Exchange Rate Pass-Through in a Small Open Economy: A Structural VAR Approach

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Exchange Rate Pass-Through in a Small Open Economy: A Structural VAR Approach*

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Abstract: Pass through from the exchange rate developments to consumer prices could be an important dimension of inflationary dynamics in small open economies. In such economies, the proper identification of exchange rate pass through (ERPT) is crucial for monetary policy analysis. In this paper, we study ERPT in Turkey for the period of 2006m1-2015m6, which starts with the launch of explicit inflation-targeting regime. We first show that commonly used recursive VAR model generates unrealistic dynamics like effects of domestic variables on external variables in small open economies and as as result ERPT estimate is biased. This bias comes from the unrealistic decline in energy prices in response to depreciation of currency for the given period in Turkey. We then use a structural VAR model with block exogeneity assumption. This model generates more realistic dynamics and suggests that ERPT is around 18 percent in Turkey. Overall, the analysis demonstrates the importance of using realistic model setup and checking the relationships across variables when estimating ERPT in small open economies.

JEL Classification: E31, E52, F31.

Keywords: Inflation, Exchange Rates, Pass-through, Turkey

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*The views expressed here are those of the authors and do not necessarily represent the views of the Central Bank of the Republic of Turkey.

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1 Introduction

Exchange rate pass-through (ERPT) to consumer prices is a very important topic for monetary policy, especially in small open economies. The degree of the pass-through matters significantly for the effectiveness of monetary policies in managing the inflationary dynamics and in reaching inflation target. With a volatile exchange rate, high pass-through can become a major obstacle for price stability. Therefore, it is very crucial to properly estimate the magnitude of the pass-through and investigate its possible determinants.

In this paper, we analyze the ERPT to the consumer prices in Turkey, which is a small open economy implementing inflation targeting regime since 2006. The inflation-targeting monetary policy regime has played an important role in macroeconomic stabilization process in Turkey.[1] Through this stabilization, the exposure of the consumer prices to exchange rate movements has changed and is estimated to be lower than the pre-inflation-targeting period. Indeed, some studies have confirmed that the ERPT has declined significantly after the implementation of inflation-targeting regime.[2]

One needs to be careful in analyzing the ERPT because the model employed for the estimation of ERPT should represent the general structure of economy well enough in order to get proper conclusion about ERPT. The VAR method is the most commonly used method for the estimation of ERPT as it removes possible endogeneity problem between inflation and exchange rate by allowing a dynamic feedback between the two variables. Furthermore, it also provides the flexibility to track the evolution of the pass-through over time. This is particularly important in that the speed and the duration of pass-through provide valuable information for the short- and medium-term inflation forecasting. The ERPT in the VAR method is measured as the cumulative response of prices to a unitary exchange rate shock in the system. However, the commonly utilized recursive VAR framework of McCarthy (1999) with Cholesky decomposition, which can work well for industrialized economies, might not be suitable for small open economies to draw conclusion about ERPT. Small open economies are

[1]The inflation targeting period in Turkey is divided into implicit inflation targeting and explicit inflation targeting periods. Implicit inflation targeting period, which covers 2002-2005 years can be considered as a transition period from high inflation environment to low inflation environment as well as the period in which major structural reforms took place to stabilize the economy.

[2]See for instance Kara and Ogunc (2008), Kara and Ogunc (2012), and Yunculer (2011).

different in many aspects than the industrialized countries. For instance, small open economies are exposed to shocks stemming from external (global) factors such as energy prices or FED fund rates but they have no impact on these factors at all; while the domestic variables of large economies can have influence on the external variables. Therefore, the Cholesky approach would not be appropriate for estimation of ERPT in small open economies since this structure assumes that domestic variables can affect external variables.

In estimating the magnitude of pass-through, we use a structural VAR model with block exogeneity feature, which assumes that small open economies such as Turkey have no impact on the external macroeconomic variables but are under exposure of these variables. The results of the structural VAR model suggest that the magnitude of ERPT in Turkey is around 18 percent in 2006m1-2015m6 period but follows a volatile pattern, measured by 72-month rolling windows, over time. Comparison of the Cholesky approach and the structural VAR approach reveals that unreasonable assumptions in the former method might bias the ERPT estimates. We find that in the Cholesky method, in response to an unanticipated depreciation of domestic currency, energy prices in foreign currency declines unreasonably. Since this decline contain some of the inflationary pressures, ERPT estimate is biased downwards. However, when we close the effect of domestic variables on external variables by the block exogeneity assumption, we get more realistic estimate of ERPT. Overall, our paper shows that using recursive identification with the Cholesky approach, which is employed very commonly in the literature, might not be appropriate for the estimation of ERPT in small open economies, as this method assumes unreasonable relationships between domestic and external variables.

The link between inflation targeting (or low inflation) and ERPT has been empirically studied in detail in the literature. For instance, Choudhri and Hakura (2006) find strong evidence of positive and significant association between pass-through and inflation using a panel of 71 countries for the time period of 1979-2000. Edwards (2006) compares the degree of ERPT before and after inflation targeting for selected developed and developing countries. The results indicate a substantial decline in the pass-through after the adoption of inflation targeting. Also Devereux and Yetman (2010) argue that sticky prices represent a key determinant of low exchange rate pass-through. In a panel study of 15 emerging countries, Lopez-Villavicencio and Mignon (2016) reveal that inflation environment matters in the sense that declining ERPT is evidenced with more stable and anti-inflationary environments. Coulibaly and Kempf (2010) suggest that inflation targeting in emerging countries has helped to reduce the pass-through to various price indexes and contribution of exchange rate shocks to price fluctuations declines after adopting inflation targeting.

In this relationship between inflation targeting and ERPT, one mechanism might work through anchoring inflation expectations. The basic underlying idea is that adoption of inflation targeting leads to monetary policy credibility that helps keeping inflation expectations low following a currency depreciation. If firms perceive an increase in the cost following exchange rate depreciation transitory, they can temporarily reduce their markups, do not change prices, and simply wait until the effects of the shock disappear. However, if they perceive exchange rate shocks permanent and persistent, then price change is inevitable even in the presence of the menu cost (Taylor (2000)). It is highly likely that exchange rate shocks are more permanent and persistent in highly inflationary environment than in low inflationary environment.

Although, the recursive VAR is widely utilized in the estimation of the pass-through in the literature, there are also some recent studies using structural VAR models in the estimation including Kucharcukova et al. (2013) for Czech Republic, Jiang and Kim (2013) for China, Peona and Brindisb (2014) for Mexico, Kim (2007) for Korea, and Forero and Vega (2015) for Peru. However, in none of these studies, an empirical comparison between the recursive and the structural VAR are investigated.

The magnitude and duration of exchange rate pass-through in Turkey have also been widely studied. Using monthly data for 1994-2002 period, Leigh and Rossi (2002) estimate an exchange rate pass-through of the size of 40% within one year but most of the effect taking place in the first four months. Similar results are obtained in Alper (2003) for 1987-2003 period. This large pass-through is possibly due to the past currency crisis, high dollarization and high inflation of the period investigated. Using a similar methodology, Kara and Ogunc (2008), Kara and Ogunc (2012), and Yunculer (2011) find that the magnitude of the pass-through has decreased after 2001 economic crisis to about 15%. [3] They attribute this reduction in the pass-through to two important factors, implementation of inflation targeting regime and the decline in the indexation of prices to exchange rate. Using several

[3] These papers also use Cholesky approach and therefore their results are open to possible bias mentioned above.

threshold-VAR models, Arbatli (2003) finds significant asymmetries in the relationship between exchange rate and inflation. In another paper, Kara et al. (2007) analyze the exchange rate pass-through for different exchange rate and monetary policy regimes using time-varying parameters approach and conclude that the monetary and exchange rate regimes might be main determinants of the rate pass through process.

This paper contributes to the literature by utilizing a more realistic framework for the estimation of ERPT in small open economies. We use the structural VAR model with the block exogeneity feature, which allows for the external factors to have contemporaneous impact on the domestic variables of the small open economy, while domestic variables have neither contemporaneous nor lagged impact on external factors. We argue that even though VAR models with the recursive identification could generate interpretable ERPT, these models might not represent small open economies very well and the estimates of ERPT are likely to be biased. Furthermore, we provide updated estimates of ERPT in Turkey for the explicit inflation targeting period and its evolution over time.

The rest of the paper is organized as follows. In the next section we estimate ERPT with a standard VAR model and discuss the results. In section 3, we estimate the ERPT with the SVAR model and compare the results with the results of the recursive VAR model. Final section gives a discussion of the overall results and concluding remarks.

2 VAR Model with Cholesky Decomposition

In this section, we use a simple recursive VAR model with the Cholesky decomposition based on McCarthy (1999). Our aim here is to analyze if this widely used simple model can sufficiently represent Turkey, a small open economy, in terms of not only ERPT but also reactions of the economy to other shocks such as shocks to interest rates and exchange rates. This is particularly important in the sense that such models could generate seemingly reasonable pass-through values while they might also generate unreasonable impulse responses to shocks. If such models fail to reflect the economy well enough, then one should approach cautiously ERPT figures estimated from them.

Following McCarthy (1999), our five-variable recursive model consists of world energy price index ($wepi$), the real GDP (y), exchange rate (Turkish lira value of US dollar) (exc), consumer price index (cpi), and interest rate (i)[4]. This structure is very similar to other studies on Turkey like Kara and Ogunc (2012), and Yunculer (2011). The cyclical component of all variables but interest rate are used in the estimation. We use monthly data and focus on period of January-2006 to June 2015 as the Central Bank of Turkey begins implementing inflation targeting monetary policy in 2006. The details of the data are presented in the Appendix.

We first present the estimated pass-through for the recursive VAR model and display it in Figure 2. Under this model, the pass-through is close to 8% and reaches this level around in one year. This number is close to the figures in other studies, while a bit on the lower bound of the estimates. However, it is very crucial to look at the overall dynamics of the model to see what kind of relationships are generating this pass-through figure. This type of analysis is mostly ignored in other studies and we argue below that there might be potential biases in the pass-through estimates as a result.

We then look at the impulse responses from the model to understand the implied model dynamics. For this purpose, we use exchange rate and interest rate shocks. Interest rate shocks are used to see the overall consistency of the model and exchange rate shocks are used to understand the dynamics behind the pass-through figures. We see that, due to a contractionary monetary policy shock, the recursive model indicates appreciation of the exchange rate and a decline in consumer prices (Figure 3), in line with the economic theory. However the model also generates a positive output gap, which seems counter-intuitive, and energy prices respond to interest rate shock, which is not reasonable given Turkey being a small open economy and have no power to affect the world energy prices.

Next, we look at the impulse responses to an exchange rate depreciation shock in (Figure 4). We see that in response to an unexpected depreciation, consumer prices and interest rates increase and output gap decreases. These seem to be in line with the economic theory, where monetary policy tightens in response to an inflationary shock and output declines. However, there is a very important development on the energy prices side.

The Cholesky decomposition allows an external variable like energy prices to respond to a domestic variable like exchange rates. This is not a reasonable assumption for a small open economy like Turkey, but it might be the case that this assumption would not affect pass-through figures and not

[4]We exclude unprocessed food, beverage and tobacco from the CPI basket because unprocessed food prices display high volatilities and tobacco prices are strictly administrated. So, we work with a core inflation indicator.

generate energy price responses in the data. However, in (Figure 4) we see that energy prices decline in response to an unexpected depreciation of the local currency. When we look at the data itself, after 2013 exchange rate depreciated around 60 percent while energy prices declined more than 40 percent. Therefore, Cholesky model might be capturing this as a relationship since it allows for such dynamics. Then, this fictive relationship would have important implications for the ERPT estimate. In the model, exchange rate depreciation creates inflationary pressures while the decline in energy prices due to the depreciation limits the inflationary pressures. As a result, ERPT figure is biased downward as energy price response is allowed in the model. This analysis shows the importance of looking at the overall dynamics of the related model as the model generates a ERPT figure however structure behind this estimate can contain a lot of counter-intuitive dynamics and unreasonable relationships.

3 Structural VAR Model

3.1 Model and Data

In this section, we estimate ERPT with the structural VAR model which would reflect the economy in a much more realistic way than the Cholesky approach. We borrow the structural VAR model from Kilinc and Cengiz (2014). One of the main features of the model is the block exogeneity feature which decomposes the external factors from the domestic ones and do not allow the domestic factors to influence the external ones neither contemporaneously nor in lag forms. First introduced by Cushman and Zha (1997), the block exogeneity is widely used for small open economies.[5] By closing the response of external variables to domestic variables, the block exogeneity eliminates the bias that arises on the estimation of ERPT under the Cholesky approach.

The model consists of three external $X_e(t)$ and six domestic variables $X_d(t)$. The external variables are energy price index ($wepi$) from World Bank, world industrial production index ($wipi$) from CPB Netherlands Bureau for Economic Policy Analysis, and federal funds rate (ffr) for the Federal Reserve. The domestic variables are the real GDP of Turkey (y), consumer price index (cpi), mone-

[5]For instance see Canova (2005), Mackowiak (2007), Giordani (2004), Franken et al. (2006), Hoffmaister and Roldos (2001), and Sosa and Cashin (2009).

tary aggregate of M2 ($m2$), nominal exchange rate ($/TL) ($exc$), emerging market bond index ($embi$), and overnight interest rate (i).[6] The details of the data are presented in the Appendix.

Defining the economy in the following structural form equation:

$$X(t) = \begin{bmatrix} X_d(t) \\ X_e(t) \end{bmatrix}, \tag{1}$$

$$A(L)X(t) = \varepsilon(t) \tag{2}$$

$$\varepsilon(t) = \begin{bmatrix} \varepsilon_d(t) \\ \varepsilon_e(t) \end{bmatrix}, \tag{3}$$

where $X_d(t)$ is m_1 x 1 vector of domestic variables, and $X_e(t)$ is m_2 x 1 vector of external variables at time t, $A(L)$ is a non-singular m x m matrix in lag operator L, and $\varepsilon(t)$ is m x 1 structural disturbances, we have partitioned the matrices according to the spirit of the block exogeneity assumption in the following way:

$$A(L) = \begin{bmatrix} A_{11}(L) & A_{12}(L) \\ A_{21}(L) & A_{22}(L) \end{bmatrix}, \tag{4}$$

where $A_{21}(L) = 0$ according to the block exogeneity assumption.

The dimension of $A_{11}(L)$ is m_1 x m_1, $A_{12}(L)$ is m_1 x m_2, $A_{22}(L)$ is m_2 x m_2, $\varepsilon_d(t)$ is m_1 x 1, and $\varepsilon_e(t)$ is m_2 x 1. Finally, the structural distributions satisfy the following conditions:

$$E[\varepsilon(t)\varepsilon(t)'|X(t-s), s > 0] = I,\ E[\varepsilon(t)|X(t-s), s > 0] = 0. \tag{5}$$

If we define the reduced form equation (VAR) as

$$B(L)X(t) = u(t), \tag{6}$$

[6] We again exclude unprocessed food and administrative products from the CPI as in the previous section. We take the natural log of $wipi$, $wepi$, gdp, cpi, $m2$, and exc and detrend these variables using HP filter. All other data, ffr, $embi$, and i are left at their level.

then the structural disturbances are related to the reduced form equation residuals by $\varepsilon(t) = A_0 u(t)$.

The details of the identification structure can be found in Kilinc and Cengiz (2014), but we briefly explain some relevant assumptions of the identification structure. As exchange rate is a forward looking variable, it simultaneously reflect all information available in the same period. In other words, exchange rate is affected by all variables within the same period. On the other hand, exchange rate has contemporaneous impact only on the country risky indicator and the domestic interest rate. We also assume that, prices are simultaneously affected by the world energy prices while the effects of the exchange rate and the other variables on the prices takes at least one month.

$$\begin{bmatrix} \varepsilon_{y_t} \\ \varepsilon_{cpi_t} \\ \varepsilon_{m3_t} \\ \varepsilon_{er_t} \\ \varepsilon_{embi_t} \\ \varepsilon_{i_t} \\ \varepsilon_{wcpi_t} \\ \varepsilon_{wipi_t} \\ \varepsilon_{ffr_t} \end{bmatrix} = \begin{bmatrix} a^0_{1,1} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & a^0_{2,2} & 0 & a^0_{2,4} & 0 & 0 & a^0_{2,7} & 0 & 0 \\ 0 & 0 & a^0_{3,3} & 0 & 0 & a^0_{3,6} & 0 & 0 & 0 \\ a^0_{4,1} & a^0_{4,2} & a^0_{4,3} & a^0_{4,4} & a^0_{4,5} & a^0_{4,6} & a^0_{4,7} & a^0_{4,8} & a^0_{4,9} \\ a^0_{5,1} & a^0_{5,2} & 0 & a^0_{5,4} & a^0_{5,5} & a^0_{5,6} & 0 & 0 & a^0_{5,9} \\ 0 & 0 & 0 & a^0_{6,4} & a^0_{6,5} & a^0_{6,6} & 0 & 0 & a^0_{6,9} \\ 0 & 0 & 0 & 0 & 0 & 0 & a^0_{7,7} & a^0_{7,8} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & a^0_{8,8} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & a^0_{9,7} & a^0_{9,8} & a^0_{9,9} \end{bmatrix} \begin{bmatrix} u_{y_t} \\ u_{cpi_t} \\ u_{m3_t} \\ u_{er_t} \\ u_{embi_t} \\ u_{i_t} \\ u_{wcpi_t} \\ u_{wipi_t} \\ u_{ffr_t} \end{bmatrix} \quad (7)$$

3.2 Results

In this part, we look at the estimate of the ERPT and the model dynamics from the structural VAR model with the block exogeneity assumption. In Figure 5) we see that the ERPT reaches to around 15 percent in a year and stabilizes at around 18 percent in two years. The evolution of the pass-through is very similar to the estimate from the Cholesky decomposition while there are significant differences in the levels of ERPT levels between these two methods. This difference could arise from the general dynamics of models as we explain below.

Similar to the VAR model with the Cholesky decomposition, we look at the model dynamics through impulse responses to interest rate and exchange rate shocks. Figure 6 displays the model dynamics to an interest rate shock. We see that the exchange rate appreciates, the consumer prices decline after an initial small increase and the output declines. These behaviors are consistent with the economic theory where a tightening in monetary policy leads to declines in prices and output. Moreover, there are no effects on the external variables by construction. In Figure 7, this time we look at the responses to an exchange rate depreciation shock. Following a currency depreciation shock, the domestic prices increases due to the inflationary pressures from the depreciation. The monetary policy responds by increasing the interest rates and the risk premium also increases slightly. We further observe that the output and monetary aggregate decline in response. These behaviors are also in line with the standard economic theory. Furthermore, again there is no effect on the external variables from the exchange rate shock.

Comparison of model dynamics from the Cholesky decomposition and the structural VAR model becomes very informative about the ERPT. We find that the energy prices respond to exchange rates in the Cholesky decomposition but they are not allowed to this response in the structural VAR model. Furthermore, we see large differences in the magnitude of the ERPT between the two models. The unrealistical decline in the energy prices in response to a depreciation of the local currency in the recursive VAR model with the Cholesky decomposition limits the inflationary pressures on consumer prices. However, this channel is closed by construction in the structural VAR model, and the exchange rate effect is not diluted by unreasonable model assumptions. As a result, we argue that in recursive VAR model with the Cholesky decomposition, ERPT estimate is biased due to unreasonable model dynamics. Then it becomes very crucial to have a realistic model setup to properly estimate ERPT.

After we establish that the structural VAR model with the block exogeneity assumption is a suitable structure and provides proper estimate of ERPT, we look at the evolution of the ERPT in two-year horizon over time in Figure 8. We use 72-month rolling window estimates of the ERPT, where first data covers the period of 2006m1-2011m12 and the last data covers the period of 2009m7-2015m6. In the initial periods, the magnitude of the pass-through was close to 20 percent and afterwards started increasingly significantly. In its peak, ERPT reached to above 28 percent for the period of 2006m7-2012m1. This period covers the strong depreciation episodes of 2006 emerging markets turmoil, 2008-2009 global financial crisis and 2011 European debt crisis. Later on, ERPT decreased to below 20 percent and reached its lowest value of below 14 percent for the period of 2008m9-2014m8. This period included episodes of appreciation after the global financial crisis and low volatility in global financial markets in 2014. Later ERPT started increasing again, and at the end reached to 24 percent for the period of 2009m7-2015m6. This period included the new phase of depreciations in the Turkish lira in end-2014 and beginning of 2015. Overall, from a descriptive perspective, strong depreciation periods seem to coincide with increases in the ERPT. However, a throughout and detailed analysis would be needed to understand the determinants in the cycles and level of ERPT. Even though other studies show that ERPT has declined significantly compared to pre-IT period, it sustained its relatively high level in Turkey compared to other countries. Then, the questions of why the ERPT stays still at high levels, why there is no further declines in it and what determines the cycles and the level in ERPT become important issues for the monetary policy in Turkey.

4 Conclusion

Exchange rate pass through could be an important component of inflationary dynamics in small open economies like Turkey. Then proper estimation of the ERPT figure and investigation of its determinants are crucial research areas for monetary policy analysis. The widely used method for the estimation of ERPT is the recursive VAR approach with the Cholesky decomposition. We show that, by allowing possible effects of domestic variables on external ones, this approach can create unrealistic dynamics across variables and as a result bias the ERPT figure. In the case of Turkey, the impulse responses show that the energy prices would decline unrealistically in response to an unexpected depreciation of domestic currency, and this decline would limit the inflationary pressures from the depreciation. Therefore, under recursive VAR approach with the Cholesky decomposition, the ERPT estimate is biased downwards. Then, we use a structural VAR approach with the block exogeneity assumption and close the effects of the domestic variables on the external variables. The dynamics from this model are consistent with the economic theory and we find that the ERPT is close to 18 percent in Turkey. With such a high ERPT, achieving the price stability target permanently in Turkey becomes a major challenge in a volatile global financial market. Policies targeted at reducing the pass-through level and policies to limit the exchange rate volatility would help the price stability objective greatly.

5 Appendix: Data

World Bank energy price index ($wepi$): The index consists of coal, oil and natural gas and reported by World Bank on monthly bases.

World Industrial Production Index ($wipi$): We obtained the construction-excluded monthly WIPI data from the CPB Netherlands Bureau for Economic Policy Analysis. This index is calculated through the import weight of each economic region. The base year is 2000.

Federal Funds Rate (ffr): We obtained monthly-averaged data on FFR from the Federal Reserve.

GDP of Turkey (gdp): The GDP of Turkey comes from the Turkish Statistical Institute (TurkStat). The data is reported at quarterly frequency. In order to have monthly data, we perform Fernandez (1981) method and use monthly industrial production index to get the monthly GDP data.

CPI of Turkey (cpi): The monthly CPI data is from TurkStat. We use the core index by excluding unprocessed food, beverage and tobacco from the CPI basket because unprocessed food prices display high volatilities and tobacco prices are strictly administrated

M2 of Turkey ($m2$): The M2 data comes from the Central Bank of Turkey.

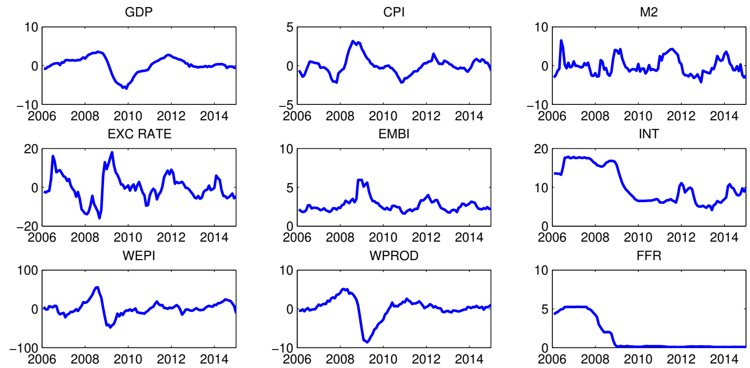
Nominal Exchange Rate (exc): The nominal exchange rate is defined as the equivalence of Turkish Lira in terms of one unit of US dollar ($/TL). The data is obtained from the Central Bank of Turkey.

Emerging Market Bond Index for Turkey ($embi$): The EMBI data comes from the Bloomberg with JPSSGTUR Ticker. Monthly data is calculated through the averages of each month.

Overnight Interest Rate (i) : Our measure of monetary policy rate is overnight repo interest rate obtained from Istanbul Stock Exchange. The monthly data is calculated through calculating the average of each month.

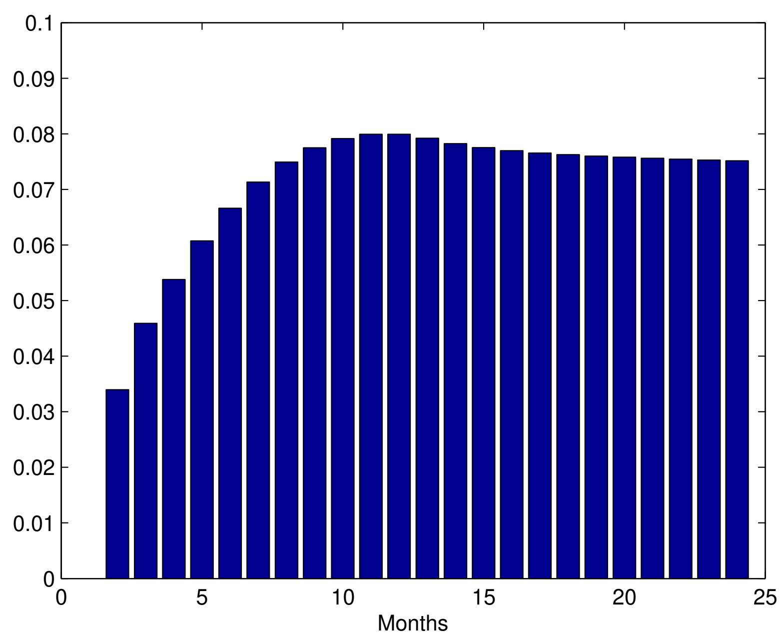
We take the natural logarithm of $wepi$, $wipi$, gdp, cpi, $m3$, and exc. Then we use HP filter to decompose all these variables into trend and cyclical components and use the deviations of the cyclical part from the trend part. We do not use any transformation for ffr, $embi$, and i.

Figure 1: Data



This figure displays the percent log deviations from HP Trend, except for Embi, Domestic Interest, and Fed Funds Rate

Figure 2: ERPT under simple recursive VAR model



This figure displays the cumulative ERPT to domestic prices under the recursive VAR model.

Figure 3: Impulse Responses to Interest Rate Shock under the Recursive Model (Cholesky Decomposition)

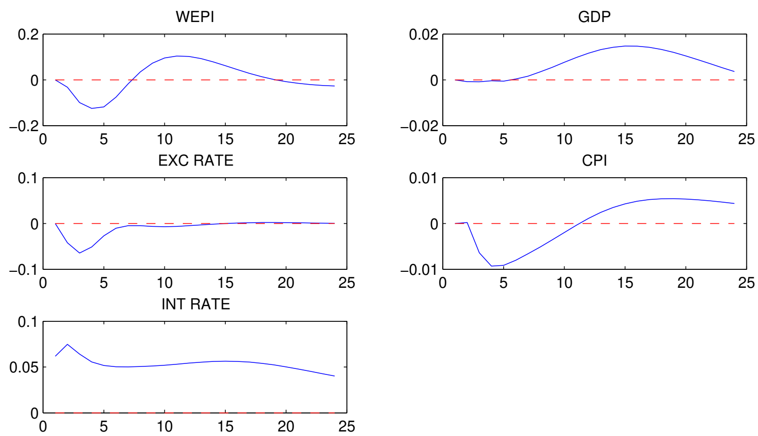


Figure 4: Impulse Responses to Exchange Rate Shock under the Recursive Model (Cholesky Decomposition)

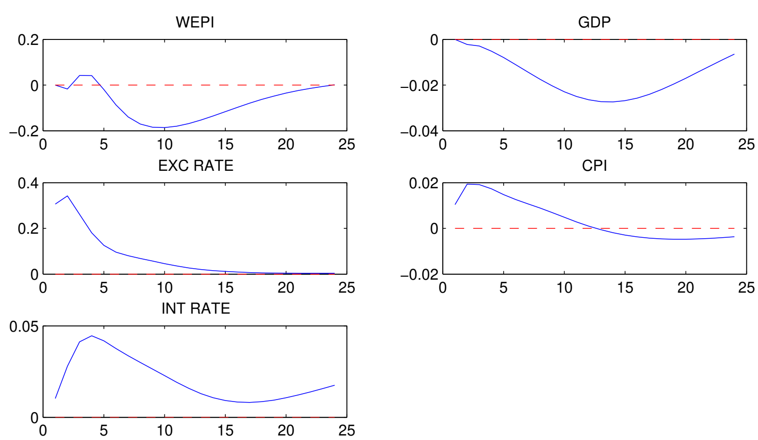
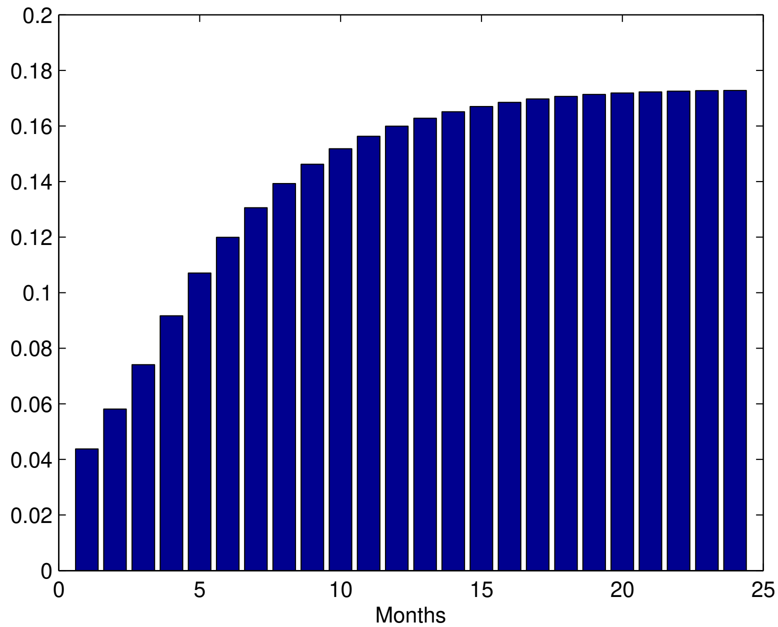


Figure 5: Exchange Rate Pass-Through - SVAR Model



This figure displays the cumulative ERPT to domestic prices under the structural VAR model.

Figure 6: Impulse Responses to Interest Rate Shock under Structural VAR Model with Block Exogeneity

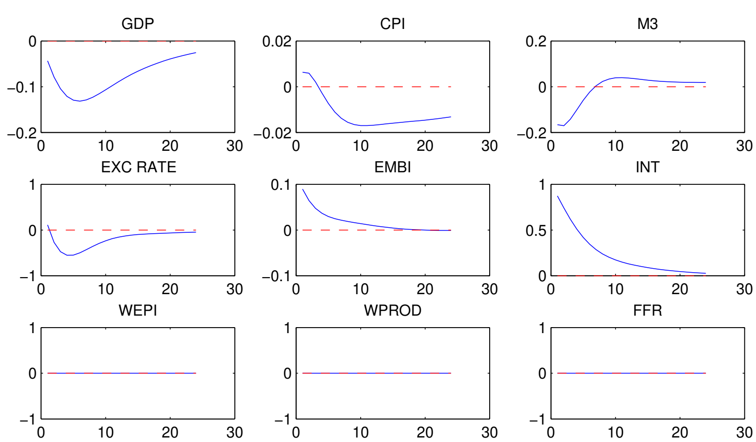


Figure 7: Impulse Responses to Exchange Rate Shock under Structural VAR Model with Block Exogeneity

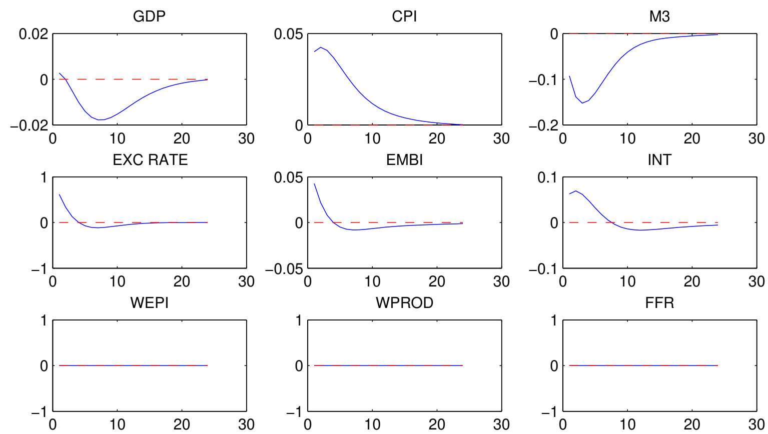
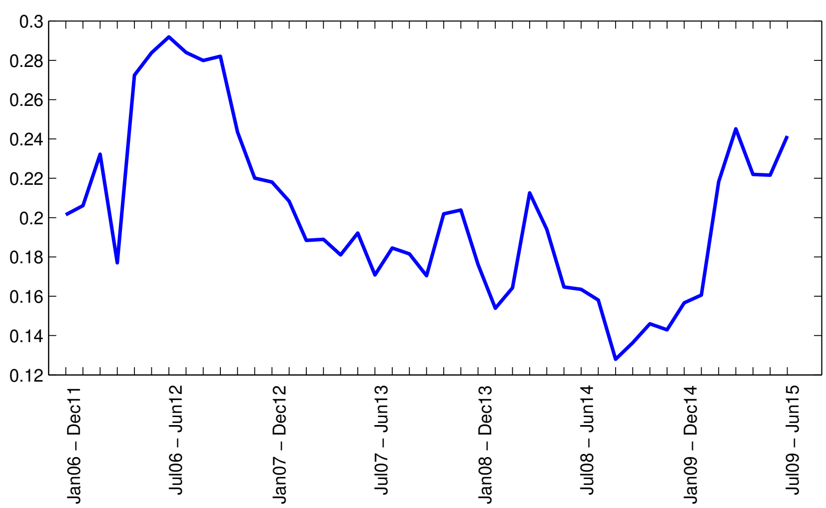


Figure 8: The Evolution of ERPT over-time in Turkey



This figure displays 72-Months interval rolling window cumulative ERPT to domestic prices in two-year horizon. The first period covers 2006m1-20111m12 and the last period covers 2009m7-2015m6.

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