Box 1.1

Decomposing Supply and Demand Shocks Affecting Inflation

The pandemic affected some sectors such as transportation, entertainment, and services, where social contact is relatively high, more negatively than others. The pandemic caused both a negative supply shock, which limited the capacity of economies to produce goods and services at a specific price, and a negative demand shock, which reduced consumers' willingness or ability to purchase goods or services at a specific price.[1] These different shocks that emerged at the same time may have had different effects on inflation dynamics. For example, fundamental supply shocks such as technology shock, inter-sectoral production shock, change in pricing behavior, labor supply shock, labor productivity shock, and disruptions in the supply chain restrict economic activity and cause inflationary pressures. In addition, adverse demand-side shocks such as a decrease in domestic demand, a change in consumption preferences between sectors, and a contraction in global demand put pressure on prices to fall. Understanding how supply and demand-side shocks affect global inflation has recently gained great importance, especially in academia and central banks. This box includes the main methods that decompose the effects of supply and demand shocks on inflation and the current results obtained using these methods.

Since Sims (1980) introduced vector autoregression (VAR) models in the article "Macroeconomics and Reality," VAR models have been one of the most widely used models in the field of empirical macroeconomics. A significant output from VAR models is the historical decomposition results of shocks. This method allows the all-time series in VAR to be expressed as the sum of different shocks and an exogenous variable. In other words, by summing the contributions of all shocks at any time “t”, the original time series at time “t” can be obtained. Also, historical decomposition allows determination of how much of an endogenous variable's deviation from the mean is due to a particular shock.

However, the Bayesian VAR (BVAR) model can also be preferred in decomposing the effects of shocks because of the necessity of making strong assumptions or calibrations about parameter values in VAR models. BVAR models differ from standard VAR models in that the model parameters are treated as random variables with a predetermined probability distribution instead of fixed values. Due to the limited number macroeconomic data sets compared to the number of parameters, BVAR models have become an essential method of eliminating the need to make rigid assumptions or calibrations about parameters. In addition, while running BVAR models, sign restrictions are determined and reflected in the model by the theory or expectations. BVAR models have recently been widely used to decompose supply and demand shocks. For example, the European Central Bank published the results of the BVAR model operated under sign restrictions in its report in September 2021. According to this report, the effects of inflationary supply shocks on Eurozone inflation in the second quarter of 2020 are more substantial than the effects of disinflationary demand shocks. This report also shows that the pandemic's effects were felt more intensely in sectors that are more exposed to supply constraints. Likewise, the number of studies on the decomposition of shocks has been increasing recently in developing countries. For example, for Mexico, the effects of sectoral supply and demand shocks on economic activity are shown using BVAR models with sign restrictions (Chavarin et al., 2021). According to this study, while it was found that the demand shock had more substantial effects in many sectors at the beginning of the pandemic, it was shown that, despite the positive effects of demand shocks in the later stages of the pandemic, supply constraints began to affect many sectors negatively, especially the manufacturing sector.

[1] While it is observed that the pandemic caused an increase in demand in some sectors, such as durable consumer goods, the aggregate demand shock is considered to be harmful when viewed from the point of view of aggregate demand.

In addition to these, Dynamic Stochastic General Equilibrium (DSGE) models are also used in the historical decomposition of shocks. These models, unlike VAR models, rely on general equilibrium theory and microeconomic principles to relate variables. For example, model-based estimates have shown how different shocks affect Eurozone consumer price inflation from the first quarter of 2000 to the first quarter of 2021 (Cardani et al., 2021). Temporary quarantine measures have been found to have little effect on inflation. While demand and international trade shocks have a disinflationary effect, supply-side shocks have been shown to have had substantial inflationary effects in the later stages of the epidemic, especially from the second quarter of 2020. In addition, by adding the dynamics related to the pandemic, temporary demand shocks, and supply shocks to the New York Fed DSGE model, and using the most recent data, the new forecasts are reported by comparing the previous forecasts of the model (Chen et al., 2021). The model to which pandemic dynamics is added gives a higher inflation forecast than the other model. In September 2021 forecasts, it was stated that cost shocks caused higher inflation projections.

Supply constraints, such as increases in import prices and disruptions in supply processes, also play a role in the rise of inflation in the Turkish economy. In this context, analyzes are made with different model approaches summarized above using domestic and international supply, demand, and cost indicators. The results indicate that more than one shock has been influential in the rise of inflation in the last year. The increase in commodity prices and the supply constraints caused by the supply-demand mismatch that emerged in the post-pandemic period play an essential role in inflation dynamics.

References

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