The Evolution of Exchange Rate Pass-Through in Turkey: Does Inflation Targeting Matter?

Dincer Dedeoglu[1a] and Huseyin Kaya[2b*]

Abstract

In this paper, we aim to investigate the behaviour of exchange rate pass-through in Turkey. We examine how the pass-through evolves over time by employing a rolling VAR. We find that the exchange rate pass-through has declined sharply after the adoption of inflation targeting regime. Additionally, we find that the exchange rate has a larger impact on the producer prices than on the consumer prices, and the gap between two impacts has significantly increased after the implementation of inflation targeting.

Keywords: *Exchange Rate, Pass-Through, Rolling Var, Inflation Targeting*
Jel Classifications: *C51, E31, E58*

Introduction

The degree to which changes in the exchange rate are reflected in domestic prices which is known as the exchange rate pass through (ERPT) (Masha and Park, 2012), and it is important for several reasons. For example, the implementation of monetary policy in response to inflationary exchange rate shocks requires information about both the degree and the speed of pass-through of exchange rate to domestic prices. A low ERPT

1a Bahcesehir University, Bahcesehir University, İ.İ.B.F, 34353, Beşiktaş/Istanbul-Turkey, e-mail: dincer.dedeoglu@bahcesehir.edu.tr

2b * Corresponding Author. Bahcesehir University, İ.İ.B.F, 34353, Beşiktaş/Istanbul-Turkey, e-mail:huseyin.kaya@bahcesehir.edu.tr

gives policy makers the opportunity to pursue an independent monetary policy (Choudhri and Hakura, 2006). Furthermore, the degree of integration has increased significantly due to globalization, thus the implementation of stabilization policies depends on both the degree and the speed of pass-through.

There are several numbers of studies on this research area. Among these studies, we can mention Berben (2004), McCarthy (1999) and, Choudhri and Hakura (2006). A growing body of research conducted at central banks as well as in academia has documented that especially after the adoption of inflation targeting (IT) regimes, the pass-through of exchange rate movements into domestic prices have been declining in many countries. Campa and Goldberg (2005), Bailliu and Fujii (2004), Gagnon and Ihrig (2004), Bouakez and Rebei (2007), Choudhri and Hakura (2006), Sekine (2006) and, Kara and Ogunc (2008) are some of the examples focusing in this research area.

This paper contributes to the existent literature on the ERPT by examining the evolution of EPRT in an emerging market; Turkey that began to implement the floating exchange rate regime and the IT after 2001. The paper also presents the evaluation of the gap between ERPT to consumer price index (CPI) and that to producer price index (PPI). The gap provides information about the change in the ability of producers to pass the costs on to consumers.

The rest of the paper is as follows. Section 2 describes our data and methodology. Section 3 introduces estimation method and empirical findings. Section 4 presents conclusion.

Data and Methodology

We use monthly data including average crude oil price, nominal exchange rate relative to US dollar, CPI, PPI and seasonally adjusted industrial production index (IPI) between 1995:04 and 2012:02. Following Kara et al. (2005), 1995:04 is selected as the starting date to avoid the effects of erratic crises in the year of 1994.

The nominal exchange rate relative to US dollar, CPI, PPI, and seasonally adjusted IPI are obtained from the International Financial Statis-

tics, published by the International Monetary Fund. Average crude oil price in terms of the nominal US dollar is obtained from the World Bank's databank. CPI and PPI are seasonally adjusted by using Census X12 method. The output gap is obtained from IPI by using the Hodrick-Prescott filter.

We employ a five variable recursive VAR model following the similar methodology in McCarthy (1999). The ordering of the endogenous variables is as follows: Oil prices, real output, nominal exchange rate against to the US dollar, producer prices and consumer prices.

The methodology relies on a model of pricing along a distribution chain. In this distribution chain, inflation in period t is assumed to comprise several different components. The components are the effects of supply, demand, exchange rate, producer prices and consumer prices shocks at period t based on the available information at the end of the period $t\text{-}1$.

We assume that the dynamics of oil price inflation in local currency enable the identification of supply shocks. The identification of demand shocks is obtained by using the output gap. The exchange rate shocks are identified after taking into account the contemporaneous supply and demand shocks. The structural shocks are removed from the VAR residuals using the Cholesky decomposition of the variance-covariance matrix. The system is as follows:

$$\pi_t^{oil} = E_{t-1}\left(\pi_t^{oil}\right) + \varepsilon_t^{oil} \tag{1}$$

$$\tilde{y}_t = E_{t-1}\left(\tilde{y}_t^{oil}\right) + \varepsilon_t^{oil} + \varepsilon_t^{\tilde{y}} \tag{2}$$

$$\Delta e_t = E_{t-1}(\Delta e_t) + \varepsilon_t^{oil} + \varepsilon_t^{\tilde{y}} + \varepsilon_t^{\Delta e} \tag{3}$$

$$\pi_t^{ppi} = E_{t-1}\left(\pi_t^{ppi}\right) + \varepsilon_t^{oil} + \varepsilon_t^{\tilde{y}} + \varepsilon_t^{\Delta e} + \varepsilon_t^{ppi} \tag{4}$$

$$\pi_t^{cpi} = E_{t-1}\left(\pi_t^{cpi}\right) + \varepsilon_t^{oil} + \varepsilon_t^{\tilde{y}} + \varepsilon_t^{\Delta e} + \varepsilon_t^{ppi} + \varepsilon_t^{cpi} \tag{5}$$

where π_t^{oil} is the oil price (in nominal US dollar), $\tilde{y}_t$ is the output gap, Δe_t is the change in exchange rate (TL/\$), π_t^{ppi} is the producer price inflation rate, π_t^{cpi} is the consumer price inflation rate, $\varepsilon_t^{oil}, \varepsilon_t^{\tilde{y}}, \varepsilon_t^{\Delta e}, \varepsilon_t^{ppi}, \varepsilon_t^{cpi}$ are the oil price inflation, output gap, change in exchange rate, producer price inflation and consumer price inflation rate shocks respectively. E_{t-1} represents the conditional expectation of a variable based on the information

available at time *t-1*. In the estimation process, we incorporate the expectations in the model by using linear projections of the lags of the variables.

Estimation and empirical findings

We estimate a rolling VAR in order to evaluate the change in ERPT. Main advantage of the rolling VAR estimation methodology is that it is an unstructured way of analysing parameter changes and instability over time (De Gregorio et al., 2007). We use a rolling window of 60 months. The first window period is from 1995:04 to 2000:03 and the last one is from 2007:03 to 2012:02. In total, we estimate the VAR on 143 rolling windows.

As in the literature, we derive estimates of the pass-through coefficient from the impulse response functions. The estimates of the ERPT coefficient are calculated as follows;

$$PT_{t,t+s} = \frac{DP_{t,t+s}}{EP_{t,t+s}} \tag{6}$$

where $PT_{t,t+s}$ is the pass-through rate of exchange rate at time horizon s in period t, $DP_{t,t+s}$ is the cumulative impulse response of domestic price to an exchange rate shock at horizon s in period t and $EP_{t,t+s}$ is the cumulative impulse response of exchange rate to an exchange rate shock at horizon s in period t. In the estimation, we allowed for data dependent lag length. In each rolling window, the optimal lag length is determined by the Akaike Information Criterion (AIC). The maximum lag length is chosen as 8.

We plot the estimated ERPT to consumer prices and ERPT to producer prices in Figure 1 and Figure 2 respectively over the 143 windows until 24-months horizon. The ERPT to domestic prices has an increasing trend in the first half of the samples and then suddenly falls in the second half. Within one month, the ERPT to consumer prices never exceeds 9 percent. In the medium and the long term, the ERPT to consumer prices increases up to 50-55 percent, suggesting that one percent increase in the exchange rate increases the consumer prices about 0.50-55 percent at most. Toward the last quarter of the sample period, the ERPT to consumer prices declines to almost 5 percent and remains relatively stable around this

level. This finding is consistent with the conclusion of Kara et al. (2005), Kara and Ogunc (2008). They find that under the floating exchange rate, the ERPT to consumer prices has fallen in Turkey. In addition, Taylor (2000) argues that the decrease of ERPT is due to the decrease in inflation. Accordingly, in Turkey, the yearly inflation has declined from 125 percent in January 1995 to 10 percent in 2004 and to a single digit after 2004[3].

The ERPT to producer prices shows a quite similar pattern. However, the magnitude of ERPT to producer prices is much higher than that to consumer prices. As discussed in Kara and Ogunc (2008), this finding is not surprising, because producers in most sectors use the imported goods, and their pricing behaviour is very sensitive to the movements in the import prices and the exchange rates. On the other hand, the weight of the non-tradable sector in the CPI basket is almost fifty percent and hence, the responsiveness of consumer prices to a change in the exchange rates is lower than that of producer prices.
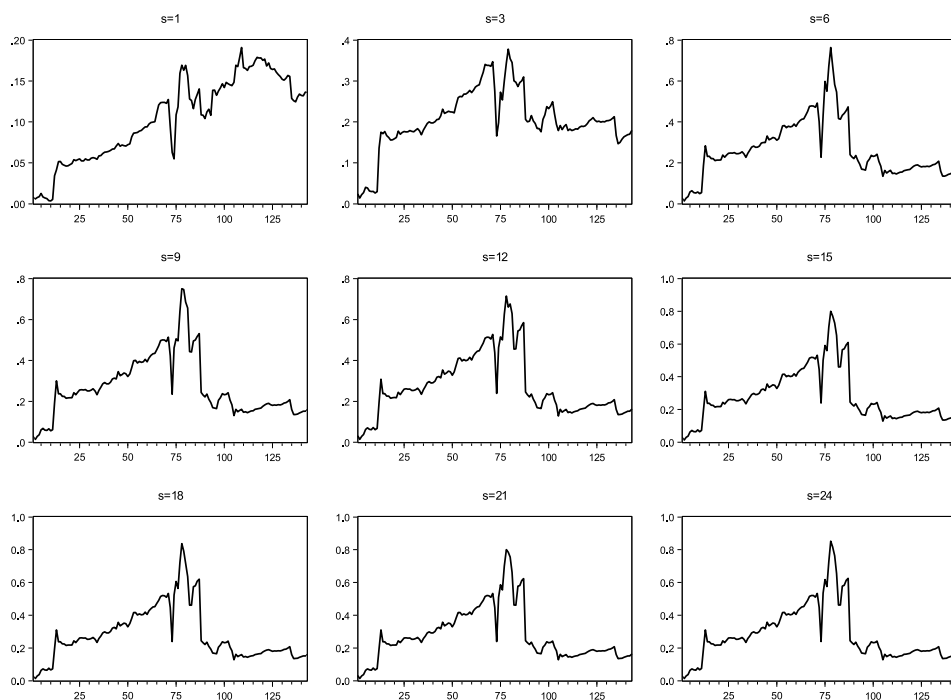
Figure 1: ERPT to CPI

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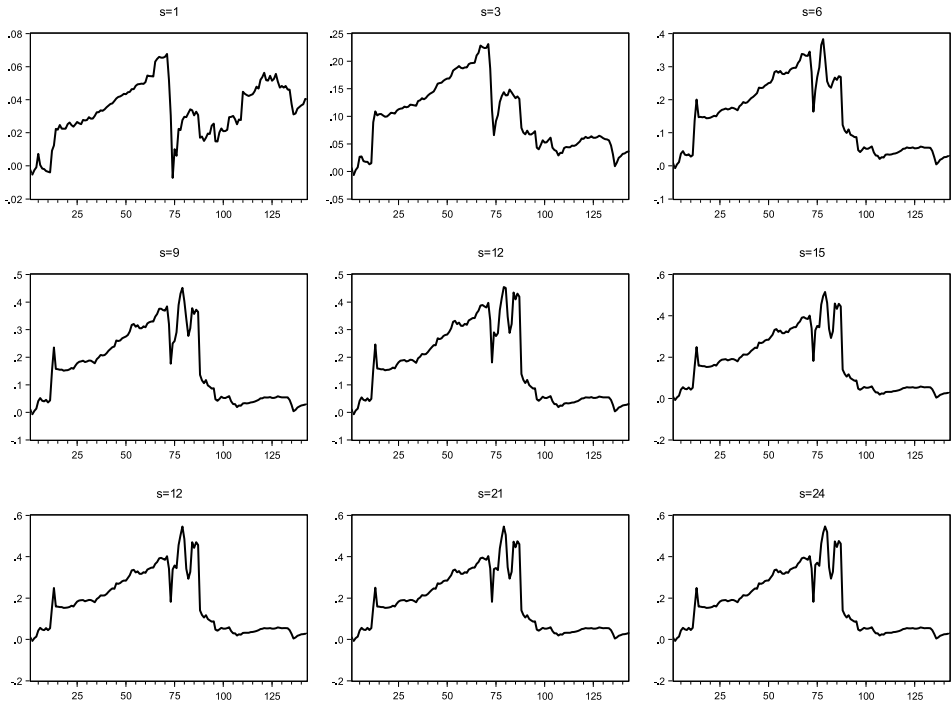
3   For an overview of Turkish economy see Kaya and Yazgan (2011).

Figure 2: ERPT to PPI

In Figure 3, we plot the gap between the pass-through to CPI and to PPI. It is clear that the gap has been increasing. The gap between these two pass-through rates may emanate from the ability of producers to pass the higher costs on to consumer. Taylor (2000) argues that the decrease in the inflation leads to a decline in the pricing power of the firms and they pass through a smaller portion of changes in the costs onto prices. In addition to this, we also note that under the IT regime, central banks usually set target on the consumer prices and can take action to reduce the producer prices pass-through to the consumer prices. Accordingly, an apparent upward shift in the gap coincides with the implementation of IT.

Figure 3: The gap between ERPT to CPI an ERPT to PPI
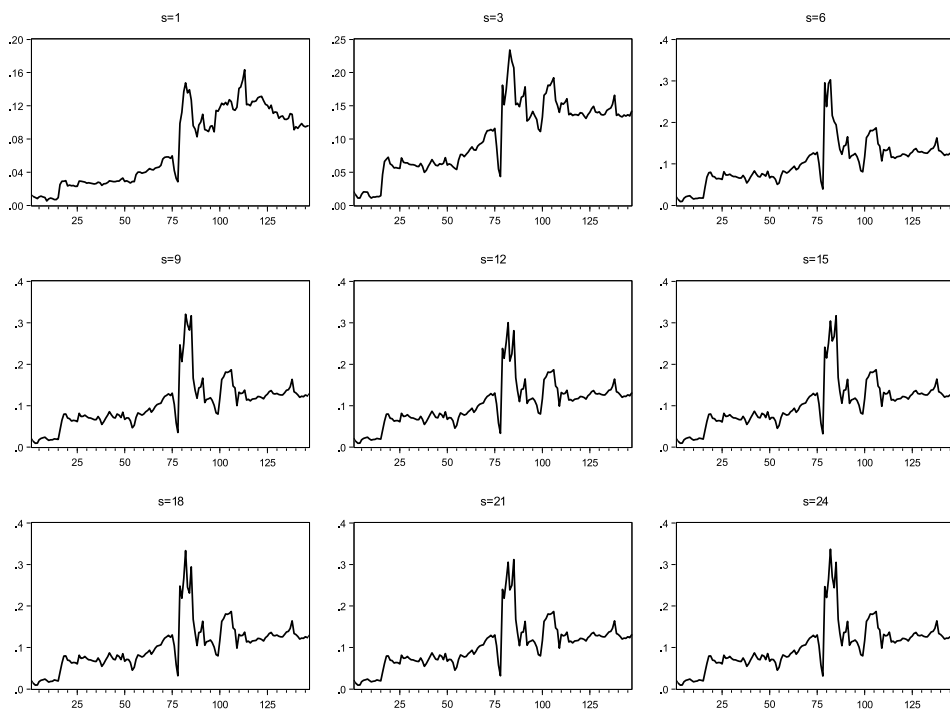
Conclusion

By employing a rolling VAR framework, the evolution of exchange rate pass-through has been examined over the period between April 1995 and February 2012. We find that in the early parts of this period, ERPT had an increasing trend. However, with the adoption of IT, it suddenly decreased and has been decreasing since then. The results also suggest that the gap between pass-through to consumer prices and that to producer prices shifts upward in the IT period. This suggests a decrease in the ability of producers to pass the higher costs on to consumers. Overall, we find that the disinflation period and the implementation of the IT regime appear to play a significant role in the dynamics of ERPT in Turkey.

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