Is There Any Meaningful Ratchet Effect in the Process of Currency Substitution? Evidence from Turkey

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Abstract

Currency substitution is an important phenomenon that has emerged with the liberalization of economies. In the Turkish economy, the studies about the currency substitution have gained momentum as a result of the extreme depreciation of the domestic currency in early 2000s. Switching to the flexible exchange rate system practice after the 2000-2001 crisis and putting into implement the inflation targeting strategy since 2005 have significantly reduced the currency substitution rate. Since 2014, the depreciation of domestic currency has made the currency substitution phenomenon a current issue again. This study analyses the main determinants of currency substitution phenomenon by considering the demand for money in the context of Turkey. Developed empirical model is estimated by using ARDL methodology for 2003-2016 periods by using monthly data obtained from Turkish economy. Estimation

results indicate that interest rate differential is an important variable in the process of currency substitution in Turkey. Besides, estimation results also support the existence of a strong ratchet effect in the allocation of deposits between local and foreign currencies. These results together show that strong policies with higher credibility should be pursued with a longer period of time to make reverse currency substitution in effect and to assure economic units to turn back local currency denominated deposits.

Keywords: Currency Substitution, Ratchet effect, ARDL

1. Introduction

The concept of currency substitution is used for exchange with other currencies considering the services provided by the money with reference to the discriminatory action between the traditional functions of money and for the potential preferability of currencies with each other (Giovanni and Turtelboom, 1994:392). But it is not clear if the concept of currency substitution intends to another currency or asset fulfilling the characteristics of a particular currency, or its replacement assuming completely equal. Keeping foreign currency for such purposes is an element that can be seen in almost every open economy. However if the foreign currency kept by the economic units replaces the national currency and even begins to fulfil the functions of national currency more effectively, it can be said of currency substitution. Another situation that differs again in the studies is, sometimes, synonymous use of the concept of currency substitution and the concept of dollarization. Though this is the case, actually currency substitution and dollarization are different processes. However in dollarization there is a process of currency substitution and it expresses the situation in which use of foreign currency is determined by the laws and domestic currency is priced together or wholly in foreign currency.

When the factors that cause currency substitution are examined, it would not be wrong to say that the high inflation rate came first. As domestic currency depreciates in the periods of high inflation, economic units leave the use of domestic currency and begin to use foreign currency instead. Devaluation and the developments that make changes in exchange rate like increase in exchange rate risk are other important reasons of currency substitution. In this case again domestic currency will depreciate and the rate of currency substitution will increase. Another reason of currency substitution in the economies where capital flows are liberalized is the arbitrage they have made in favour of the economic units the situation arising from the interest rate difference between countries (Calvo and Vegh, 1992). Besides financial crises increasing with financial liberalization and political uncertainties are also the important factors that cause increase in currency substitution rate (Dumrul, 2010:202).

The Turkish economy has struggled with high inflation for many years and therefore the currency substitution and the problems caused by the currency substitution have become an important agenda for Turkish economy. But with the effect of the inflation targeting policy implemented, implicitly after the 2000-2001 crisis until 2005 and explicitly from 2006, inflation rates become to fall. This is one of the most important reasons for the decrease in the rate of currency substitution by the years talked about above. Thus it is possible to see that in the process of currency substitution described as foreign currency deposits/M2 in the Figure
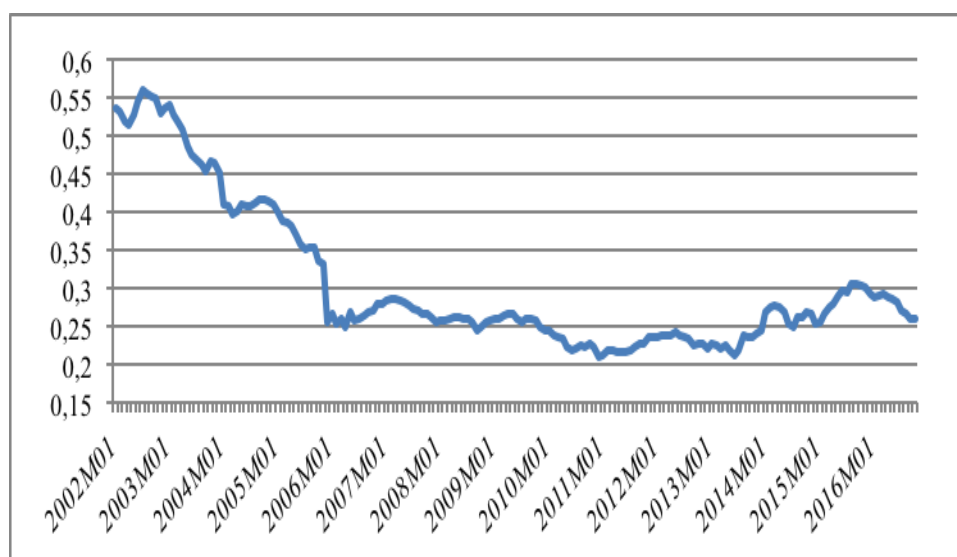
Figure 1. The Process of Currency Substitution in Turkey

When the graph is examined carefully, it is clearly seen that by the last quarter of the year 2013 the rate of currency substitution tends to increase. Increase in the rate of currency substitution raise the importance of the issue, possible problems it can cause in the economy and the policy measures to be applied for this. In this study, it is aimed to examine factors behind the fact of currency substitution for the developing Turkish economy. For this purpose, the permanence of currency substitution in Turkish economy will be analyzed and the necessity not to lose the efficiency in monetary policy will be emphasized. Because the ratchet effect is a more suitable way to measure permanence of currency substitution, it will be estimated by the ratchet effect. The ratchet effect is usually accounted for through the inclusion of the past peak value of an independent variable, in addition to the current value of that variable, or of the past peak value of the dependent variable (Mongardini-Mueller, 1999:12).

2. Literature

When the studies about currency substitution are examined, it can be seen that currency substitution is usually studied in two different ways. The first of these is about what the determinants of currency substitution are and about determination of the direction of relationships between relevant variables and currency substitution. The second is the studies examine the existence of currency substitution and its size by the period subjected to research. For this, there are lots of studies examines both Turkish economy and other economies. While the studies examining currency substitution in Turkish economy increase with especially excessive depreciation in TL during 1990s, the studies about the issue gradually decrease by the reason of decline in the size of currency substitution with the transition to the flexible exchange rate regime by 2001 crisis and implementation of inflation targeting strategy. Nowadays it is thought that with the rapidly depreciation of TL, the fact of currency substitution begins to gain importance again.

The study of Calvo and Rodruguez (1977) in which they model an open economy, has

rational expectations with two sectors under flexible exchange rate regime, is one of the most important studies about currency substitution. In this study it is determined that when the rate of expected return of exchange rate increases, the currency substitution accelerates and thus the main determinant of national currency demand becomes expected return of exchange rate. Selçuk (1994 and 1997), Özkarametre (1996), Civcir (2003), Komarek and Melecky (2003), Genc et. al. (2005), Bahmani-Oskooee and Karacal (2006), Birkan (2006) and Yazgan and Zer-Toker (2010) obtain important results about the presence of currency substitution by the countries they examined. Bordo and Choudhri (1982), Scacciavillani (1995), Metin-Özcan and Us (2007), Milenkovic and Davidovic (2013), Doguwa (2014) and Kuscevic and Martin (2015) examine the determinants of currency substitution in their studies and mention that currency substitution is effected by the variables such as changes in exchange rates, interest rate, economic and political instability, long term uncertainty. Şıklar (1998) and Selçuk (2001) emphasize especially the fact of currency substitution will increase the seniorage income. In addition to all these, Ortiz (1983), Chaisrisawatsuk et. al. (2004) and Oomes and Ohnsorge (2005) reach at the result that there isn't any important evidence for the presence of currency substitution.

Another specific study on currency substitution is about the measurement of ratchet effect, which is also the subject and the method of this study. Mongardini and Mueller (1999) are used ratchet effect for the first time in the measurement of currency substitution. In the study it is revealed the presence of ratchet effect in Kyrgyz Republic but it is emphasized that it is in small size. But, Us (2003), Kumamoto (2014), Bawa et. al. (2015), Ben-Sharar and Golan (2016) and Xaiyavong and Toyoda (2016) in their studies examining ratchet effect on currency substitution, reveal a strong presence of it.

Entire summary of literature, including the periods and countries, the methods and the results of the studies examined, is shown in appendix.

3. Model and Estimation Results

3.1 Method

The model of the currency substitution is based on the concept of optimization problem of economic units developed by Rojas-Suarez (1992). In the model, it's assumed that the representative consumer using domestic and foreign currencies and consuming domestic and foreign goods and services under budget constraint will tend to utility maximizing. The main assumption in the model, the currency is accepted the only means of holding wealth, because of shallow domestic capital markets and restrictions to access of international markets. Residents for the purpose of preserving value distribute their portfolio between domestic and foreign currency assets in order and use these for their consumption expenditures. This situation fits the concept of currency substitution used by Calvo-Vegh (1992) for the first time. The final form equation of Rojas-Suarez (1992) shows the relationship between foreign currency/domestic currency rate and expected loss in the exchange rate. The currency substitution model that is widened for Turkey using Mongardini-Mueller (1999), Ra (2008) and Samreth (2011) can be written as below:

$$\ln(CS)_t = \alpha + \beta(i^{TL} - i^{\$})_t + \gamma e_t^e + \lambda \ln(R)_t + \mu(D)_t + \varepsilon_t \tag{1}$$

In this equation, CS is the criterion of the currency substitution, i^{TL} is the interest rate paid

for domestic currency deposits, $i^{\$}$ is the interest rate paid for foreign currency deposits, e^e

is expected rate of change in the exchange rate. The variable for ratchet effect shown by R is included in the model to represent permanence (continuity) in the currency substitution. The variable shown by D in the equation is the dummy variable in the global crisis of 2007-2008. On the other hand, ε is the error term with the classical properties.

In our study, to represent foreign currency the US dollar will be used. Although two types of currencies (dollars and euros) are generally used as foreign currencies in Turkey, the main reason for this preference is that the share of dollar denominated deposits in foreign

currencies is higher. The variable of interest rate differential in the model $(i^{TL} - i^{\$})_t$

represents the opportunity cost of holding TL and $. This cost is measured by the difference between the interest rate paid for TL deposit accounts -3 months maturity- and the interest rate paid for $ deposit accounts in the same maturity in Turkish Banking System. For that reason, it's expected that the coefficient β, to be negative; because an increase in the interest rate differential (as it will mean the increase in the relative return of TL deposits) will decrease the currency substitution. According to the fact of the currency substitution, opportunity cost regarding to hold domestic currency should include another factor, which is usually represented by the expected change rates in the exchange rates. If the domestic currency depreciates (appreciates), the opportunity cost of holding domestic currency will increase (decrease), so the economic units will tend to foreign currency (domestic currency). In earlier studies to represent the expected rate of change in foreign exchange rates, it is often used realized rate of change. But in our study, "Dollar Exchange Rate Expectation of Interbank Exchange Market at the End of Next 12 Months" that is determined in the frame of the expectation survey of Central Bank of Turkey will be used to represent this variable. The coefficient (γ) regarding to this variable is supposed to be positive. All other things being equal, the expected increase in the depreciation of the domestic currency will increase the motivation of holding foreign currency against the domestic currency. The currency substitution ratchet that is the last variable in the predicted equation will be included in the model for two reasons; firstly in the period examined the currency substitution has increased gradually and so it has reduced the effect of outliers. For this reason the inclusion of ratchet effect in the model means to take into account learning, developing strategies and implementation processes of the economic units against the fluctuations in the inflation and value of domestic currency. On the other hand inclusion of the ratchet effect in the model means to include all the variables, which affected the currency substitution process in the past, except exchange rate. It's accepted that in the currency substitution models including the ratchet effect, the currency substitution will give asymmetrical reaction to the changes in the ratchet effect. It's supposed the related coefficient (λ) to be a positive value because ratchet

value regarding to the currency substitution is described as the highest value of the dependent value in the past. Lastly a dummy variable for August 2007-March 2010 period will be included in the model to see the effects of 2007-2008 global financial crisis on the currency substitution. This variable takes the value 1 in the period mentioned above, and 0 in other periods. Expected sign of the coefficient (μ) related to the dummy variable is positive. In such periods, to avoid the sudden changes in the value of domestic currency, increase in the demand for foreign currency is possible.

To examine the dynamics of the currency substitution model given in the equation (1), bound test approach to co-integration analysis will be implemented. The bound test has two stages. While the first stage is including having long-term relations between the variables in the equation numbered (1), the second stage carries out the prediction of short and long-term coefficients if there's a co-integrated relation between the variables.

3.2. Data

Model given in the equation (1) has four basic variables; interest rate differential, the currency substitution rate, expected change rate in exchange rate and the mode showed by the currency substitution in the past. In our study, monthly data regarding to these variables including 2002-2016 is used. The reason to choose January 2002 as the initial term is excluding the crisis period of 2001 in our country from the study and including the period in which a new exchange rate regime is carried out. All the data of used variables are obtained from EDDS database of Central Bank of Turkey on a monthly basis. While all the data used (FD, M2, i^{TL}, $i^{\$}$ and e^{e}) is obtained from the database, the variable of the ratchet effect (R) and the variable of the global financial crisis (D) should be constituted. A brief of the constitution of the variables are below (Euddington et al, 2002):

$$R_t = max_i CS_i \qquad (i = 0,1,2,...,t-1)$$

$$D = 1 \ For \ August 2007 - March 2010$$

$$D = 0 \ For \ other \ observations$$

3.3 Estimation Results

Critical values determined for bound test by Pesaran et al. (2001) depend on the related variable to show the feature of I(0) or I(1). If one of the variables is second-order integrated [I(2)], the F test, which tests the co-integration relation between the variables will not be applied. So the integration degrees of the variables in the model should be examined. For this purpose, augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) tests are used and the results are summarized in Table 1.

Table 1. Unit Root Test Results

Variable	Level	ADF Prob.	First Difference	Prob.	Level	Phillips-Prob.	Peron First Difference	Prob.
lcs	2.72	0.07	4.08	0.00	2.23	0.20	12.83	0.00
idit	5.00	0.00	5.34	0.00	5.86	0.00	14.78	0.00
deexc	5.46*	0.00	6.14	0.00	12.15	0.00	72.78	0.00
lrcs	3.05*	0.12	2.90	0.04	2.69	0.08	41.08	0.00
(*) includes trend.								

lcs: currency substitution rate, idit: Interest rate differential, deexc: expected rate of change in exchange rate, lrcs: The mode showed by the currency substitution in the past.

According to the table, all of the variables used show the feature of I(0) or I(1), and there's no variable showing the feature of I(2). This complex structure of integration degree states that it is necessary to use ARDL approach instead of co-integration analysis based on maximum likelihood approach developed by Johansen-Juselius. As it's known, Johansen-Juselius approach requires all the variables used in the model to be I(1).

The first step in ARDL analysis is to test whether the relation expressed in the equation (1) exists in long-term or not. For this purpose bound test proposed by Pesaran et. al. (2001) will be used. Accordingly ARDL model is estimated by the least squares method for the dependent variable and common F test is applied for the coefficients of lagged variable included in the model. If all these coefficients are 0, there's no co-integrated relation. The critical values for bound test is presented in Pesasran et. al. (2001) and is determined depending whether variables in the model are I(0) or I(1). Lower limit critical values is based on the assumption that all the variables in ARDL model to be I(0), upper limit values is based on the assumption all of them are I(1). If the calculated F value passes the upper limit, the null hypothesis that there's no co-integration relation is rejected. If it is under the lower limit, the null hypothesis is accepted. The results of ARDL bound test are showed in table 2.

Table 2. Results of ARDL Bound Test

	%1 Significance	%5 Significance	F Statistics
Lower level [I(0)]	3.65	2.79	—
Upper level [I(1)]	4.66	3.67	—
Model	—	—	5.06

According to the results obtained in the equation (1), there's a co-integrated relationship of 5% significance level (long-term) between the variables included in the model. After determining long-term relation between variables, the ARDL (m, n, p, q) model below will be estimated.

$$\ln(CS)_t = \alpha + \sum_{i=1}^{m} Q_i \ln(CS)_{t-1} + \sum_{i=0}^{n} \beta_i (i^{TL} + i^{\$})_{t-1}$$

$$+ \sum_{i=0}^{p} \gamma_i (e^e)_{t-i} + \sum_{i=0}^{q} \gamma_i \ln(R)_{t-i} + \mu(D)_t + \varepsilon_t \qquad (2)$$

In ARDL (m, n, p, q) model determined above, lag structures are designated as ARDL (3,1,2,0) by using Akaike information criteria. Estimated long-term coefficients normalized to ln(CS) can be seen in Table 3 while short term dynamics are summarized in Table 4.

Table 3. The Currency Substitution In Long-Term Period

Variable	Coefficient	t statistics	Probability
idit	1.74	3.73	0.00
deexc	4.13	2.55	0.09
lrcs	5.95	2.88	0.05
Dummy	-0.09	0.86	0.39
Fixed	4.95	1.26	0.21

Table 4. Dynamics of Short-Term

Variable	Coefficient		t statistics	Probability
Δidit	-0.03		2.42	0.01
Δdeexc	0.12		3.28	0.00
Δlrcs	3.49		4.88	0.00
Dummy	0.02		2.32	0.02
Fixed	-0.01		1.78	0.08
Error Recovery	-3.71		6.11	0.00
$\bar{R}^2$	0.73	LM	2.018	0.365
F	10.08	ARCH	0.711	0.701
D.w	1.98			

Obtained long-term results show that all explanatory variables in the model are the variables affecting the currency substitution process in Turkey and have statistical significance. For example a 10% increase in expected rate of change in foreign exchange rate causes 40% increase in the currency substitution. Since the nominal exchange rate is used in the analysis, this variable includes inflation expectations. Both of the situations are suitable for our theoretical expectations.

According to Table 5, which gives short-term dynamics including error correction term the equation gets a positive result from all used diagnostic tests and indicates no statistical problem in the estimation process. Obtained adjusted coefficient of determination value is satisfactory for short-term. The coefficient for error correction term is very high and the negative value of this coefficient indicates the existence of equilibrium relation, indicating adaptation period is 3,5 months. In Cusum Test given by Figure 2 for the stability condition of the model, it's observed that the model doesn't have structural break.
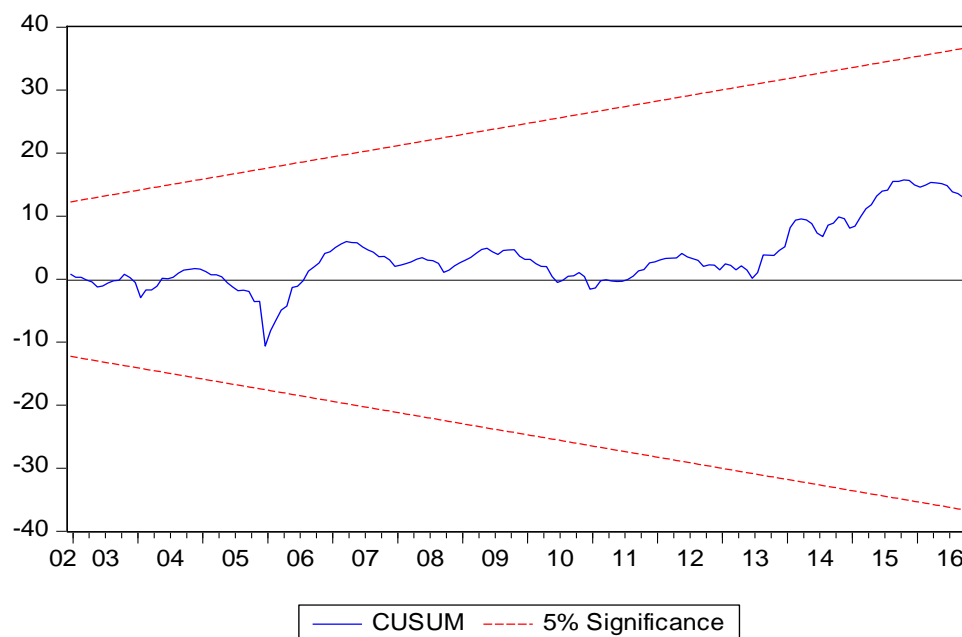
Figure 2. Stability of the Model

It's understood that long-term effect of the expected rate of change in foreign exchange rate on the currency substitution is higher than the short-term effect. This shows that exchange rate policy has an important effect on the currency substitution. Therefore, it's possible to say that long-term strong policies have an important influence for reversing the process of currency substitution.

The ratchet variable, which is included in the model in order to able to see the permanence in the currency substitution, has a positive sign for both long and short terms and is statistically significant. This indicates the permanence and regularity of the currency substitution in Turkey. To see this situation in a clear manner, the contributions of explanatory variables to dependent variable should be examined. For this purpose, the scaled coefficients of the variables are calculated. Obtained results are shown in Table 5. According to the results, ratchet variable explains about 26% of the changes in the currency substitution. The existence of such a strong ratchet effect in the currency substitution model, while pointing to a strong instability in the functioning of the money demand, causes a negative inference on the effectiveness of the monetary policy.

Table 5. The Relative Contributions of the Explanatory Variables to the Currency Substitution

Variable	Long-Term Flexibility	Relative Contribution
lcs	0.746	0.58
idit	0.091	0.07
deexc	0.200	0.13
lrcs	0.324	0.26
Dummy	-0.051	-0.04

4. Conclusions

In the study the factors that affect the currency substitution in Turkey between the years 2002-2016, (namely interest rate differential between local and foreign currency deposits, expected rate of change in foreign exchange rate, a ratchet variable representing the permanence of currency substitution and a dummy variable for 2007-2008 global financial crisis) are analysed. Since the co-integration degrees of the variables vary, the ARDL approach is the most appropriate. The coefficient for the error correction term in the predicted model is quite high. In addition, the negative coefficient indicates the existence of equilibrium relation and the adjustment period is 3,5 months. The ratchet variable in the model has positive sign in both long-term and short-term and is statistically significant. This indicates the regularity and the permanence of the currency substitution in Turkey. Although the currency substitution rate tends to decrease for a long time with the transition to the flexible exchange rate regime and inflation targeting strategy in Turkish economy. By the period examined the existence of a permanent currency substitution is an important issue to be noticed. In fact this rate again tends to increase from the last quarter of 2013. Undoubtedly, the most important cost of increasing currency substitution rate to the economy will be the decrease in the foreign exchange reserves and with these decreases the power of the Central Bank to intervene to the market will be limited. To overcome this issue, it's necessary to be able to operate the reverse currency substitution process and to enable the economic units to return to domestic currency deposits. As a result, it would be a good idea to say that strong policies with high credibility needed to be maintained for a long time.

Acknowledgement

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Appendix

Appendix 1. Summary of Literature

Study	Period	Country	Method	Result
Bordo and Choudhri (1982)	1970-1979	Canada	Regression Analysis	It has been determined that the expected rate of change in exchange rate and currency substitution of the domestic currency demand are important determinants. Significant evidences have been found to show that forward exchange rate is a good measure of the expected rate of change.
Ortiz (1983)	1960-1979	Mexico	Regression Analysis	The money demand forecasts show that the foreign interest rates don't affect the demand for Peso, and therefore there's no evidence of currency substitution.
Selçuk (1994)	1986-1992	Turkey	VAR	It has been seen that when the TL depreciates against foreign currencies, the currency substitution increases; while the nominal return of TL increases, currency substitution decreases.
Scacciavillani (1995)	1989-1995	Turkey	Regression Analysis	While the main reason for the currency substitution is long-term movements, the effect of inflation on currency substitution is statistically insignificant.
Özkarametre (1996)	1990-1995	Turkey	VAR	With the depreciation of TL, the currency substitution increases.
Selçuk (1997)	1985-1993	Turkey	GMM	There is a strong orientation towards foreign exchange deposit accounts rather than TL in the periods of high inflation.

Şıklar (1998)	1986-1997	Turkey	ECM	The static and dynamic money demand forecasts show that interest rate is an important determinant of real demand for money and an increase in the interest rate has been emphasized to increase the demand for domestic currency while reducing currency substitution. The study also confirms the hypothesis that currency substitution reduces seniorage income.
Mongardini and Mueller (1999)	1993-1998	Kyrgyz Republic	ARDL	In the economy there is ratchet effect but it doesn't have the size to affect the entire economy. In addition, the currency substitution remains poor to many other countries.
Sel çuk (2001)	1987-2000	Turkey	Regression Analysis	In Turkish economy there is currency substitution and it has high flexibility. Therefore, it is emphasized that the government will not be able to obtain more seniorage return through the arrangements in monetary base.
Civcir (2003)	1987-1999	Turkey	Johansen Cointegration Analysis and ECM	It's emphasized that real demand for money is stable for both short and long term during the period examined and it is stated that the currency substitution doesn't adversely affect the stability of money demand in Turkey.
Us (2003)	1990-1999	Turkey	ARDL	It's mentioned that for the period 1990-1993, the currency substitution did not show permanence that cannot be reversed, and for the period 1995-1999 it is mentioned that this permanence can be compensated in the broad sense and therefore the conditions for an effective monetary policy are appropriate.
Komarek and Melecky (2003)	1994-2001	Czech Republic	Johansen, ARDL, DOlS and ADL	In the banking system and capital mobility, the currency substitution has been determined.

Chaisrisawatsuk et. al. (2004)	1980-1996	Different countries	Cointegration Analysis	In Malaysia there's no evidence for currency substitution between domestic currency and British sterling, despite its presence for US dollar and Japanese yen.
Genc et. al. (2005)	1987-2000	Turkey	Johansen Cointegration Analysis	The existence of currency substitution with an inflexible demand against TL has been determined and it has been concluded that this could be a restricting factor for the monetary authorities for policy-making.
Oomes and Ohnsorge (2005)	1995-2014	Russia	Cointergration Analysis and ECM	It's been reached that the broad definition of the money demand is not affected by the currency substitution.
Bahmani-Oskooee and Karacal (2006)	1987-2003	Turkey	Bound Test and ECM	In the study it's been reached the conclusion that the currency substitution exists when the TL depreciates and it's been underlined this contradicted with the wealth effect in many countries.
Birkan (2006)	1990-2005	Turkey	VAR	There's a long-term relationship between inflation difference and currency substitution rate, and asset substitution rate and gross rate of return in the foreign exchange deposit account. Another result of the study is that driving power of the currency substitution in Turkey, especially after 2001, is the volatility in exchange rate.
Metin-Özcan and Us (2007)	1985-2007	Turkey	VAR	With the excessive fluctuations in the exchange rate and the inflation, changes in the expectations have affected the currency substitution.
Yazgan and Zer-Toker (2010)	1987-2004	Turkey	VECM	It's been emphasized that currency substitution is a fact that cannot be ignored for the Turkish economy in that period and the necessity of some policies to reduce the level of currency substitution in order to avoid any possible negativity.

Valev (2010)	2003	Bulgaria	Probit	It's been reached the result that the currency substitution has increased in the periods of high inflation; reverse the currency substitution hasn't been fully realized in the periods of low inflation.
Milenkovic and Davidovic (2013)	2005-2011	Serbia	Correlation Analysis	The relationship between exchange rate changes and inflation rate with the currency substitution is determined. Furthermore when it's aimed at strengthening domestic currency, the currency substitution in monetary and fiscal policies should be reduced to an acceptable level (15-20%).
Kumamoto and Kumamato (2014)		Deficient Financial Markets	Dynamic Stochastic Equilibrium Analysis	As the level of currency substitution changes, permanence effect is also changes. The monetary policy of the country doesn't have serious effects on the currency substitution, but the currency substitution is sensitive to the monetary policies of other countries.
Kumamoto (2014)	1999-2014	Different Countries	Regression Analysis	Foreign exchange is an important determinant as both a means of exchange and a store of value, for the currency substitution. Therefore in the monetary policy, the currency substitution has an important influence.
Doguwa (2014)	1994-2014	Nigeria	ARDL	The currency substitution is affected by the devaluation expectation, exchange risk and political uncertainties.
Akalin and Prater (2015)	2006-2010	Russia, Turkey and Ukraine	Regression Analysis	The crisis began in the USA in 2007 has significant negative effects on the currency substitution in the three countries. When the crisis ended in the USA, these negative effects diminished but continued.
Kuscevic and Martin (2015)	1990-2014	Bolivia	DOLS-CCR-FMOLS	It's been found that long-term instability in money demand is related to high degree of fiscal

				dollarization.
Bawa et. al. (2015)	1994-2014	Nigeria	ARDL	A strong ratchet effect has been identified and therefore the existence of a strong currency substitution has been mentioned.
Ben-Sharar and Golan (2016)	1998-2008	Israel	Regression Analysis	The presence of an upward ratchet effect has been identified and this effect has been disappeared after the currency substitution process has been completed.
Xaiyavong and Toyoda (2016)	1993-2012	Laos	ECM	Interest rate difference is an important determinant of the currency substitution. Therefore the presence of ratchet effect has been revealed. To return back the currency substitution, it's needed to have strong policies.

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