

Box 3.2

The Use of Imported Inputs and Pass-through Effects

In emerging economies, the exchange rate pass-through can be affected by factors such as the degree of openness of the economy, the inflation outlook, exchange rate volatility, the current account deficit and the direction and size of exchange rate movements. Moreover, the extent of the exchange rate pass-through to price indices can also vary across subcategories. For example, the exchange rate pass-through to prices can be relatively lower for services products, non-tradable goods or products with relatively low import content, compared to tradable goods or products with higher import content. Therefore, analysis of pass-through using general price indices might mask some crucial information hidden in the details.

Import prices can affect final consumer prices both directly and indirectly through imported final consumer goods and imported intermediate goods. As far as direct effects are concerned, a rise in import prices would be fully passed through to prices of imported consumer goods, while the pass-through of imported input prices to producer prices is expected to be proportional to the share of imported inputs in total costs. However, the extent of the pass-through can be affected by market conditions and competition, and also may differ across countries. For instance, according to Ahn et al. (2017) in their analysis of the short and medium-term pass-through of imported input prices to producer prices by sectors, the pass-through of imported input price shocks to producer prices is lower than the share of imported inputs in cost in Korea, but equals this share in European countries. On the other hand, in a study by Auer and Mehrotra (2014), which demonstrates that the use of imported inputs affects the sensitivity of costs to exchange rates, it was found that the share of imported inputs in total cost increased between 1998 and 2008 in Asia Pacific countries and the impact of the exchange rate depreciation on producer prices varied depending on the use of imported inputs.

This box, in the spirit of Auer and Mehrotra (2014) and Ahn et al. (2017), estimates the effect of imported input price increases on domestic producer prices by sectors in Turkey. However, unlike the above studies, the analysis separates USD-denominated import prices and the USD/TL exchange rate, which together determine the import prices in local currency.¹ We compare the pass-through coefficients calculated for each of these variables with the intensity of sector-level imported input use², and then examine if the degree of pass-through effects is proportional to their shares in cost.

Empirical Analysis Method

The empirical framework for estimating pass-through is based on a Vector Autoregression (VAR) model. The variables are USD-denominated import prices, the USD/TL exchange rate, the output gap and the D-PPI. The model is estimated separately for each sector utilizing monthly data between 2010:01 and 2017:12. The import price index in USD and the output gap are estimated on a sectoral basis.³ D-PPI and import prices are seasonally adjusted. Except the output gap, all the variables are in monthly changes.

The ordering of the variables and the identification of shocks in the impulse-response analysis are based on Cholesky decomposition. Accordingly, import prices are assumed to be the most exogenous variable, which is followed by the USD/TL exchange rate, the output gap and D-PPI, respectively. The shock for the variable at a particular stage is the part of that variable that cannot be explained by shocks of previous stages and information at period $t-1$. In the model, the variables that are in the lower stages do not affect the preceding variables contemporaneously but only with a lag. Against this background, the model can be stated as follows:

$$IMP_{i,t} = E_{i,t-1}(IMP_{i,t}) + \varepsilon_{i,t}^{IMP} \quad (1)$$

$$EXC_t = E_{i,t-1}(EXC_t) + \alpha_{1,i}\varepsilon_{i,t}^{IMP} + \varepsilon_{i,t}^{EXC} \quad (2)$$

$$GAP_{i,t} = E_{i,t-1}(GAP_{i,t}) + \beta_{1,i}\varepsilon_{i,t}^{IMP} + \beta_{2,i}\varepsilon_{i,t}^{EXC} + \varepsilon_{i,t}^{GAP} \quad (3)$$

$$PPI_{i,t} = E_{i,t-1}(PPI_{i,t}) + \delta_{1,i}\varepsilon_{i,t}^{IMP} + \delta_{2,i}\varepsilon_{i,t}^{EXC} + \delta_{3,i}\varepsilon_{i,t}^{GAP} + \varepsilon_{i,t}^{PPI} \quad (4)$$

Here, *IMP* denotes the import price index; *EXC* is the USD/TL rate, *GAP* represents the output gap and *PPI* stands for the D-PPI. $E_{t-1}(\cdot)$ denotes the expected value of the respective variable based on the information set available at the end of period $t-1$. $\varepsilon_{i,t}^{IMP}$, $\varepsilon_{i,t}^{EXC}$, $\varepsilon_{i,t}^{GAP}$ and $\varepsilon_{i,t}^{PPI}$ represent shocks to import price index, the exchange rate, output gap and D-PPI, respectively. Finally, i stands for the relevant industrial sector and t denotes time.⁴

Empirical Findings

The estimation results show that the long-term pass-through coefficients for import prices and exchange rates differ drastically across industrial sectors. The import price pass-through coefficient may reach as high as 70 percent, while the exchange rate pass-through can range from 5 to 107 percent. The manufacture of coking coal and refined petroleum products has the highest values for both pass-through coefficients, while it has the highest intensity of imported input use.

The diversification of the degree of import price and exchange rate pass-through across sectors seem to be positively related to the intensity of imported input use (Chart 1). Given only the cost channel, the pass-through of both exchange rate and USD-denominated import prices should be proportional to the share of imported inputs in total cost. Thus, the pass-through from import prices has a linear relationship with the use of imported inputs, whereas the pass-through from exchange rate is higher than the share of imported input use.

As shown in Chart 1, the exchange rate pass-through is much higher than the import price pass-through in many sectors. This can be attributed to the presence of factors other than production costs, such as FX liabilities and investment costs, which affect pricing and a firm's balance sheet. Moreover, the persistence and volatility of shocks are key determinants of the pass-through of cost shocks to prices (Taylor, 2000). In the analyzed period, commodity prices were more moderate than before the financial crisis of 2008; thus, another reason for the higher pass-through from exchange rate than that from import prices could be the gradual weakening of the Turkish lira, especially with the heightened uncertainty about global monetary policies and when the US Federal Reserve signaled a tapering of its asset purchases after May 2013. Lastly, the level of competition and the resulting profit margins are among other factors that may affect this relationship. In sum, the findings reveal that exchange rates affect inflation not only through the cost channel but also through expectations, type of financing, market structure, etc.

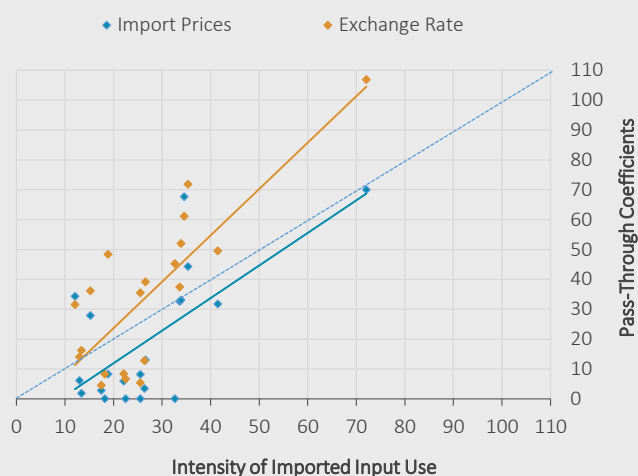
¹ Previous pass-through studies carried out at the CBRT have shown that the degree and speed of the pass-through to prices might be different for import prices and exchange rates, and therefore, combining them would cause an aggregation bias in coefficients (Yüncüler, 2011; Kara and Ögünç, 2012, Özmen and Topaloğlu, 2017). Thus, decomposition of these effects is deemed to be useful for enriching the information content.

² The intensity of imported input use is calculated by dividing the value of imported inputs in the domestic use table for 2012 by the sum of total intermediate consumption and compensation of employees.

³ For each sector, the imported input price index is calculated by weighting sectoral import unit value indices with the relevant shares in the imported input use table from the input/output tables for 2012. Sectoral output gap is obtained by applying the Hodrick-Prescott filter to sectoral production indices.

⁴ The shocks are assumed to be serially uncorrelated and orthogonal across equations. The model can be estimated by VAR after replacing expected values of each variable with the linear projections of the lagged values of all variables. The lag length is set individually for each sector by lag length selection tests.

Chart 1: Use of Imported Inputs and Pass-Through Coefficients by Sectors* (%)



* The dotted line is the 45-degree line while the solid lines show the linear relationship between the intensity of imported input use and pass-through coefficients.

To sum up, this study finds empirical evidence that the domestic producer prices are more likely to be exposed to exogenous shocks as the use of imported inputs increases. Estimations based on input/output tables show that the use of imported inputs has increased over years in Turkish manufacturing industry. This suggests that the cost pressure from exchange rates and import prices has increased over time. Adopting policies to reduce the share of imported inputs is critical to narrowing the structural current account deficit as well as to enhancing the effectiveness of monetary policy and creating more room for maneuver to fight against inflation.

References

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