The link between financial capital movements and the exchange rate in Turkey

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Abstract

This paper aims to analyze the short and long run impacts of financial capital inflows on the exchange rate in Turkey during the implementation of inflation targeting regime. Accordingly, the impact of financial capital flows on the exchange rate has been examined by using the ARDL model for the period between 2003 and 2018. Thus, our research contributes to the existing literature by examining the impact of capital inflows on the exchange rate in the short and long run separately. Besides, we consider the era of inflation targeting regime while analyzing the impact of capital flows on the exchange rate. Econometric results show that financial capital inflows have the potential to fluctuate the exchange rates in different directions in the short and in the long term. Thus, exchange rate volatility associated with capital movements have a significant potential to put the Turkish inflation-targeting regime in trouble. Therefore, capital inflows to Turkey should effectively be managed to stabilize the level of domestic prices. That means that monetary authorities, even under the inflation-targeting regime, should try to provide both price and exchange rate stability.

Keywords: exchange rate, financial capital movements, inflation targeting regime

Introduction

The volume of capital movements expressing the circulation of capital between countries has increased rapidly especially over the past few decades. Thus, the volume of capital market transactions between countries has increased to a level that not is comparable to previous periods, whereupon the whole world has entered a new era known as financial globalization. It has been clearly determined in the literature that both liberalization of capital movements and developments in the field

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of communication technology play an important role in this process. With the expansion of liberalization policies, which imply the abolition of restrictive rules in the financial markets, capital has been allowed to move freely in the international dimensions. In addition, the developments in the field of communication technologies have made transactions in financial markets much cheaper and faster, which supported the internationalization of capital movements (Alp, 2000, pp. 94-108).

The increasing capital flows in the globalised world provides significant benefits for both developed and developing countries' economies. Capital owners in developed countries have had a wide range of investment opportunities to increase their earnings and manage their risks more effectively. Besides, increases in the internationalisation of capital movements also provide significant opportunities for developing countries to achieve important external financial resources that will enable them to develop much more. At this point, the benefits provided by increasing international capital movements for developing countries are quite important. The total level of savings in developing countries is rather insufficient due to the fact that the level of their income is low. Therefore, the supply of funds in the financial markets of developing countries is not enough to finance the amount of investment expenditures needed for economic growth. However, in the era of increasing capital mobility, abundant financial funds in developed countries easily direct to developing countries in order to get more returns and thus create significant opportunities for these countries to compensate for insufficient savings and investment levels.

Accordingly, many developing countries have made great efforts to attract foreign funds to their economies in order to finance their investment. As a result of this process, a significant fund flow has been observed towards developing countries since the beginning of the 1990s. However, besides providing additional financial resources, it has been observed that capital flows to developing countries create significant fluctuations in the equilibrium level of macroeconomic variables. The exchange rate has become an important channel through which capital inflows can threaten the macroeconomic stability of the recipient economy. Indeed, the exchange rates of developing countries have become over sensitive to the developments in global capital movements. Thus, along with the ongoing financial integration process, exchange rate and capital movements have become pivotal variables in open economy macroeconomics. This paper is motivated by the developments in the literature indicated above and aims to analyse the impacts of capital flows to Turkey on the exchange rate.

In the literature, there are many studies analysing the effects of financial capital inflows to developing countries on exchange rates. This study differs from the studies carried out in the literature on the same subject in two points. First, previous studies have analyzed the effect of capital inflows on the exchange rate, regardless of the monetary policy regime applied. This study focuses on the effect of capital inflows on exchange rates, especially under the inflation-targeted monetary

policy regime. Secondly, the current literature mostly focuses on the short-term effects of capital inflows on exchange rates. Nevertheless, the impact of capital inflows on exchange rates produces two different results in the short and long term. Accordingly, in our study, the effects of capital inflows on exchange rates are determined separately for the short and for the long term. Consequently, our research contributes to the existing literature by examining the impact of capital inflows on the exchange rate in the short and long run separately. Besides, we consider the era of inflation targeting regime while analyzing the impact of capital flows on the exchange rate. We make some policy suggestions concerning the effectiveness of inflation targeting regimes based on the impact of financial capital inflows on the level of the exchange rate.

In this context, it is also particularly important to focus on the Turkish case because the Turkish experience provides a genuine experience to examine the impact of capital flows on the exchange rate under inflation targeting regime. Turkey has embarked on a path of financial integration with the world economy and has attracted a large amount of foreign capital for a long time. After the capital account liberalization in Turkey was fully completed in 1989, the volume of capital inflows to Turkey has increased significantly. However, during the initial phase, when fixed exchange rate systems were implemented, Turkey experienced some problems concerning the management of capital flows and thus suffered from big economic crises arising from exchange rate instabilities in 1994 and 2001. Following the economic crisis in 2001, Turkey adopted an inflation targeting regime and continued to attract a large amount of foreign capital under a flexible exchange rate system. Thus, the Turkish experience offers an important opportunity to examine the impact of financial capital inflows on the level of the exchange rate under the inflation-targeting regime.

With the motivation provided by the above-mentioned facts, the aim of this paper is to analyse the relationship between the capital flows and the exchange rate in Turkey consequent to the implementation of the inflation-targeting regime by using the Autoregressive Distributed Lag (ARDL) approach. The estimations are conducted on the quarterly data on Turkish economy under inflation targeting regime which adopts a flexible exchange rate system for the period 2002–2018. Thus, we try to explain how capital flows to Turkey affect the exchange rate under inflation targeting regime in the short and in the long run. Besides, in this study, we consider the era of inflation targeting regime that adopts the flexible exchange rate system after 2001 while analysing the impact of capital flows on the exchange rate. Thus, empirical results may provide significant theoretical implications for the effect of capital inflows on the exchange rate under the inflation targeting regime. In this way, empirical findings can also provide a valuable input for policy implications to prevent exchange rate instability against capital inflows.

Following this introduction, in the second part of the study, the relevant literature analysing the impact of capital inflows on exchange rate will be discussed.

In the third section, the data and methodology will be explained. In the next section, empirical findings will be presented and some comments will be provided. In the final part of the study, some policy inferences will be made based on the success of inflation-targeting monetary regime in Turkey.

1. Literature review

Along with the financial market globalization, explaining exchange rate fluctuations based on capital movements becomes one of the most intriguing themes among economists. Accordingly, it is clearly indicated in the literature that the exchange rate is an important channel through which capital inflows can affect the recipient economy. Thus, capital flows to countries has emerged as a prime factor affecting the exchange rate level. In the literature, there are many studies indicating the impact of capital inflows to developing countries on the exchange rate. However, it seems that most studies do not present the short-run and long run impact of capital inflows on the exchange rate, separately.

Against the foregoing literature, the impact of capital movements on the exchange rate needs to be analysed in the short and long term separately. In the short term, capital inflows to developing countries appreciate local currency by decreasing the exchange rate and also contribute significantly to the economic growth by increasing resources to finance domestic consumption and investment. However, in the long-term, the initial appreciation of the domestic currency deteriorates the current account balance and thus stimulates the expectation of economic units towards exchange rate depreciation. At the end of this process, the expectations of economic agents related to the exchange rate depreciation increase the exchange rate. Calvo (1998) has theoretically showed how the capital inflows to developing countries cause fluctuations of exchange rates in the short and long run. Accordingly, large amount of capital inflows to developing countries firstly lead to a decrease in the level of exchange rate, in other words, to an increase in the value of domestic currency. Afterwards, depending on the exchange rate appreciation, this process brings about a large deficit in the current account balance. Finally, increasing capital account deficit raises the expectations related to exchange rate depreciation, which increases the exchange rate in the end. Therefore, for the developing countries, especially those that attract a large amount of foreign capital, developments in the exchange rate play a major role in order to provide economic stability during capital inflows (Corden, 1994, p. 8).

Looking at the foregoing literature, many studies focused only on the fact that the appreciation of local currencies due to large capital inflows to developing countries causes an abrupt deterioration of the current account balance and increases vulnerability to economic crises (Calvo, Leiderman and Reinhart, 1993; Agenor, 1998; Lartey, 2008). Regarding the latest country-specific empirical papers studying the relationship between capital flows and exchange rates, Ibarra (2011) analysed

the determinants of the Mexican peso's real exchange rate from 1988 to 2008 by using the bounds testing approach. A main result of the paper is that not only portfolio investment but also FDI can strongly appreciate the recipient country's currency. Thus, by contrast to the many studies, this paper argues that FDI may also significantly appreciate the local currency. Dua and Sen (2013) also investigated the relationship between the real exchange rate and capital flows to Indian economy for the quarterly data including the period 1993 and 2010 by using Johansen Cointegration and Granger Causality Tests. Empirical findings show that increased capital inflows have appreciated the real exchange rate and later increased current account deficit. Thus, they stress that one needs to pay attention not only to the appreciation of the local currency but also to the huge trade deficit arising from the consequences of this appreciation. The policy prescriptions that emerge for the analysis suggest that capital inflows may need to be managed effectively to provide economic stance in India. Globan (2014) examined the macroeconomic impacts of capital inflows by focusing on the case of Croatia. The analysis based on descriptive statistics between 2000 and 2011 has shown that capital inflows affected economic growth by accelerating the development of the financial system by attracting foreign investments thus saving the country in the short run. However, in the long run, capital inflows to Croatia also appreciated the real exchange rate and thus worsened the current account balance. From the policy aspect, the paper emphasizes the importance of capital account management for developing countries based on attracting long term capital inflows in order to get benefits from foreign capital in the long run. Urbanovsky (2017) analysed the effects of foreign capital inflows on the economy of the Czech Republic. Within the framework of the Johansen Cointegration and Error Correction Model, the economic effects of capital inflows were analysed by using quarterly data between 1995 and 2015. Empirical findings indicate that capital inflows have led to expectations of an increase in the exchange rate level by disrupting the current account balance in the long term. Therefore, it was emphasized that capital account should be managed effectively for exchange rate stability.

As for multi-country studies, Edwards *et al*. (1999) examined the effect of capital movements on the country group consisting of Argentina, Brazil, Chile, Mexico and Peru in the period between 1970 and 1997. Empirical findings determined that capital inflows to these countries yield currency overvaluation in the short term. However, in the long term, due to the unsustainable current account deficits, it has been determined that capital inflows cause the depreciation of domestic currencies. Thus, it was pointed out that capital movements created instability by causing pressure on the exchange rates in Latin American countries. Therefore, the effective management of capital inflows is recommended as the most important policy option for stability in exchange rates. Bakardzhieva *et al*., (2010) analysed the effect of capital inflows on the exchange rate and thus, competitiveness, in 57 developing countries selected from different regions of the world. Within the

framework of dynamic panel analysis, the annual data between 1980 and 2007 were examined. The findings determined that financial capital flows negatively affect the competitiveness of host countries by evaluating their currencies in the short run. It is pointed out that developing countries face the risk of high amount of deficit in current account by losing their competitiveness as a result of appreciation of their money when attracting huge foreign capital. Cardarelli *et al*. (2010) investigated the impact of private capital inflows across a large group of emerging and advanced economies. Estimation results found that capital inflows are associated with real appreciation and deteriorating current account balances. Findings also imply that the stabilisation challenges from capital inflows are most serious for countries with substantial current account imbalances. Jongwanich and Kohpaiboon (2013) examined the nexus between capital flows and real exchange rates in emerging Asian countries using dynamic panel data model in the period 2000-2009. Countries include India, China, Singapore, Indonesia, Korea, Malaysia, and Thailand. The study found that all forms of capital flows have an impact on determining the real exchange rate. The estimation results show that capital inflows into the region resulted in the appreciation of local currencies. More specifically, it also indicated that portfolio investment brings in a faster speed of real exchange rate appreciation compared to other types of capital inflows.

Portfolio investments were found to have a much greater impact on the real exchange rate appreciation compared to other investment and foreign direct investment. Benazic and Kersan-Skabic (2016) examined the determinants of the exchange rate in Croatia as a developing country. The analysis is carried out by using the bounds testing (ARDL) approach for co-integration. The data are analyzed on a quarterly basis from December 1998 until March 2013. Empirical results indicated a relationship among the main sources of foreign currency inflow and outflow and the exchange rate level in Croatia. It is clearly indicated that the determination of the nominal exchange rate in Croatia primarily depends on the external factors that affected the domestic economy. Finally, Caporale *et al*. (2017) investigated the economic effects of foreign portfolio investments in Asian countries consisting of Pakistan, Philippines, South Korea, Taiwan and Thailand. In the analyses conducted by using GARCH model, foreign capital inflows were determined to cause significant fluctuations in exchange rates and hence uncertainties in these countries. Therefore, it was concluded that capital inflows should be controlled in an effective manner in order to achieve stability in exchange rates.

In the literature, there are also some studies examining the relationship between capital flows to Turkey and the exchange rate. For example, in a recent paper, Karpuz and Kiziltan (2014) examined the relationship between real exchange rate and short-term capital flows in Turkey by using the data for the period 2003-2014. It was found out that there is a bi-directional causality relationship between real exchange rate and short-term capital flows. This interaction between capital flows and exchange rate lead to some instabilities in the economy. Erdal and Pınar

(2015) analysed empirically the effects of short-term capital flows on the exchange rate in Turkey under intermediate (January 1994-February 2001) and flexible (March 2001-September 2012) exchange rate regimes. The estimation results of regression analysis showed that capital flows have significant effects on exchange rates in the flexible exchange rate regime while they have no significant effects on the exchange rate in the intermediate exchange rate regime. Thus, empirical findings of the study indicate that foreign exchange rate regime is a significant factor in the relationship between capital flows and exchange rate. Organ and Berk (2016) investigated the link between short-term capital inflows and the exchange rate during the 2005-2012 period for Turkey by using VAR methodology. The results of Impulse-Response Analysis show that a shock in short-term capital movements resulted in a 4% decline in the exchange rate. Thus, it has been indicated that short-term capital movements have a negative effect on the exchange rate. According to the Variance Decomposition Analysis, the most important variable affecting the exchange rate in the future is the short-term capital movements with a rate of approximately 14%. Arslan and Çiçek (2017) analysed the short run impact of portfolio investments on the exchange rate in Turkey using VAR method for quarterly data between 2006 and 2016. The results of the analysis showed that the increase in foreign portfolio investments affected the exchange rate negatively. Finally, by using the VAR model for the data set covering the period 2005-2017, Okur *et al*. (2019) show that the exchange rate in Turkey plays an important role in the monetary transmission mechanism. Accordingly, a shock in capital inflows can affect the domestic price level through fluctuations in the exchange rate.

The studies in the literature focusing on Turkey and other countries, as set out above, show that financial capital inflows towards developing economies have a very significant interaction with exchange rates. As a result of these interactions, capital movements decreased the level of the exchange rate in the short term, while in the long term, the deterioration in the current account balance due to overvaluation of the exchange rate gave rise to the depreciation of the domestic currency. According to this, while there is a negative relationship between capital flows to a country and the exchange rate in the short term, there is a positive relationship in the long term. However, looking at the literature, it seems that most studies only focused either on the short or on the long run impact of capital inflows on the exchange rate. Especially, the foregoing literature focusing on Turkey mostly indicated that the capital inflows have a significant appreciation impact on Turkish currency. These studies used time series techniques which examined the short run effects of capital movements. Nevertheless, the relationship between capital flows and exchange rate cannot be finalized in the short run interaction. Related to capital inflows, an initial appreciation is followed by a depreciation of local currency later because an initial step appreciation enlarges the current account deficit and thus stimulates expectation of economic units towards exchange rate depreciation. Thus, from a theoretical point of view, the interaction between capital movements and exchange rate needs to be

analysed in the framework of two sub-processes which produce opposite results in the short and long term. Accordingly, by using the ARDL method, this study aims to investigate the effects of capital flows on exchange rates in both short and long runs. Consequently, our research contributes to the existing literature by examining the impact of capital inflows on exchange rate in the short and in the long run, separately.

2. Data set and methodology

We examine the nexus between financial capital inflows and the exchange rate for Turkish economy over the period between 2003 and 2018 by incorporating the quarterly data. We compiled the data for financial capital inflows and exchange rate from the Electronic Data Distribution System of the Central Bank of the Republic of Turkey. Financial capital inflows cover the portfolio investments and other investments under the Finance Account of the Balance of Payments which is measured in US Dollars. Regarding the exchange rate series, we incorporated the nominal exchange rate on buying rates which is transformed into the quarterly frequency from the daily frequency. It should also be noted that both series are adjusted for seasonal and calendar effects and transformed into the natural logarithmic form. In line with the above-mentioned variables, Table 1 roughly reports the descriptive statistics. The mean of the natural logarithm of the financial capital flows (LCP_t) is overwhelmingly larger than the natural logarithm of the exchange rate (LER_t) whereas standard deviation of the series displays relatively lower variance. However, the standard deviation of LCP_t is relatively higher than LER_t since the difference between the maximum and minimum values of LCP_t is larger. Jarque-Bera normality test statistics for both variables yield that both variables are normally distributed since the corresponding statistics are not statistically significant.

Table 1. Descriptive Statistics

Variables	**LER_t**	**LCP_t**
Number of Observations	64	64
Mean	0.63	7.72
Maximum	1.71	9.52
Minimum	0.17	5.35
Standard Deviation	0.39	0.82
Skewness	1.07	-0.41
Kurtosis	3.18	2.96
Jarque-Bera stat. (probability)	0.40 (0.81)	1.87 (0.39)

Note: Capital L denotes the natural logarithm of corresponding variable.
Source: own calculations

Our empirical investigation commences by examining the direction of the causality between financial capital inflows and exchange rate. Accordingly, we performed Granger (1969) causality test and the relevant results are displayed in Table 2. The results yield the presence of unidirectional causality that runs from financial capital inflows to exchange rate by rejecting the null hypothesis that is set up as „LCP_t does not Granger cause of LER_t."

Table 2. Granger causality test

Null Hypothesis	**F-statistics (p-value)**
LER_t does not Granger cause of LCP_t	1.566 (0.149)
LCP_t does not Granger cause of LER_t	2.373 (0.064)***

Notes: *** denotes the significance level at 10 %. Lag length is specified as 4.
Source: own calculations

After the determination of the unidirectional causality from capital flows to exchange rate, we investigate the cointegration relationship among the variables by incorporating the following baseline specification in which the natural logarithm of the exchange rate is considered as a dependent variable whereas the natural logarithm of the financial capital flows is an independent variable:

$$LER_t=\beta_0+\beta_1 LCP_t+\varepsilon_t \quad (1)$$

where LER_t represents the natural logarithm of nominal exchange rate, LCP_t represents the natural logarithm of financial capital inflows and ε_t denotes the conventional disturbance term that is independently and identically distributed (i. i. d) with which zero mean and constant variance. In the light of the baseline specification above, the cointegration relationship between exchange rate and financial capital flows would be examined by the ARDL bounds testing approach to cointegration which is developed by Pesaran *et al*. (2001). As advocated by Shahbaz *et al*. (2016), this technique has some advantages over its counterparts in some aspects. First, it is applicable no matter the integration order of variables. Secondly, it performs in a more efficient way under small sample cases compared to its counterparts such as Engle and Granger (1987), Johansen and Juselius (1990). Finally, Banerjee and Newman (1993) highlight the potential superiority of performing the dynamic error correction model through simple linear transformation without losing information over long time horizons. Thus, within the context of the ARDL approach, the error correction model integrates the short-run dynamics into the long-run path by hindering the information loss on the latter.

The use of the ARDL model in our study in parallel with the above explanations provides very important advantages. In other words, there are several significant reasons to prefer the application of the ARDL model. Firstly, this study

aims to analyse the impact of capital inflows on the exchange rate in the short and long runs, separately. The ARDL model provides a highly effective empirical method for analysing short- and long-term relationships between variables. Secondly, while investigating the effect of capital inflows on the exchange rate, this study has focused on the period of implementation of inflation targeting regime in Turkey. Therefore, the analysis should be restricted by a very limited data set. In this respect, a method that could produce effective analysis results with a limited data set was required. The ARDL method provides a significant advantage as an empirical method that provides effective estimation even with a small data set compared to other methods. Thirdly, in our study, it has been found that financial capital inflows were stationary at their level while the exchange rate became stationary by taking the first differentiation. Thus, the presence of a mixed stationary sequence of variables leads us to employ the ARDL model because this approach can be applied irrespective of whether the regressors in the model are purely I (0), purely I (1) or mutually co-integrated.

We elaborate the ARDL bounds test approach through the baseline specification indicated in Equation-1. First, the existence of cointegration relationship among the variables is examined by constructing the following unrestricted error correction model (UECM) within the context of baseline specification:

$$\Delta LER_t=\beta_0+\beta_1 T+\sum_{i=0}^{n}\beta_{2i}\Delta LCP_{t-i}+\beta_3 LCP_{t-1}+u_t \quad (2)$$

where n denotes the lag length, Δ denotes the first difference operator, subscripts t-i and t-1 denotes the lag orders respectively. In this equation, β_0 denotes the drift parameter and the time trend is denoted by T,β_1, β_{2i} and β_3 represent the coefficients to be estimated and finally u_t denotes the conventional white-noise disturbance term with standard normal distribution. In order to select the optimal lag length for appropriate ARDL model, Akaike Information Criterion (AIC) is used in which nonexistence of serial correlation and heteroskedasticity problems are ensured. The cointegration relationship between the variables is tested by employing the F-test in which the null hypothesis of no cointegration among the variables is tested against the alternative. Pesaran *et al*. (2001) offer lower and upper bounds to compare whether calculated F-statistics is greater or lower than the upper bound and if F-statistics exceed the upper bound, then the decision would be in favour of cointegration between the variables whereas the calculated F-statistics falls below the lower bound, then the decision would be non-existence of cointegration between the variables in consideration.

After rigorous investigation of the long-run relationship between the variables, in the next step, short-run dynamics would be investigated by estimating the following error-correction representation of our baseline specification.

$$\Delta LER_t = \beta_0 + \beta_1 T + \sum_{i=1}^{m}\beta_{2i}\Delta LER_{t-i} + \sum_{i=0}^{n}\beta_{3i}\Delta LCP_{t-i} + \beta_4 EC_{t-1} + u_t \quad (3)$$

Apart from Equation-3, EC_{t-1} denotes the one-period lagged error-correction term which is derived by estimation of the long-run equation, m and n denote the corresponding lag lengths that are prone to each variable in Equation-3. In an analogous vein, the estimation of the short-run error correction model is performed including drift parameter β_0 and time trend T.

Finally, the diagnostic check of the short and long run estimation of the ARDL model should be tested. Accordingly, Breusch-Godfrey (BG) test and White test are performed to determine whether residuals are serially correlated in subsequent periods or not correlated with the independent variables, respectively. On the other hand, Jarque-Bera (JB) normality test is performed for determining the normal distribution of the residuals while the result of Ramsey test confirms that ARDL model is correctly specified through the UECM. Additionally, stability check of parameters has been done from which the estimation of either long run or short-run models by performing the cumulative sum (CUSUM) test were emphasised.

3. Empirical results

We embark upon our empirical analysis by checking the stationary status of the variables before performing the bounds test. In this context, we employ the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) type unit root tests and the results should necessarily satisfy the integration of variables at I(0) or I(1) or both, but except for I(2). Test results confirm that the natural logarithm of financial capital inflows is stationary at I (0) to the extent to which corresponding test statistics are significant at 1 % significance level. However, the series of the natural logarithm of the exchange rate becomes stationary by taking the first differentiation at which corresponding test statistics are statistically significant at 1 % significance level.

Table 3. Unit root tests

Variables	ADF test	ADF test (Trend)	PP test	PP test (Trend)
LER_t	2.230[0.999]	-1.129[0.915]	3.217[1.000]	-0.814[0.958]
LCP_t	-7.562[0.000]*	-7.574[0.000]*	-7.564[0.000]*	-7.576[0.000]*
ΔLER_t	-6.826[0.000]*	-7.648[0.000]*	-6.806[0.000]*	-8.931[0.000]*
ΔLCP_t	-9.500[0.000]*	-9.414[0.000]*	-51.640[0.000]*	-53.619[0.001]*

Notes: * denotes the significance level at 1 %. For ADF test, SIC is used for selecting optimal lag length and maximum lag length for each test is selected as 10. For PP test, bandwidth length is predetermined by the Bartlett Kernel criterion. Probability values are shown in brackets for each test statistics. Δ denotes the first difference of relevant variables.
Source: own calculations

Having decided the presence of mixed order of integration among the variables leads us to figure out the optimal lag order for appropriate ARDL model. Following Shahbaz *et al*. (2016) who state that Akaike Information Criterion (AIC) has superior predicting properties even in small sample sizes compared to its counterparts. We identify the optimal lag order according to AIC. The optimal lag order for the ARDL model is chosen as (1, 1) over 20 models at which the minimum value of the AIC equals -2.589 without bearing serial correlation and heteroskedasticity problems. Thus, we would conduct the ARDL model which identified as (1, 1).

Table 4. ARDL Cointegration test and long-run estimation results

Depended variable: ΔLER_t		Optimal lag length (1, 1)					
A-Cointegration Test							
Critical value bounds for F-statistics		1 % Level		5 % Level		10 % Level	
k	F-statistics	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
1	18.11*	4.81	6.02	3.15	4.11	2.44	3.28
Variable	Coefficient	Standard Error				t-statistics	
Constant	-0.209	0.074				-2.819*	
Trend	0.001	0.000				3.320*	
LER_{t-1}	0.232	0.127				1.819***	
LCP_t	0.018	0.007				2.460**	
LCP_{t-1}	0.015	0.007				-2.128**	
B-Long-Run Coefficient Estimate							
Variable	Coefficient	Standard Error				t-statistics	
LCP	0.2868	0.1365				2.1006**	
Diagnostic tests	Statistics	Diagnostic tests				Statistics	
R^2	0.11	F-Statistics				5.381 (0.002)*	
Adjusted R^2	0.08	JB Normality test				2.940 (0.229)	
SE of Regression	0.063	BG Autocorrelation test				0.365 (0.695)	
AIC	-2.616	White Heteroskedasticity test				1.242 (0.302)	
Schwarz Criterion	-2.513	Ramsey RESET test				4.190 (0.123)	

Notes: For critical values regarding the bounds test, see Pesaran *et al*. (2001), Table CI (v) on p. 300 and k denotes the number of explanatory variables. *,**,*** denotes the significance levels at 1 %, 5 % and 10 % respectively. Regarding the diagnostic tests, probability values of test statistics are displayed in parenthesis. Δ denotes the first difference of variables in consideration. AIC: Akaike Information Criterion, JB: Jarque-Bera, BG: Breusch-Godfrey

Source: own calculations

After determination of ARDL Model, cointegration test and long run estimation are given in the segment A of Table 4. Without imposing any restriction on trend and drift parameters, the results of bounds test demonstrate the existence of

cointegration or long-run relationship among the variables as the calculated F-statistics (18.11) exceeds the upper (6.02) and lower bounds (4.81) at 1 % significance level enormously. The one-period lag of the exchange rate (LER_{t-1}), the current value of the financial capital inflows (LCP_t) and one-period lag of the financial capital flows (LCP_{t-1}) are statistically significant at 1 % significance level. These results show the robustness of the ARDL (1, 1) model to show the long run interactions among the variables.

Segment B of Table 4 is devoted to the estimation of ARDL (1, 1) model based on the UECM, which is specified by equation 2. The coefficient of the LCP is 0.2868 and it is statistically significant at 5 % significance level. Hence, the coefficient of the LCP attests the positive association between financial capital inflows and exchange rate. That means that capital inflows to Turkey depreciated Turkish Lira in the long run by increasing the exchange rate level. As seen from the long-run estimation results, as theoretically expected, financial capital inflows to Turkey have a negative impact on the exchange rate. That means financial capital inflows to Turkey depreciate Turkish lira in the long-run. It is highly probable that the initial appreciation of the domestic currency deteriorates the current account balance and thus stimulates the expectation of economic units towards exchange rate depreciation. At the end of this process, the rising expectations of exchange rate depreciation increase the exchange rate and thus Turkish Liras depreciates.

Below, the B-Section of Table 4 shows the information regarding the diagnostic check of the long-run model estimation. The results of Breusch-Godfrey (BG) test and White test reveal that residuals are either serially correlated in subsequent periods or not correlated with the independent variables, respectively. On the other hand, the result of Jarque-Bera (JB) normality test highlights the normal distribution of the residuals while the result of Ramsey test confirms that our model is correctly specified through the UECM.

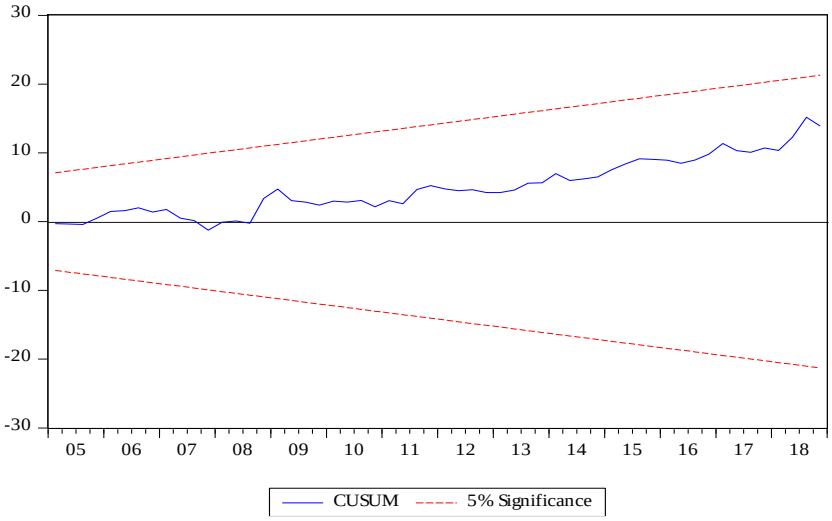
Based on the Error Correction Model (ECM), the short-run dynamics is captured by estimating equation 3 and the relevant results are reported in Table 5. Without imposing any restriction on trend and drift, the short-run speed of adjustment is captured by the period lagged error correction term (EC_{t-1}) which is obtained from the residuals of ARDL (1, 1) model. According to the estimation results, the coefficient of the first differenced flows of capital is -0.019. Hence, flows of financial capital in the form of portfolio investments and other investments cause an appreciation of domestic currency in the short-run. Through the expectations, the coefficient of EC_{t-1} is negative and statistically significant at 1 % significance level imply that shocks to the dependent variable dwindles at a speed by 76 %. These findings indicated that, in the short term, capital inflows to developing countries appreciate local currency by decreasing the exchange rate. In other words, large amounts of capital inflows to developing countries firstly lead to a decrease in the exchange rate level, in other words, to an increase in the value of domestic currency.

Table 5. Short-run error correction model estimation results

Depended variable: ΔLER_t			
Variable	Coefficient	Standard Error	t-statistics
Constant	-0.206	0.063	-3.257*
Trend	0.002	0.000	4.512*
ΔLCP_t	-0.019	0.006	2.754*
EC_{t-1}	-0.767	0.126	-6.069*
Diagnostic tests	Statistics	Diagnostic tests	Statistics
R^2	0.48	Durbin-Watson statistics	1.989
Adjusted R^2	0.47	JB normality test	0.771 (0.701)
SE of Regression	0.063	BG autocorrelation test	0.157 (0.855)
AIC	-2.648	White heteroskedasticity test	0.847 (0.539)
Schwarz Criterion	-2.580	Ramsey RESET test	1.726 (0.266)
F-statistics (prob.)	3.742	(0.003)*	

Notes: * denotes the significance levels at 1 %. Regarding the diagnostic tests, probability values of test statistics are displayed in parenthesis. Δ denotes the first difference of variables.
Source: own calculations

Figure 1. Stability of short-run and long-run parameters



Source: own representation

Below, a part of Table 5 displays the results of diagnostic tests and the test results confirm the non-existence of serial correlation or heteroskedasticity problems by which accepting the null hypotheses since each test statistics are not significant statistically in line with the BG. According to the results of JB test and Ramsey's RESET test, residuals are normally distributed and the proposed model is correctly

specified respectively since the corresponding test results are not significant at any level.

In order to measure the overall stability of the long-run and short-run parameters of the proposed ARDL model, we employ CUSUM test. In Figure 1, the dashed red lines represent the critical boundaries at 5 % significance level and the blue line represents the plot of CUSUM test at which it oscillates between the critical boundaries. The plot of CUSUM test highlights that either long-run or short-run parameter obtained from each ARDL model follows a stable pattern. Thus, the above mentioned short-run and long-run estimations regarding the impact of financial capital inflows on exchange rate are verified by the CUSUM test.

4. Some theoretical and policy implications

In our study, empirical results give two significant insights for related literature. Firstly, the results show that financial capital inflows have two different effects on exchange rates in the short and long term. Capital flows to Turkey are found to be significantly associated with the appreciation of the exchange rate in the short run while the depreciation of the exchange rate in the long run. Thus, as often the case in the literature, the capital inflow exchange rate relationship should not be addressed in a single direction over a single period. Secondly, the results of our study show that, under the inflation targeting monetary policy strategy, financial capital inflows have a potential to fluctuate the exchange rates in different directions in the short and long term. In this case, it can undoubtedly create significant fluctuations due to capital movements at the exchange rate level, leading to significant instability in the economy. The success of the inflation-targeted stabilization program is compromised by the fluctuating effect of capital inflows on the exchange rate. Therefore, in inflation-targeted money programs, it is important to control exchange rates in certain ways rather than fluctuating completely.

More specifically, empirical results also give some significant insights for Turkey's economy. Findings clearly indicated that domestic currency appreciation and depreciation, respectively, associated with capital inflows have a significant potential to put inflation targeting regime in trouble. The fluctuations in the exchange rates caused by capital inflows will also cause instabilities at the price level. As a result, it will prevent the successful pursuit of the inflation-targeted monetary program because the transmission mechanism from the exchange rate to the price level called „exchange rate pass-through" works very strongly in Turkey. Okur et. al. (2019) show that the exchange rate in Turkey plays an important role in the determination of domestic prices. Accordingly, a shock in capital inflows can affect the domestic price level through fluctuations in the exchange rate. Accordingly, the pressure exerted by capital inflows on the exchange rate makes the successful implementation of inflation targeted monetary program in Turkey rather difficult.

In terms of policy implication, it can be argued that capital inflows to Turkey should be managed effectively in order to avoid major episodes of exchange rate volatility and economic instability. Therefore, policymakers should develop a strategy that can control the exchange rate within the framework of the inflation-targeted monetary program instead of allowing it to fluctuate freely. Monetary authorities in Turkey, even under the inflation-targeting regime, should pursue an active policy that prevents the substantial appreciation of their currencies during capital inflows and thus ensure both price and exchange rate stability.

Conclusions

Along with the financial market globalization, capital flows to developing countries has emerged as a prime factor affecting the stability of the exchange rate. Explaining exchange rate movements based on capital inflows to developing countries is one of the most intriguing themes in international macroeconomics. As a developing country, the Turkish economy also has a rich experience to be examined in terms of relationship between capital inflows and exchange rates. Accordingly, this paper analyses the impact of capital flows on the exchange rate in Turkey under the implementation of the inflation targeting regime for the period 2002–2018 by using the Autoregressive Distributed Lag (ARDL) approach. Most of the studies focused on Turkey investigate the effects of capital movements on exchange rates by using short-term time series techniques. Consequently, the foregoing literature only indicates that capital flows lead to exchange rate appreciation in Turkey. However, the relation between capital flows and exchange rate cannot be finalized in the short run interaction because an initial phase of appreciation is followed by a depreciation since an appreciation in initial step enlarges the current account deficit and thus stimulates expectations of economic units towards exchange rate depreciation. The interaction between capital movements and exchange rate needs to be analysed in the framework of two sub-processes which produce opposite results in the short and long term. Therefore, by using the ARDL method, this study examines the effects of capital flows on exchange rates in both short and long runs. In addition, the originality of the study stems from the period analysed covering the term in which the inflation targeting regime has been active in Turkey. Thus, this study also aims to provide significant implications about how capital inflows affect the exchange rate under the inflation targeting regime adopting the free exchange rate system.

Our findings indicate that exchange rate movements are sensitive to capital flows to Turkey both in the short and in the long run. Besides, as theoretically expected, capital flows to Turkey have varying effects on the exchange rates in the short and long run. More specifically, the impact of capital flows to Turkey on the exchange rate is negative in the short run but positive in the long run. In other words, capital flows to Turkey is found to be significantly associated with the appreciation

of the exchange rate in the short run while depreciation of the exchange rate in the long run. These results show that the immediate result of capital inflows to Turkey is an appreciation of domestic currency. After a while, when the deficits on current account enlarge, the appreciation trend is replaced by expectations of local currency depreciation, which in turn subsequently tends to lead to increasing the exchange rate in Turkey. That means that, under the inflation targeting regime, capital inflows to Turkey are the major cause of real exchange rate appreciation at an initial phase but has to be reversed later, with the expectation of exchange rate depreciation.

The empirical results indicated above show that capital inflows cause fluctuations in the exchange rate and lead to a significant instability in Turkey's economy in an environment where exchange rate is allowed to fluctuate within the framework of the inflation targeting regime. Domestic currency appreciation and depreciation, respectively, associated with capital inflows have a significant potential to put Turkish Economy in trouble. In terms of policy implication, it can be argued that capital inflows to Turkey should be managed effectively in order to avoid major episodes of exchange rate volatility and economic instability. Besides, monetary authorities in Turkey, even under the inflation targeting regime, should have an active policy which avoids a substantial appreciation of their currencies during capital inflows and should ensure both price and exchange rate stability because doing nothing in the face of capital inflows will initially deteriorate current account balance by appreciating currency sharply and this situation feeding the „expectation of exchange rate depreciation" will later lead to serious exchange rate volatility and to economic instability.

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