

Effects of Various Economic Factors on Turkish Imports

Aydin Sari^{*}, Murat Sari^{**}, Cătălin Popescu^{***}

* Faculty of Economics and Business Administration, Pamukkale University, Denizli 20070, Turkey

** Department of Mathematics, Faculty of Arts and Science, Pamukkale University, Denizli 20070, Turkey

e-mail: msari@pau.edu.tr

*** Faculty of Economic Sciences, Petroleum-Gas University of Ploiești, Bd. București 39, 100680, Ploiești, Romania

e-mail: cpopescu@upg-ploiesti.ro

Abstract

Changes in imports affect the external trade of other countries through international links. Therefore, the stability in imports will help both the importing country and the exporting country to gain easier and to get stable external balance. The main aim of this study is to discover the periods of the crises that took place in Turkish economy through real data based on the import, production, price and exchange rate. To achieve this, various statistical methods have been applied. Turkey is experiencing effects of the crises, i.e. structural breaks. To carry out the present study, the monthly time series data reported by the Central Bank of Turkey were used in the time period of 1986–2013. The produced results are understood to be in agreement with that of the structural breaks taken place in 1994, 2001 and 2008. All graphical and statistical results here have been carried out by the authors through the Eviews 7.1.

Keywords: structural break, Turkish economy, import, exchange rate, GDP, statistical method, econometric analysis

JEL Classification: E2, E6

Introduction

The drastic changes in the applied policies and the traces left by the crisis faced by the Turkish economy can be demonstrated by structural break tests. In order to see whether there are new break points in the economy, we compare the results based on the data collected from the Turkish central bank with each other. When there are break points in the economy, it is expected that some changes take place in the exchange regimes. Then the structural changes occurring at points where the implemented economic policies unexpectedly switch to a different one deserve to be examined.

This article aims at finding out the structural changes that may have occurred in Turkish economy by using time series method. First, we examine the data pertaining to the Turkey's import to show that there is a structural break which occurred due to policy regime changes as a result of the economic crisis. Second, we take into consideration the data in order to discover

where the economic crisis that caused structural change or floating exchange rate. It is hoped to identify a new structural break because of the floating exchange rate system stemming from the implemented policies or from the economic crisis in the world.

Structural break points and structural changes are studied in the first section. The second section is devoted to reviewing econometric methods used in the study. The findings are presented in the third section. The last section presents the conclusions.

Literature Review

We state that variations in applied policies reveal changes in the Turkish import during the examined period. The change in the quantitative aspect of import is analysed. The theoretical aspects of the import function are expressed by relation (1):

$$M = f(Y, R) \quad (1)$$

where M , Y and R stand for the import, the gross domestic product and the exchange rate, respectively.

We assume that the import of a country increases once the income of the country rises. In other words, as pointed out by Krugman and Obstfeld (2000), there is a direct relationship between country's import and its income. We also assume that there is an inverse relationship between the exchange rate and the import of the country involved. Namely, as exchange rate of the country's currency increases, the import of the country considered decreases or once the domestic currency appreciates, the import goes up (Dornbusch et al., 2007: 344).

Considering the internal and external factors that affect Turkey's imports, structural breaks are analysed according to two different approaches. Firstly, findings of researchers and historical developments in the issue are dealt with. Secondly, the external factors influencing both Turkey's economy and world economy are addressed. In 1986, in order to protect the domestic producers of some goods in Turkey, the Turkish government issued permission for certain goods. At the same time, Turkish government liberalised the import of other goods. However, these permissions were gradually eliminated in time. The customs duties and the funds received from the imports were abolished. Hence, the stabilized prices of the imported goods. This policy led to 113.8% increase in the import of consumer goods in 1989 as compared to 1985. The changes in the amount of the imported goods were affected by the external developments.

Moreover, Turkey signed the act of the World Trade Organisation on April 15, 1994. Turkey also signed the Uruguay Round Final Act. Furthermore Turkey, considering to be accepted as member of the European Union, signed the Common Tariff Agreement with EU in March 6 1995 (Karakayali, 1998: 378). The Gulf crisis of 1990, causing the unexpected spark in oil prices, negatively affected Turkish economic growth. This crisis also caused the inflation in the Turkish economy, which resulted in the turmoil on the financial market and foreign exchange market. The corresponding crisis also led to a decrease in the bank deposits and to a sudden increase in the demand for foreign currency.

The amount of import exceeded the amount of export during the early 1990s. This trade deficit consoled with the budget deficit, resulting in a twin deficit. The outcome was the April 1994 crisis. In the early 1990s, Turkish Lira became an overvalued currency which brought about excessive volatility which threatened the stability of Turkish Lira. The budget deficit became another negative factor that forced the Turkish Lira to lose its exchange value. Consequently, Turkish Lira depreciated which in turn raised domestic prices. Another global crisis occurred during the second half of 1997 in the South East Asian countries –Thailand, Indonesia, South Korea, Malaysia, and Japan- spread from the financial sector of the economies to real part of the economies (Tharnpanich, 2013:570). Although the 1997 crisis deeply affected the countries

above, it did not exert any influence on Turkish economy. However, it quickly spread to Brazil, Russia, as well as the Latin American countries (Lakoff, 2004: 247). Its impact on Russian economy also influenced Turkish economy by reducing Turkish export to Russia.

The inflation process dramatically increased after the November 2000-February 2001 crisis. In order to reduce the inflation, Turkey implemented the economic policy suggested by the IMF. However, the policy resulted in the liquidity constraint in the economy, as the Central Bank of Turkey had tried to reduce the demand for foreign exchange by using the loan from the IMF. Moreover, in February 2001, the economic instability reappeared due to drastic movements on the financial markets.

Guloglu (2007, 49) identified the excessive volatility in the exchange rate of Turkish Lira against other currencies during the March 2001-July 2002. After the excessive volatility in the exchange rate in a short-period of time in 2004, low volatility in the exchange rate was observed. Although excessive volatility started in February 2006 and continued until the November 2006, lower volatility in the exchange rate movements was observed later.

So far we have tried to point out the common findings of both domestic and foreign researchers on the issue in the literature. For example, the economic crisis started in Mexico in 1994 and the economic crisis in the South East Asia countries during 1997 spread to Brazil and to Latin American countries. In addition, the same crisis also affected Russia in 1998. For more profound analysis of behaviours of various economic parameters in terms of different perspectives, readers are referred to further literature (for instance, Akaike, 1973; Sanso and Montana, 2002; Faure, 2003; Franses and Dijk, 2006; Ito and Sato, 2008).

Thus, our findings in the literature review show that the external parameters arising from the impact of the economic crisis occurred in other countries appear to result in negative economic impact on Turkish economy.

Material and Method

In this study, we try to prove the assertion that volatility takes place during the period of economic crisis. The imports violate the process of sustainable development and often break from its regular pattern just before the crisis has occurred.

Monthly data collected from the Central Bank of Turkey Electronic Data Dissemination System, on the imports, the exchange rate, industrial production index and consumer price index are considered.

The variables used in time series analysis are assumed to be stationary: the mean and variance of the variables are independent of time (Enders, 2004: 70). Therefore, we tested stationarity of the variables; all variables were found to be non-stationary as the Augmented-Dickey-Fuller (ADF) test indicated (Vogelvang, 2005: 266). In order to correct the non-stationarity in the variables, the natural logarithm of the variables was taken. The imports and the consumer price index are still seen to be non-stationary while the exchange rate and the industrial production index have been found to be stationary. Furthermore, we took the first difference of the natural logarithm of the imports and of the consumer price index, of the industrial production index and of the exchange rates. Finally, stationarity in these variables has been obtained.

The results of the ADF test, of Philip Peron (PP) test, and of Kwiatkowski-Philips-Schmidt-Shin (KPSS) test given in Table 1 indicate that the variables are stationary. Also, the variables are all significant at 1% level of significance.

Table 1. ADF, PP and KPSS test Results

LDK	ADF Test			PP Test			KPSS Test	
	Constant and No Trend	Constant Term	Constant and Trend	Constant and No Trend	Constant Term	Constant and Trend	Constant Term	Constant and Trend
Dln(Pr)	-5.88***	-5.90***	-5.92***	-44.40***	-46.03***	-49.02***	0.17***	0.13***
Dln(E)	-13.58***	-13.56***	-13.56***	-13.19***	-13.16***	-13.22***	0.10***	0.06***
Ln(Imp)	2.78***	-0.67	-3.49**	2.17	-1.17	-6.83***	0.03***	0.03***
Dln(P)	-1.71	-3.50***	-9.71***	-4.66***	-7.69***	-9.66***	0.23***	0.24

*** Statistics are significant at 1% level

Source: made by the authors through EViews 7.1

Results and Discussion

The results of the regression of the import, Ln(Imp), on the consumer price index, on exchange and on the industrial production index are shown in Table 1. It can be noticed that the stationary hypothesis is accepted in the ADF, PP and KPSS tests statistically significant at 1% level. Thus, from the produced results, the series in the period considered is seen to be stationary. The findings in Table 1 are examined in three ways. First, the coefficient of the consumer price index, the elasticity of the prices related to the import is -0.10 that is not statistically significant at all levels of significance. Second, when the elasticity coefficient of the exchange rate is related to the import, the coefficient of the exchange rate is -0.11 that is statistically significant at all levels of significance. Third, the elasticity coefficient of the industrial production index related to the import is 0.64 which is statistically significant at all levels of significance. Time series econometric approach requires the variables under consideration to be independent of time (Enders, 2004: 70). Moreover, the results produced by the Chow test are presented in Tables 2 and 3.

Table 2. Regression Results; Dependent Variable: Dln(Imp)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dln(E)	-0.110323	0.056655	-1.947278	0.0524
Dln(P)	-0.104287	0.304457	-0.342534	0.7322
Dln(Pr)	0.647352	0.082837	7.814743	0.0000
C	0.013629	0.011021	1.236639	0.2171
R-squared	0.169550	S.E. of regression	0.133772	
Adjusted R-squared	0.161716	Durbin-Watson stat	2.725257	
F-statistic	21.64169	Prob(F-statistic)	0.000000	

Source: made by the authors through EViews 7.1

Table 3. Chow Breakpoint Test

Chow Breakpoint Test: 1994M05			
Null Hypothesis: No breaks at specified breakpoints			
F-statistic	1.346726	Prob. F(4,314)	0.2525
Log likelihood ratio	5.477298	Prob. Chi-Square(4)	0.2417
Wald Statistic	5.386903	Prob. Chi-Square(4)	0.2499
F-statistic	1.346726	Prob. F(4,314)	0.2525
Chow Breakpoint Test: 2005M01			
Null Hypothesis: No breaks at specified breakpoints			
F-statistic	0.949840	Prob. F(4,314)	0.4354
Log likelihood ratio	3.872775	Prob. Chi-Square(4)	0.4235
Wald Statistic	3.799359	Prob. Chi-Square(4)	0.4338
F-statistic	0.949840	Prob. F(4,314)	0.4354

Source: made by the authors through EViews 7.1

While the Chow test indicates no structural breaks in 1994 and in 2001, the structural breaks occurring in both 1994 and 2001 have been clearly observed in Figures 1,2,3,4 and 6.

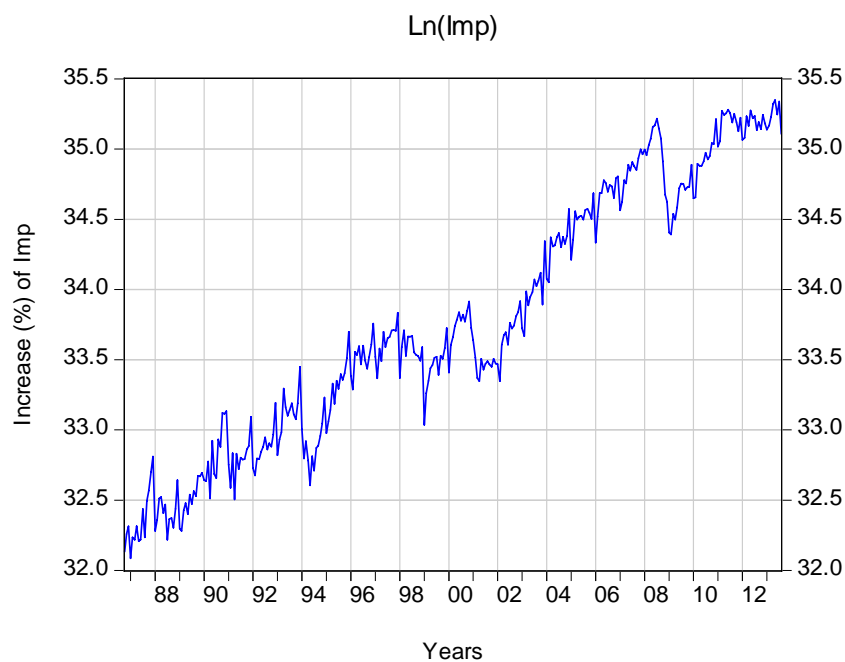


Fig. 1. Import

Source: made by the authors through EViews 7.1

The structural breaks have been observed in Figure 1 a-c under the consideration of the behaviours of the import, exchange rate and production. In the corresponding figures, the 1994, 2001 and 2008 crises were noticed.

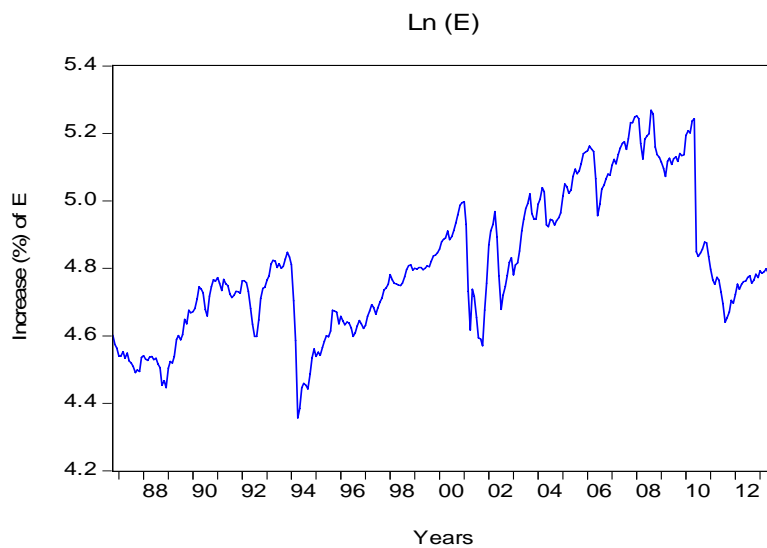


Fig. 2. Exchange Rate

Source: made by the authors through EViews 7.1

Although the crises occurred in 1994, 2001, 2008 and their effects continued for some more time, fewer effects of the crises in the import/exchange rate/production movements were observed later on.

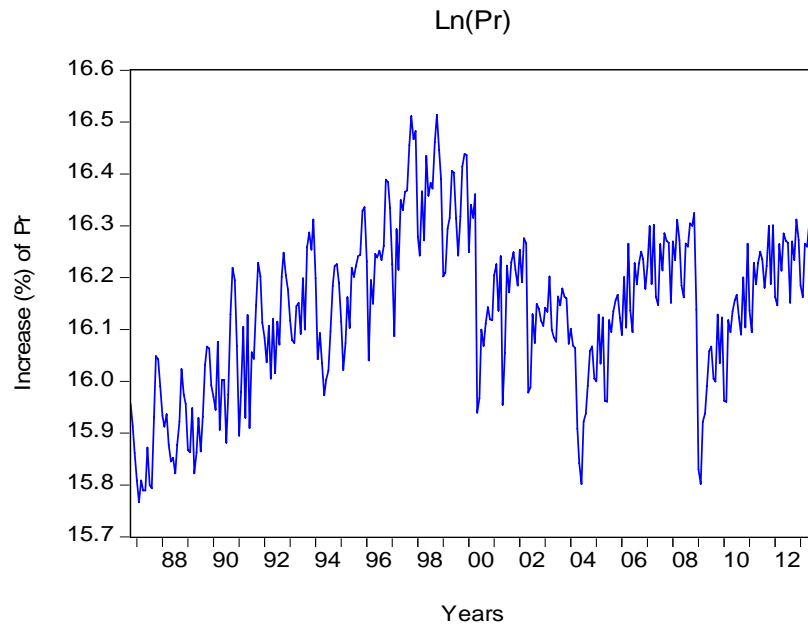


Fig. 3. Production

Source: made by the authors through EViews 7.1

As noticed in Figure 6, the cumulative sum of squares is generally within the 5% significance lines, suggesting that the residual variance is somewhat stable.

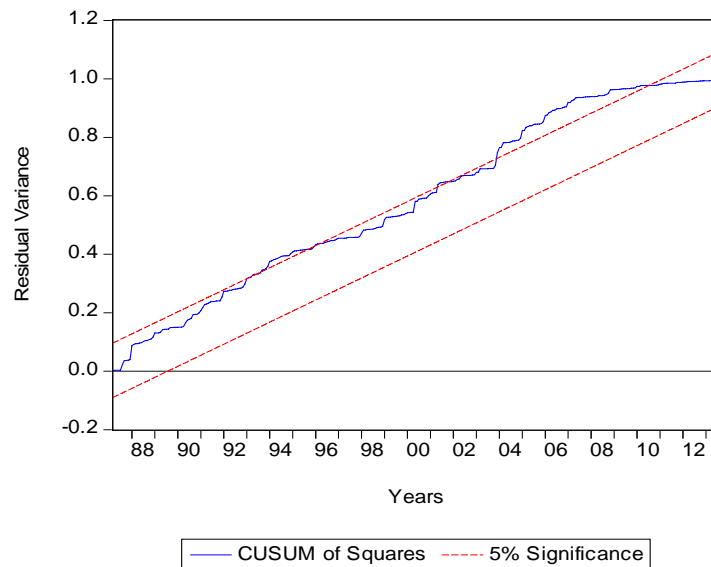


Fig. 6. CUSUM Square Test

Source: made by the authors through EViews 7.1

As shown in Figure 4, the price is increasing throughout the period. The increase in the price can be categorized as i) before 2001, and ii) after 2001. In case (i), price is relatively sharp. In case (ii), price is relatively very stable as compared to case (i). It is worth mentioning that the corresponding difference stems from the political stability, especially after 2002, in Turkey.

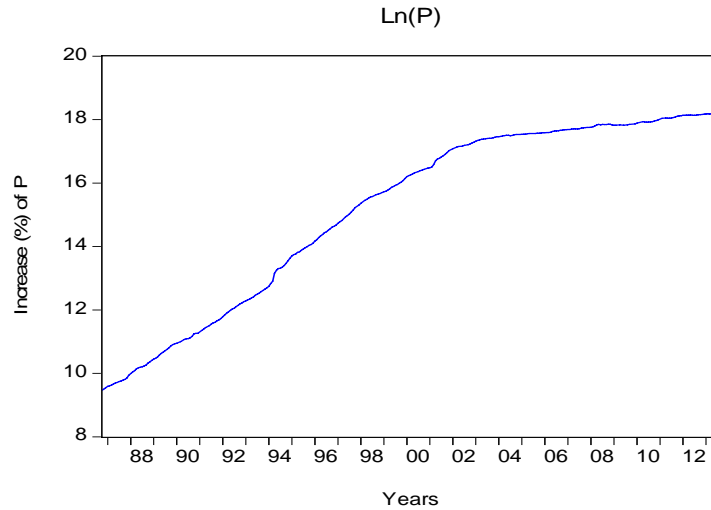


Fig. 4. Price

Source: made by the authors through EViews 7.1

After the regression, the CUSUM test (Cumulative Sum of the Recursive Residuals) based on the CUSUM test (Griffiths et al., 2007: 139) was performed. Use of the test did not show any structural break as presented in Figure 5.

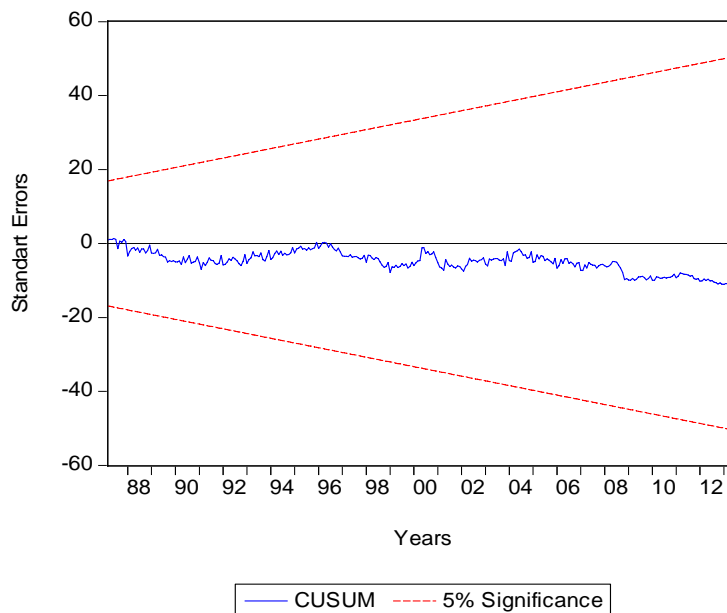


Fig. 5. CUSUM Test

Source: made by the authors through EViews 7.1

Even though the structural breaks are distinguishable, they are not so sharp in the figure of the CUSUM square test. However, use of the Chow test is not yielding the corresponding structural breaks as realized in Tables 2 and 3.

In order to determine the import variable the breakpoint for the data related to the import, we performed a regression analysis shown in Table 2. In the table, exchange rate (E), price (P) and production (Pr) are exogenous variables and import (Imp) is endogenous variable. The production and exchange rate are found to be statistically significant at 1% and 5%, respectively. The price was found statistically insignificant. Looking at the variables in the table we can notice that the exchange rate and price are in opposite relation with regard to the import as expected. The import and production exhibit the same behaviour. To compare the results in the figures with the results in Table 3, the months in which the crises took place were considered for testing (5 months in 1994 and a month in 2005). In both cases, there is no break found at the specified points.

As indicated above, the crisis in Turkey during these periods arose from both the external and the internal forces. First, the external crises such as the Gulf crisis taken place in 1990 and in the 1997 and the Far East crisis in the 2000 and the 2008 Mortgage crisis in the USA affected Turkish economy and led to economic crises in Turkey, such as the crisis of April 5, 1994 and of the November 2000 and of February 2001 crises. Those crises have also been discovered in our findings as seen in the corresponding figures and tables.

As clearly represented in Figures 1,2,3,4 and 6, the results appear to indicate the structural breaks that occurred during these crises in Turkey. The amount of the import drastically decreased when Turkey experienced the aforementioned crises. Furthermore, the decline in the imports during those periods, as expected, continued at least for further six months.

Conclusion

The present study has discovered the periods of crises faced by the Turkish economy through real data based on various economic parameters such as: import, production, price and exchange rate. To achieve this, various statistical methods have been applied. It has been realized that Turkey has experienced effects of the crises, i.e. structural breaks. The produced results are understood to be in agreement with those of the structural breaks taken place in 1994 and 2001. The effects of the crises in the imports of Turkish economy during those periods, as expected, were seen to continue for some more time and to lead to contraction economy. In sum, the presented results based on the data overwhelmingly support our hypothesis that the structural breaks occurred in Turkey during those crises. How these crises broke out may be the subject of further study.

Acknowledgements

The first two authors would like to express their sincere gratitude to the leadership of Petroleum Gas University of Ploiești, to PhD Assoc. Prof. Cristina Gafu (Philology Department of Petroleum Gas University of Ploiești) and PhD. Lect. Jianu Muresan (Economics Department of Petroleum Gas University of Ploiești) for their collaboration and great hospitality during our visits at Petroleum Gas University of Ploiești, Romania.

References

1. Akaike, H., Maximum Likelihood Estimation of Gaussian Autoregressive Moving Average Models, *Biometrika*, 60: 255-65, 1973.
2. Dornbusch, R., Fischer, S., Startz, R., *Macroeconomics*, McGraw-Hill, 2007.

3. Griffiths, W.E., Hill, R.C. and Judge, G.G., *Learning and Practising Econometrics*, John Wiley & Sons, pp.746-747, 1993.
4. E nders, W., *Applied Econometric Time Series*, Wiley Series, Alabama, 2004.
5. Faure, P., Monetary and Fiscal Policy Games and Effects of Institutional Differences between the European Union and the Rest of the World, *Revue économique*, 54, No. 5, pp. 937-959, 2003.
6. Franses, P.H., Dijk, D. *Non-Linear Time Series Models in Empirical Finance*, Cambridge University Press p. 13, 2006.
7. Guloglu, B., Akman, A., Turkiye’de Doviz Kuru Oynakliginin Swarch Yontemi ile Analizi, *Finans Politik & Ekonomik Yorumlar*, Year: 4, No.512, p.43-52, 2007 (in Turkish).
8. Ito T., Sato K., Exchange Rate Changes and Inflation in Post-Crisis Asian Economies: Vector Autoregression Analysis of the Exchange Rate Pass-Through, *Journal of Money, Credit and Banking*, 40:7, pp.1407-1438, 2008.
9. Karakayali, H., *Turkiye’nin Ekonomik Yapisi ve Degisimi*, Emir Ofset, Izmir, p.378, 1998 (in Turkish).
10. Krugman, P.R., Obstfeld, M., *International Economics*, Harper Collins College Publishers, 2000.
11. Lakoff, A., The Anxieties of Globalization: Antidepressant Sales and Economic Crisis in Argentina, *Social Studies of Science*, Vol. 34, No. 2, Intersections of Pharmaceutical Research and Marketing. pp. 247-269, 2004.
12. Sanso, M., Montana A., Cointegration, Error Correction Mechanism and Trade Liberalization: the case of the Spanish imports of manufactures, *Applied Economics*, No. 34, pp.231-240, 2002
13. Tharnpanich, N., McCombie, J.S.L. Balance-of-payments constrained growth, structural change, and the Thai economy, *Journal of Post Keynesian Economics* , Vol. 35, No. 4, pp. 569-597, 2013.
14. Vogelpang, B., *Econometrics Theory and Applications with Eviews*, Pearson, p.117, 2005.