

# Exchange Rate Pass-Through in Turkey Before and After the Adoption of Inflation Targeting Regime

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**Abstract:** *The impact of exchange rate change on the domestic price level which is called as exchange rate pass through has long been of interest in international economics literature. Along with the application of inflation targeting regime widely, the focus of this interest has also evolved to examine the changes in degree and speed of exchange rate pass through under inflation targeting regime. Turkey, adopted Inflation Targeting (IT) as a monetary regime between 2001 and 2006 implicitly and then explicitly, exhibits which was a genuine experience to be analyzed in this respect. From this point of view, the goal of the study is to provide a time-series analysis of exchange rate pass-through for Turkish economy based on single equation Error Correction Model estimation using the monthly data under pre-IT period 1995-2000 and post-IT period 2006-2014. Thus, we try to clarify the effectiveness of inflation targeting regime as monetary policy on the exchange rate pass-through. The findings of the study indicate that the exchange rate pass-through decreased in the post-IT period compared to pre- IT period. Accordingly, it can be argued that the implication of inflation targeting regime reduced exchange rate pass through in Turkey.*

**Keywords:** *error correction model, exchange rate pass-through, inflation targeting*

**JEL codes:** *E31, E58, F31, C22*

## Introduction

Along with increasing globalization, international financial and business relationships grow dramatically, which lead the exchange rate to be one of the most significant macroeconomic factors. In this context, large fluctuations in nominal exchange rates have also become very important from the perspectives of policy actions aiming at macroeconomic stability. Therefore, dynamics of exchange rate and its relationships with other macroeconomic variables need to be understood intensively. Accordingly, understanding the impacts of exchange rate changes on other macroeconomic variables has been the main focus of international economics literature recently. In this literature, it appears that studies examining the impact of changes in exchange rate on domestic price level, called as "Exchange Rate Pass Through" (ERPT) has a big share. In fact, the number of studies focusing on ERPT tremendously has grown over last decades.

Along with the growing interest on the ERPT, it also seems that an important number of empirical studies have recently dealt with the impact of inflation targeting regime on ERPT. Along with the adoption of inflation targeting regime many countries have

reached low and stable inflation levels. In connection with this process analysing, the impact of inflation targeting regime on ERPT becomes a significant research agenda for the economists. The empirical evidences mostly suggest that the degree of pass-through decreases along with the implications of inflation targeting. After adopting Inflation Targeting as a monetary regime in 2006 explicitly, accompanied by an increase in the transparency of monetary policy, Turkish economy has also embarked into a process of diminishing inflation. Accordingly, the crucial research question here is whether the lower the inflation rate under inflation targeting regime caused the weaker the exchange rate pass through in Turkey.

From the starting point of consideration above, this article aims to examine the impact of the changes in nominal exchange rates and domestic prices in Turkey by using of Error Correction Model over two different periods; the pre-Inflation Targeting period between 1995 and 2000 and Post-inflation Targeting period between 2006 and 2014. Thus, we try to investigate how changes in the exchange rate were transmitted to the consumer prices in Turkey after adopting Inflation Targeting Regime explicitly in 2006 compared to previous era. By examining the Turkish case, we aim to shed some more light on the transmission mechanism from exchange rates to prices under inflation targeting regime. Our paper is organised as follows. Following the introduction above, the second part describes the methodology and data. The third section presents empirical results and includes some discussion on the relationship between exchange rate pass through process and implementation of inflation targeting regime. The final section concludes and suggests some policy implications.

## **1 Literature Review**

Exchange rate fluctuation passed through to domestic price which is called as exchange rate pass-through effect has long been of interest in the international macroeconomics literature. The impact of exchange rate shock on price level operates in a complex transmission mechanism depending on many factors. Accordingly, separate estimations of the ERPT have to be conducted for different ways in the literature. However, generally speaking, it can indicate two channels through which changes in the exchange rate are passed on to consumer prices directly and indirectly. In the end, we can explain the ERPT process by considering direct and indirect effects of the exchange rate changes on domestic price levels like below (Aliyu et. al. 2009; 7-8).

The direct channel is related to the impact of exchange rate fluctuations on domestic price level via import prices. According to this, importers increase their prices in the local currency to maintain their markups while local currency depreciates after an increase in the nominal exchange rate. Thus, consumers have to pay much more in the local currency to purchase the same imported consumption goods. On the other hand, if the manufacturing sector depends on imported inputs that are priced in a foreign currency, then depreciation of local currency results in an increase in the production cost of manufacturing sector. In connection with that, local producers charge consumers higher prices in order to maintain their markups. Thus, initial depreciation of local currency causes an increase in the consumer prices. The

magnitude of this kind of pass-through is tightly related to the dependency of local production on imported inputs that are priced in foreign currency. To sum up, importers change their prices of imported consumer and producer goods proportionally with the shift in the exchange rates and thus transfer fluctuations in the exchange rates to domestic price level.

The indirect channel is related to the effect of exchange rate fluctuations on the amount of total demand and in the level of wages. If the exchange rate increases, the imports become more expensive for domestic buyers. This leads to a higher demand for substitute domestic products by domestic consumers. On the other hand, demand for exports rises while the exchange rate increases since the domestic products become relatively cheaper for foreign buyers. This also leads to a higher demand for domestic production by foreign buyers. In conclusion, depreciation of local currency causes increasing total demand via a higher demand for import substitute goods by domestic buyers and for exports by foreign buyers. This increase in the total demand, of course, pushes the domestic price level up. Furthermore, the increasing demand for domestic products eventually leads to a higher production and therefore a higher demand for labour, which can be followed by an increase in wages. This increase results in further upward pressure on the domestic prices.

When we examine the literature, it seems that studies searching the exchange rate pass-through previously focus only on the link between exchange rate and import prices. Thus, previous studies mostly concentrate on exchange rate fluctuation passed through to import prices (Swamy and Thurman 1994; Webber 1999; Campa and Goldberg 2002; Barhouni 2006). In detail, the exchange rate affects domestic consumer prices through prices of imported consumer goods and the price of imported inputs used in domestic production. To put it another way, exchange rate movements affect domestic consumer prices via either directly prices of imported consumption goods or indirectly prices of imported intermediate goods. Subsequently, much of the research deals with the relationship between movements in exchange rate and producer and consumer prices (Takhtamanova 2010; Ocran 2010; Ahn and Park 2014). Some studies in the literature also focus on the macro drivers of the exchange rate pass-through. They indicate the factors like exchange rate and inflation volatility, import dependence, output gap, price inertia, currency substitution and expectations as the basic drivers of exchange rate pass-through (Choudhri and Hakura 2001; Carranza et. al. 2009; Jimborean 2013).

Recently, it also seems that large body of literature devoted to examine the link between the effectiveness of monetary policies adopted in the framework of inflation targeting regime and the exchange rate pass-through process. The findings of empirical studies generally argued that the low inflation environment recently achieved in many countries after adopted inflation targeting regime causes a decline in the impact of exchange rate on domestic prices. Thus, after the adoption of the inflation target regime, the pass-through effect seems to be diminished in the most of the countries. In this context, Reyes (2007) uses the simulations for the pass through effect analysis under two monetary regimes crawling peg and inflation targeting.

Rolling Windows Correlation methodology based on stochastic stimulated data shows that declining pass through effects in Brazil, Chile and Mexico are results of changes in monetary policy regimes, a switch from a crawling peg regime to an inflation targeting regime. Thus, it is also indicated that the nominal exchange rate effects on the overall inflation rate may no longer be an issue for emerging economies implementing inflation targeting policy.

Odria et al (2012) tries to analyse whether the exchange rate pass-through into prices changed when the inflation targeting scheme was adopted in Peru between 1994 and 2007. In the framework of a vector smooth transition autoregressive model (VSTAR), analysis of the generalized impulse response functions reveals that the decision to adopt inflation targeting significantly decreased the exchange rate pass-through into producer and consumer prices. Thus, they indicate that adopting inflation targeting generates a pass-through contraction. Looking at the European area, Beirne and Bijsterbosch (2011) assess the degree of exchange rate pass through to consumer prices using both a multivariate cointegration approach and impulse responses derived from the VECM for nine central and eastern EU Member States based on monthly data from 1995 to 2008. They find notable differences across countries with fixed exchange rate regimes compared to those with more flexible regimes. Accordingly, while for the four fixed exchange rate countries such as Bulgaria, Estonia, Latvia and Lithuania, a hypothesis test for full pass-through cannot be rejected, for the countries with more flexible regimes like the Czech Republic, Hungary, Poland, Romania and Slovakia, full pass-through is rejected in all cases.

Concerning with the studies focusing on Turkey, Volkan et al (2007) also try to determine if there has been a change in the magnitude of exchange rate passes through for the 2003-2006 periods, when the exchange rates were allowed to float under inflation targeting regime. Their findings indicate that exchange rate pass through has declined for the post-2003 period by nearly one-half compared to the pre-2003 period. In addition, the decline in the exchange rate pass-through impact on domestic prices coincides with a 25 percent decline in the post-2003 consumer price inflation. Another evidence of declining exchange rate pass-through in the Turkish economy after the adoption of an inflation-targeting regime is offered by Kara and Öğünç (2008). They employed the VAR methodology and examined the exchange rate pass-through before and after the implication of inflation targeting. Empirical results show that exchange rate pass-through has weakened since the adoption of inflation targeting regime in 2001. They also argued that this finding is due mainly enhanced credibility of the central bank acquired by the implementation of a successful inflation targeting regime.

More recently, Dedeoğlu and Kaya (2014) employ a rolling VAR framework to examine exchange rate pass through over the period between 1995 and 2012 in Turkey. They find that the exchange rate pass-through has declined sharply after the adoption of inflation targeting regime. The larger impact of exchange rate pass through on the producer prices compared to consumer prices upwards in the inflation targeting regime. Overall, they indicate that the disinflation period and the implementation of

the inflation targeting regime appears to play a significant role in the dynamics of exchange rate pass through in Turkey. Arslaner et. al. (2014) also quantitatively analyse exchange rate pass-through between 1986 and 2013 by using vector auto-regressions (VAR) and Markov switching regression methods. The higher degree of exchange rate pass-through is found in Turkey. However, it is observed that exchange rate pass through substantially decreases during the implementation of inflation targeting regime compared to pre-inflation targeting regime. They also find that exchange rate pass-through for producer price-index-based inflation is higher than for consumer-price-index-based inflation.

Contrary to findings presented in the studies relating Turkey above, Civcir and Akçağlayan (2010) prominently argue that the main channel in feeding the inflation in Turkey is the depreciation of the domestic currency even under inflation targeting although exchange rate pass through weakened and slowed compared to its degree in crawling peg system. They analyse the exchange rate pass through and monetary policy reaction function of the Central Bank of Republic of Turkey over the two different periods before inflation targeting (1987-2001) and after inflation targeting (2001-2009). Using VAR model, they show that there has been strong pass-through during whole period while exchange rate has also been the main reaction variable for the Central Bank. Thus, they also argue that, Central Bank, taking into account of presence of higher level exchange rate pass through, still intervenes in the foreign exchange rate markets against to temporary fluctuations even during the inflation targeting period.

As can be seen from the review of studies focusing on Turkish case, it has been widely documented that the exchange rate pass-through to domestic inflation has decreased after adaptation of inflation targeting regime. Furthermore, existing empirical studies estimating the impact of inflation targeting regime on exchange rate pass-through for Turkish Economy are based on either single equation estimation or VAR models. We will use an alternative estimation method, namely vector error correction (VEC) model since evidence of the exchange rate pass-through based on VEC model is scarce in Turkey. In this way, we contribute to the existing evidence on the transmission mechanism from exchange rates to prices under inflation targeting regime by using an alternative estimation method. Thus, it will be interesting to compare the results from this paper model with the results of previous studies using VAR model to analyse exchange rate pass-through in Turkey.

## **2 Data and Methodology**

We use two basic data set including nominal exchange rate and consumer prices while we explore the exchange rate pass through in Turkey over the period pre-Inflation Targeting (IT) regime between 1995 and 2000 and post-IT regime between 2006 and 2014. Accordingly, the data set consist of monthly observation of TL/USD nominal exchange rate (ER) and consumer prices (CP) covering the periods, pre-inflation-targeting (1995-2000) and inflation-targeting (2006-2014) periods. We do not consider the term between 2001 and 2005 since this term is a transition period to inflation targeting and inflation targeting has only been applied implicitly in this

process. All of the data have been obtained from the data base of Central Bank of Turkey (CBRT).

Looking at the econometric approach used in related literature, it seems that the empirical papers mostly employ the methodologies based on single equation model and vector autoregressive (VAR) model introduced by Christopher Sims (1972). In this study, we apply cointegration analysis including vector error correction (VEC) model introduced by Engle and Granger (1987) in order to examine the exchange rate pass-through. Compared to single equation model and VAR model, VEC model presents two significant advantages in order to analyse the process of exchange rate pass-through. Firstly, coefficient of the error correction term estimated in this model can be interpreted as the disequilibrium response of prices to exchange rate shocks, which means speed of exchange rate pass through. Secondly, this model let us to estimate the long run stable relationship between exchange rate and price level which shows the degree of exchange rate pass through. To sum up, VEC model is the appropriate estimation tool for providing significant advantage to estimate the degree and speed of exchange rate pass through together. Thus, VEC model has the advantage of incorporating short-run dynamic without disregarding long-run equilibrium relations between exchange rate and price level.

In order conduct an VEC model, one can start with a bivariate autoregressive distributed lag model such that the current value of the  $y$  is a function of its own past value and current and past value of  $x$  (Thomas, 1993, p. 153). In this equation,  $C$  symbolizes intercept while  $\varepsilon$  shows white noise error terms.

$$y_t = C + \beta_1 x_t + \beta_2 x_{t-1} + \alpha y_{t-1} + \varepsilon_t \quad (1)$$

subtracting  $y_{t-1}$  to both sides of the Equation (1) yields

$$\Delta y_t = C + \beta_1 x_t + \beta_2 x_{t-1} - (1 - \alpha) y_{t-1} + \varepsilon_t \quad (2)$$

adding and subtracting  $\beta_1 x_{t-1}$  to right side of the Equation (2);

$$\Delta y_t = C + \beta_1 x_t + \beta_2 x_{t-1} - \beta_1 x_{t-1} + \beta_1 x_{t-1} - (1 - \alpha) y_{t-1} + \varepsilon_t$$

$$\Delta y_t = C + \beta_1 \Delta x_t + (\beta_1 + \beta_2) x_{t-1} - (1 - \alpha) y_{t-1} + \varepsilon_t$$

$$\Delta y_t = C + \beta_1 \Delta x_t - (1 - \alpha) (y_{t-1} - \frac{\beta_1 + \beta_2}{1 - \alpha} x_{t-1}) + \varepsilon_t \quad (3)$$

re-arranging Equation (3) in terms of  $\lambda = (1 - \alpha)$  and  $\delta = \frac{\beta_1 + \beta_2}{1 - \alpha}$  ;

$$\Delta y_t = C + \beta_1 \Delta x_t - \lambda (y_{t-1} - \delta x_{t-1}) + \varepsilon_t \quad (4)$$

$$\Delta y_t = \beta_1 \Delta x_t - \lambda (y_{t-1} - \frac{C}{1 - \alpha} - \delta x_{t-1}) + \varepsilon_t$$

finally re-arranging in terms  $\mu = \frac{C}{1-\alpha}$  ;

$$\Delta y_t = \beta_1 \Delta x_t - \lambda (y_{t-1} - \mu - \delta x_{t-1}) + \varepsilon_t \quad (5)$$

where  $(Y_{t-1} - \mu - \delta X_{t-1})$  express long run relationship between X and Y. Accordingly,  $\delta$  means the coefficient of long run equilibrium relationship which shows the degree of exchange rate pass through. The coefficient of  $\lambda$  refers to the speed of adjustment of short run disequilibrium to long run equilibrium between Y and X. To put it another way, the value of coefficient  $\lambda$  tells us what rate it corrects the previous period disequilibrium of the system. When  $\lambda$  is significant and contains negative sign, it validates that there exists a long run equilibrium relationship among variables Y and X. The coefficient of  $\beta$  represents an immediate or short run effect of X on Y. Thus, the coefficient  $\beta_1$  indicates the effect of the change in X on the change in Y, of which will be helpful to know short run dynamics of the system. Consequently, the change in Y as a function of the change in X plus an error correction term, where  $\beta_1$  describes the short-run relationship and  $\lambda$  the speed of adjustment to the long run equilibrium.

As can be seen in the explanation above VEC model has the advantage of yielding an estimate for the degree and speed of exchange rate pass through. Accordingly, ECM given by Equation 5 will be estimated separately for both term's consumer prices, pre-inflation-targeting (1995-2000) and post-inflation targeting (2006-2014) periods. Thus, we will try to estimate the long term pass through ( $\delta$ ) as well as the speed ( $\lambda$ ) at which the prices indices adjust to a change in the exchange rates for both terms.

### 3 Results and Discussion

In this section, based on single equation Error Correction Model, we empirically analyse the exchange rate-pass through pre-inflation targeting period 1995-2000 and post-inflation targeting period 2006-2015 in Turkey. First of all, we check whether our time series are stationary at same level or not since cointegrating necessitates that the variables be integrated of the same order. Cointegrated variables only have a built in error correction mechanism and subsequently cointegrating necessitates that the variables be integrated of the same order. Thus, before setting up the cointegration analysis and error correction model, we start with the determining the order of integration for both of the variables Consumer Prices (CP) and Exchange Rate (ER). The results of Augmented Dickey-Fuller (ADF) test in Table 1 suggest that non-stationary cannot be rejected for the levels of variables. In contrast, when the data are differenced, non-stationary can be rejected in all variables. Thus, both of the variables Consumer Prices (CP) and Exchange Rate (ER) appear to contain a single unit root which cancels out on first differencing. Thus, they clearly appear to be  $I(1)$  in both pre-inflation targeting period and post-inflation targeting period.

After determined that all of the variables are  $I(1)$  for both periods, a simple OLS regression indicated in Model 1 also runs on the levels of each variable for both periods again.

$$CP_t = \mu + \sigma ER_t + u_t \quad (\text{Model 1})$$

**Table 1** Augmented Dickey-Fuller unit root test

Variables	Pre-IT period 1995-2000		Post-IT period 2006-2014	
	Levels	First Differ.	Levels	First Differ.
CP	- 3.231 (0.230)	- 11.231 (0.000)*	-2.089 (0.310)	-10.117 (0.000)*
ER	-1.346 (0.410)	-9.9837 (0.000)*	-0.346 (0.410)	-8.745 (0.000)*

**Note:** p-values in parenthesis; (\*) indicates significance at the 1 percent level.

where CP and ER are non-stationary variables and u is the residual.

After estimation of the long run relationship in Model 1 by using OLS for both terms, cointegration can be tested using ADF-type unit root tests on the residuals ( $u_t$ ) by testing the null hypothesis of non-stationary of the residuals ( $u_t$ ). As can be shown in Table 2, results of unit root tests for residuals performed by ADF asserts that the null hypothesis of non-stationary of the residuals is rejected, which indicates that there is a cointegration between CP and ER for both terms.

**Table 2** Augmented Dickey-Fuller tests for the residuals

Pre-IT period 1995-2000		Post-IT period 2006-2014	
Level	Order of integration	Level	Order of integration
-7.112 (0.000)*	I(0)	-8.834 (0.000)*	I(0)

**Note:** p-values in parenthesis; (\*) indicates significance at the 1 percent level.

As the variables such as CP and ER are cointegrated for two terms, we then can run the error correction model (ECM). Accordingly, the ECM given by Equation 5 has been estimated in the form of Model 2 below for both term's consumer prices separately.

$$\Delta CP = \beta_1 \Delta ER_t - \lambda (CP_{t-1} - \mu - \delta ER_{t-1}) + \varepsilon_t \quad (\text{Model 2})$$

Where  $\delta$  shows the long run relationship between consumer prices (CP) and exchange rate (ER) and hence degree of exchange rate pass through;  $\lambda$  refers to the speed of adjustment of short run disequilibrium to long run equilibrium between consumer prices (CP) and exchange rate (ER) and hence speed of exchange rate pass through.

Estimation results of ECM indicated Model 2 for both terms data is presented in Table 3. For two terms, explanatory power of the models (Adj  $R^2$ ) and the statistical significance of their regression coefficients ( $\delta$  and  $\lambda$ ) are appropriate. Results of the Breusch-Godfrey LM Test and White test also indicate that there is no serial correlation and no heteroscedasticity, respectively. The estimated results of the degree of



exchange rate pass through ( $\delta$ ) as well as the speed at which the prices indices adjust to a change in the exchange rates ( $\lambda$ ) are also presented in Table 3.

Speed of pass through or the coefficient of error correcting term ( $\lambda$ ) in ECM estimation appears with the expected negative coefficient, which is significantly different from zero at the 5 percent level for both periods. Thus, empirical results support the acceptance of cointegration or the validity of long run equilibrium relationship between CP and ER or exchange rate passes through for both terms. Consequently, after determination the cointegration between exchange rate and consumer prices by using ADF Test for residuals in Table 2, we also indicated again this fact with the results of error correction model. Besides, the coefficient of speed of adjustment are -0.347 and -0.091 percent meaning that system corrects its previous period disequilibrium at a speed of 34.70 and 9.10 percent monthly for pre-IT and post-IT period, respectively.

Looking at the degree of long term pass-through ( $\delta$ ), although they seem to be statistically significant for both terms, the values of coefficients are 0.665 in the first term and 0.218 in the second term. This means that, in the long run, a change in the exchange rate is poorly transmitted to the consumer prices in post-IT period compared to pre-IT period. Given the fact that  $\delta$  symbolizes complete exchange rate pass through when it equals one ( $\delta = 1$ ), it can be further asserted that exchange rate pass through for both terms are incomplete.

**Table 3** Error correction model estimation

	<b>Pre-IT period 1995-2000</b>	<b>Post-IT period 2006-2014</b>
Degree of pass-through ( $\delta$ )	0.665 (0.013) **	0.218 (0.031)**
Speed of pass-through ( $\lambda$ )	-0.347 (0.014) **	-0.091 (0.021)**
Co-integration Relation	Yes	Yes
Complete pass through	No	No
Adj R <sup>2</sup>	0.580	0.690
Breusch-Godfrey LM Test	1.123 (0.201)	1.917 (0.241)
White Test	0.513 (0.178)	0.698 (0.271)

**Note:** p-value in parentheses, (\*\*) indicates significance at the 5 percent level.

The findings of the study indicate that the pass-through effect dramatically reduce in post-IT period (2006-2014) with the introduction of the inflation targeting practices. In other words, we indicate a decline in the exchange rate pass-through along with the implications of inflation targeting regime. Our findings are consistent with previous investigation of the exchange rate pass-through under inflation targeting regime for Turkey (Volkan et. al 2007; Kara and Öğünç 2008; Dedeoğlu and Kaya 2014; Arslaner et. al 2014). However, although previous studies have mostly relied on single equation or VAR models to estimate the exchange rate pass-through, we use VEC model since this methodology is more suitable to capture the dynamics of the exchange rate pass-

through. Thus, we provide further evidence in support of same claim for Turkish economy by using alternative estimation method, namely VEC model.

It is clear that under inflation targeting regime low and more stable inflation rate leads to a decrease in the pass-through in Turkey. Indeed, recent reduction in the exchange rate pass-through can be attributed in the low-inflation environment provided inflation targeting regime. This fact can be arisen from several reasons in the implementation of inflation targeting regime. The increase in the transparency of monetary policy may raise the credibility of the central bank regarding the prospects of disinflation and hence lower exchange rate volatility. The effects of price stability may also be reflected by the decrease in the risk premium included in the exchanges rates charged by economic agents.

Besides decreasing impacts of inflation targeting regime on exchange rate pass through, it should also be noted that lower pass-through can be more advantageous for central bank adopted inflation targeting regime. The lower the extent of pass-through the larger will be the effectiveness of central bank's policies. A low level of pass-through is beneficial because the high level exchange rate pass through decrease the flexibility of central bank for setting inflation target. Thus, on the one hand, the degree of exchange rate pass-through into inflation is important for the effectiveness of inflation targeting regime. But on the other hand inflation targeting regime is also the major determinants of the weaker exchange rate pass through process. In conclusion, this positive mutual interaction between weak exchange rate pass through and effective inflation targeting regime may be at the root of developments in post-IT term for Turkish economy.

## **Conclusions**

The purpose of this paper is to evaluate the effects of the adoption of an inflation targeting regime on the exchange rate pass-through in Turkey. Accordingly, we examine the impact of fluctuations of exchange rate on general price level before and after adoption of inflation targeting regime in Turkey. Along with the most of the countries adopted Inflation Targeting (IT) regime, related literature intensively focuses on the impact of inflation targeting regime on exchange rate pass through. Accordingly, this study also focuses on how changes in the exchange rate are transmitted to the consumer prices in Turkey after adopting IT regime explicitly in 2006. In this framework, we examine exchange rate pass through in Turkey applying Vector Error Correction (VEC) model for the monthly data over the pre-IT period from 1995 to 2000 and the post-IT period from 2006 to 2014.

The findings indicate that the exchange rate pass-through decreases in the post-IT period compared to pre- IT period. Thus, as indicated previous literature on exchange rate pass-through under inflation targeting regime in Turkey (Volkan et. al 2007; Kara and Ögünç 2008; Dedeoğlu and Kaya 2014; Arslaner et. al 2014), our study also presents evidence of a similar decline in the pass-through that adopted an inflation targeting scheme. However, although previous studies used mostly the methods based on single equation models and vector autoregressive (VAR) models, we use an

alternative estimation method, namely vector error correction (VEC) model. Therefore, this study contributes to the existing evidence on the development of exchange rate pass-through under inflation targeting regime by using alternative estimation method.

Empirical results clearly indicate that the decline in the pass-through in Turkey is the result of the low inflation environment experienced after adoption of inflation targeting regime. In this way, empirical results also show that development of exchange rate passes through process in Turkey identifies the effectiveness of inflation targeting policy. Thus, it can also be argued that monetary and correspondingly exchange rate regimes are among the major determinants of the exchange rate pass through process. This finding has important implications for policy-makers that the adoption of a credible regime of low inflation under inflation targeting regime has been instrumental in driving the exchange rate pass-through down. Accordingly, if the central bank aims to decrease exchange rate pass-through then establishing a credible low inflation environment under inflation targeting regime is essential.

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## References

- Aliyu, S. U. R., Yakub, M.U., Sanni, G. K. and Duke, O.O. (2009). Exchange Rate Pass-through in Nigeria: Evidence from a Vector Error Correction Model. *MPRA Paper, No: 25053*.
- Ahn, J. and Park, C. (2014). Exchange Rate Pass through Producer Prices: Evidence from Korean Firm Level Pricing Survey. *Economics Letters*, 125(1), pp. 138-142.
- Arslaner, F., Karaman, D., Arslaner, N. and Kal, H. S. (2014). The Relationship between Inflation Targeting and Exchange Rate Pass-Through in Turkey with a Model Averaging Approach. *Central Bank of the Republic of Turkey Working Paper No. 14/6*.
- Barhouni, K. (2006). Differences in the long run exchange rate pass-through into import prices in developing countries: An empirical investigation. *Economic Modeling*, 23, pp. 926-951.
- Beirne, J. and Bijsterbosch, M. (2011). Exchange rate pass-through in central and eastern EU Member States. *Journal of Policy Modeling*, 33, pp. 241-254.
- Campa, J. M. and Goldberg, L. S. (2002). Exchange rate pass-through into import prices: a macro or micro phenomenon. *NBER Working Paper Series, No. 8934*.
- Carranza, L., Galdon-Sanchez, J. E. and Gomez-Biscarri, J. (2009). Exchange Rate and Inflation Dynamics in Dollarized Economics. *Journal of Development Economics*, 89, pp. 98-108.
- Choudhri, E. U. and Hakura, D. S. (2001). Exchange Rate Pass-Through to Domestic Prices: Does the Inflationary Environment Matter? *IMF Working Paper, WP/01/194*.
- Civcir, I. and Akçağlayan, A. (2010). Inflation Targeting and the Exchange Rate: Does it Matter in Turkey. *Journal of Policy Modeling*, 32, pp. 339-354.

- Dedeoğlu, D. and Kaya, H. (2014). The Evolution of Exchange Rate Pass-Through in Turkey: Does Inflation Targeting Matter? *Afro Eurasian Studies Journal*, 3(1), pp. 26-33.
- Engle, R. F. and Granger, C. (1987). Co-integration and Error Correction: Interpretation, Estimation and Testing. *Econometrica*, 66, pp. 92-107.
- Jimborean, R. (2013). The Exchange rate pass-through in the new EU Member States. *Economic Systems*, 37, pp. 302-329.
- Kara, H. and Ögünç F. (2008). Inflation Targeting and Exchange Rate Pass-Through: The Turkish Experience. *Emerging Markets Finance and Trade*, 44(6), pp. 52-66.
- Ocran M. K. (2010). Exchange Rate Pass-Through to Domestic Prices: The Case of South Africa. *Prague Economic Papers*, 4, pp. 291-306.
- Odria, L. R. M., Castillo, P. and Rodrigez, G. (2012). Does the exchange rate pass-through into prices change when inflation targeting is adopted? The Peruvian case study between 1994 and 2007. *Journal of Macroeconomics*, 34, pp. 1154-1166.
- Reyes, J. (2007). Exchange Rate Pass-through Effects and Inflation Targeting in Emerging Economies: What is the Relationship? *Review of International Economics*, 15(3), pp. 538-559.
- Sims, A. C. (1972). Money, Income and Causality. *American Economic Review*, 17(4), pp. 540-552.
- Swamy, P. and Stephan, T. (1994). Exchange Rate Episodes and the Pass-Through of Exchange Rates to Import Prices. *Journal of Policy Modelling*, 16(6), pp. 609-623.
- Takhtamanova, Y. F. (2010). Understanding changes in exchange rate pass-through. *Journal of Macroeconomics*, 32, pp. 118-1130.
- Thomas, R. L. (1993). *Introductory Econometrics: Theory and Applications*. New York: Longman Publishing.
- Volkan, A., Saatçioğlu, C. and Korap, L. (2007). Impact Exchange Rate Changes on Domestic Inflation: The Turkish Experience. *Turkish Economic Association Discussion Paper* 2007/6.
- Webber, G. A. (1999). Dynamic and Long Run Responses of Import Prices to the Exchange Rate in the Asia-Pacific. *Asian Economic Journal*, 13(3), pp. 303-320.