: 37, pp.424-438.*

Habibe Yaman,(2018), "Türkiye'de Döviz Kurunun Dış Ticaret Üzerine Etkileri", *Uluslararası İktisadi ve İdari Bilimler Dergisi.*

Hungarian Central Statistical Office, (2016), "*Annual Report"*, Hungary.

International Monetary Fund,(2019), "World Economic Outlook Database", *IMF.org*.

Jong Woo Kang and Suzette Dagli, (2018), " International trade and exchange rates" , *Journal of applied economics.*

Karaçor Zeynep & Gerçeker Mustafa, (2017), "Reel Döviz Kuru ve Dış Ticaret İlişkisi: Türkiye Örneği (2003 - 2010)", *Sosyal ve Ekonomik Araştırmalar Dergisi , pp. 289.*

Ngondo M. & Khobai H. (2018)," The impact of exchange rate on exports in South Africa", *Munich Personal RePEc Archive.*

Nyeadi J., Atiga O. and Atogenzoya Ch., (2014), "The Impact of Exchange Rate Movement on Export: Empirical Evidence from Ghana*" International Journal of Academic Research in Accounting, Finance and Management Sciences Vol. 4, pp. 41–4.*

Özdemir Abdullah, (2013), " Relationship between exchange rates and foreign trade: Case of Turkey", Adnan Menderes Üniversitesi, Nazilli İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü, Aydın, Türkiye.

Thi Thuy V. N. & Thi Thuy D. T. (2019), "The Impact of Exchange Rate Volatility on Exports in Vietnam: A Bounds Testing Approach", *Journal of Risk and Financial Management.*