Exchange rate pass-through: estimates from local projections

Using local projection models, this box estimates the pass-through of exchange rate variations to headline inflation, as measured by the Extended National Consumer Price Index (IPCA), as well as to several of its components. The central estimates indicate sizable but heterogeneous exchange rate pass-through effects across the IPCA components. Among market prices, for instance, higher effects are seen in food-at-home and industrial goods, while the pass-through to services is close to zero. However, given the uncertainty associated with the estimates, the results should be interpreted with caution.

Introduction

The significant movements observed in the exchange rate over the past two years – with a BRL depreciation throughout 2024, followed by an appreciation during 2025 – have renewed attention to the potential effects of these variations on inflation. In episodes of this nature, it becomes essential to consider both the magnitude and the speed at which changes in the exchange rate are transmitted to domestic prices.

This box estimates the exchange rate pass-through to inflation using local projection models, a methodology that allows for directly measuring the response of inflation to exchange rate shocks throughout different horizons. The analysis is conducted for the IPCA headline index and for several analytical series derived from it – such as administered prices, services, food-at-home, industrial goods, and core inflation measures.

The central estimates indicate sizable but heterogeneous exchange rate pass-through effects across the different IPCA components. However, given the high degree of uncertainty associated with these estimates, the results should be interpreted with due caution.

Methodology

The exchange rate pass-through coefficients are estimated using local projection models, based on monthly observations from July 2006 to December 2025. The specification for horizon h is given by:

$$p_{t+h} - p_{t-1} = \phi^h \Delta e_t + \gamma_0^h + \gamma_1^h \Delta e_{t-1} + \gamma_2^h \Delta ICBr_t + \gamma_3^h \Delta ICBr_{t-1} + \gamma_4^h \, (u_t - u_t^*) + \gamma_5^h IPPCV_t + \gamma_6^h IPPCV_{t-1} + \gamma_7^h \Delta p_{t-1} + \varepsilon_t$$

where p_t denotes the price level, in month t, of the inflation measure under analysis, seasonally adjusted; e_t represents the monthly average of the USD/BRL exchange rate in t; $ICBr_t$ and corresponds to the price level of the BCB's Commodities Index – Brazil (IC–Br)[1] in t. The three variables – p_t, e_t and $ICBr_t$ – are expressed in natural logarithms, so that their absolute monthly change, indicated by the difference operator Δ, approximately corresponds to the percentage change of the variable.

1/ Given the negative correlation frequently observed between commodity prices and the USD/BRL exchange rate, the estimated exchange rate pass-through coefficients would tend to be biased downward if a commodity price index were not included as a control variable. Intuitively, in the absence of this control, the coefficient associated with the exchange rate would capture not only the exchange rate pass-through itself, but also the impact of commodity prices on inflation, which tends to offset part of the exchange rate effect. For a more detailed discussion, see box *Influência dos Preços de Commodities sobre o Repasse Cambial* in the March 2015 Inflation Report (IR) (Portuguese only).

In addition to these variables, the estimation includes IPPCV_t, which represents the pressure index in Brazilian supply chains in t [2], and ω_t, a monthly proxy for the degree of slack in the economy.[3] Finally, ε_t represents the unobserved error term.

The parameters ϕ^h and γ_i^h, for $i = 1, 2, \ldots, 7$, are estimated by ordinary least squares (OLS) for each horizon h between 0 and 24 months, using heteroscedasticity-robust standard errors. The parameter of interest is ϕ^h, which measures the cumulative exchange rate pass-through over horizon h. More precisely, ϕ^h quantifies the expected increase, in percentage points, of accumulated inflation between t and $t + h$ after a 1% depreciation of the exchange rate at t. For example, if $\phi^h = 0{,}1$, a 10% depreciation would imply a 1 percentage point (p.p.) increase in accumulated inflation.

Results

Figures 1 to 6 present the exchange rate pass-through coefficients for the headline IPCA, administered prices, market prices, and the three market price segments (services, food-at-home, and industrial goods). Each figure displays both the point estimates and the 90% confidence intervals (CI).

Initially, it can be seen that, in all cases, the CI are quite wide, indicating substantial uncertainty surrounding the estimates. Accordingly, the central results should be interpreted with due caution.

Figure 1 – IPCA
Cumulative exchange rate pass-through, by horizon

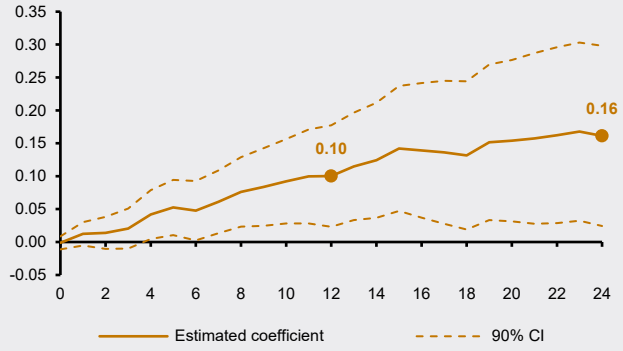


Figure 2 – Administered prices
Cumulative exchange rate pass-through, by horizon

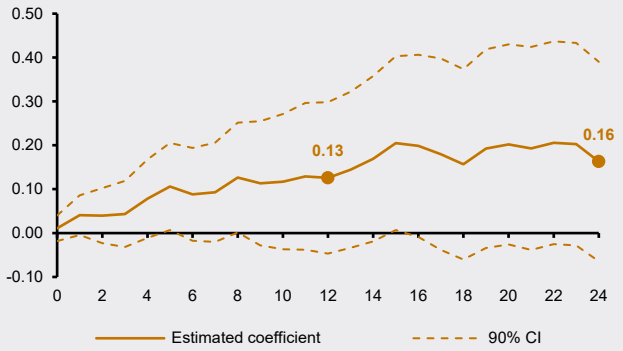


Figure 3 – Market prices
Cumulative exchange rate pass-through, by horizon

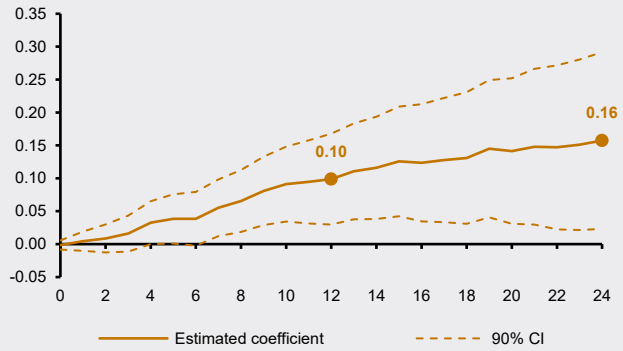
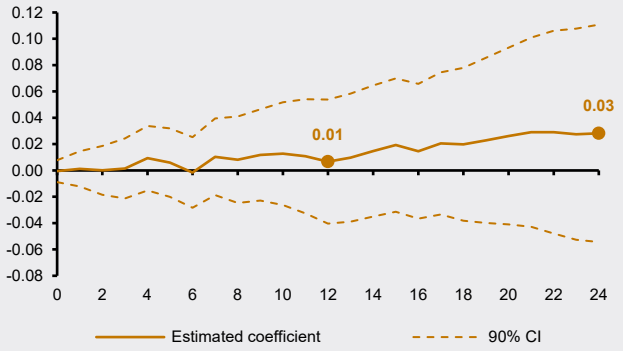


Figure 4 – Services
Cumulative exchange rate pass-through, by horizon



2/ This pressure index was presented in the box Brazilian supply chains pressure index in the September 2022 IR. Its inclusion in the regressions aims to control for the effects associated with disruptions in global production chains, which became particularly relevant during the pandemic.

3/ The output gap estimates monitored by the Banco Central do Brasil (BCB), and regularly updated in boxes of the Inflation Reports (IR) through 2024 and of the Monetary Policy Reports (MPR) starting in 2025, are calculated at a quarterly frequency. To obtain a monthly measure of slack, this box relies on the unemployment gap estimated according to the methodology of Santos and Sabbadini (2025), which is based on services inflation and labor market data. As highlighted in Chapter 2 of this MPR, there is substantial uncertainty surrounding any measure of slack, which is why the Copom assesses its projections using different estimates and scenarios for this variable.

Figure 5 – Food-at-home
Cumulative exchange rate pass-through, by horizon

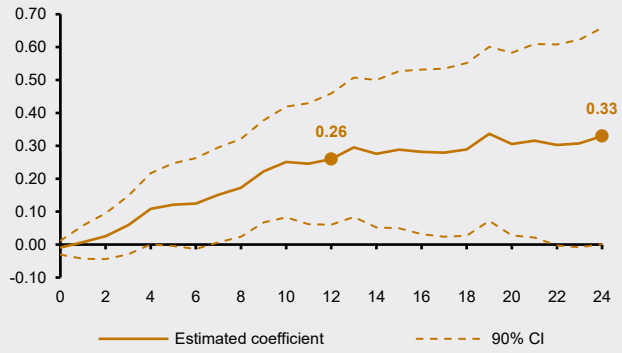
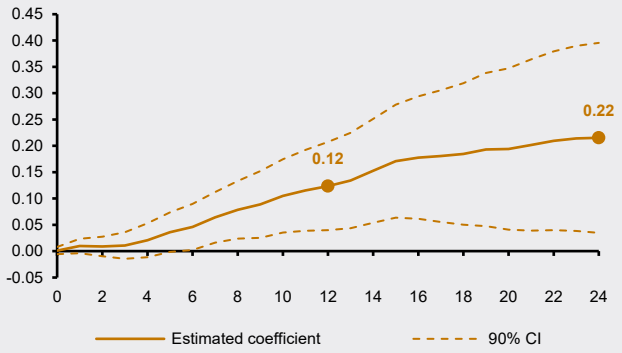


Figure 6 – Industrial goods
Cumulative exchange rate pass-through, by horizon



Regarding the point estimates, coefficients of 0.10 and 0.16 are obtained for the headline index at the 12- and 24-month horizons, respectively. Thus, a 10% BRL depreciation would imply increases of 1 p.p. in accumulated inflation over the subsequent 12 months and 1.6 p.p. over the 24-month period. The central estimates for administered and market prices are quite close to those for the headline IPCA. However, in the case of administered prices, given the higher degree of uncertainty, the estimates are not statistically significant for most horizons. The BCB's small-scale semi-structural models, both in their aggregate and disaggregated versions, suggest an exchange rate pass-through coefficient of 0.10 for the headline IPCA at the four-quarter horizon – the same value as the estimate reported in Figure 1 – but with a higher coefficient for administered prices (0.18) and a lower one for market prices (0.07), respectively.[4]

The pass-through coefficients for market price segments are heterogeneous. On the one hand, the estimated exchange rate pass-through for services is very close to zero, and it is not possible to rule out that it is, in practice, null. On the other hand, substantial pass-through effects are estimated for industrial goods and, especially, for food-at-home. In the case of food, the pass-through is not only intense but also quite fast: in the 12-month horizon, the coefficient is 0.26, which represents almost 80% of the cumulative pass-through over 24 months (0.33). Even so, given the particularly high uncertainty in this segment, additional caution is recommended when interpreting these results. These estimates for market price segments are qualitatively similar to those obtained from the disaggregated version of the BCB's small-scale semi-structural model, which also suggests low pass-through for services and high coefficients for industrial goods and, most notably, for food-at-home.[5]

The exchange-rate pass-through was also estimated for the average of the core inflation measures.[6] The estimated coefficients, shown in Figure 7, indicate sizable pass-through, reinforcing the interpretation that the exchange rate has an important effect on the inflation process. However, the coefficients obtained for the average of the core measures are smaller than those estimated for the headline IPCA. This result may stem from the lower sensitivity of the core measures to the volatile components of the IPCA, which are possibly more influenced by exchange rate changes. In particular, the EX0 and EX3 core measures exclude components of food-at-home, a segment for which the estimated exchange rate pass-through is high (Figure 5).

It is interesting to note that lower pass-through coefficients appear not only in the core average, but also in each of the five core measures that comprise it. This result can be seen in Figure 8, which presents the

4/ See box Updating the model for the medium-term projection of administered prices in the June 2025 MPR, which presents exchange rate pass-through coefficients for both market and administered prices. It should be noted that the model for administered prices discussed in this box is generally not based on estimated equations, but rather on calibrations anchored in the prevailing institutional framework. Therefore, while these calibrations seek to reflect price behavior under the current regime, the empirical exercises presented here capture an average effect over the sample, which may encompass different institutional regimes.
5/ See box Updating of small-scale semi-structural models in the June 2024 IR.
6/ The core average is calculated as a simple average of the monthly changes of five IPCA core measures: EX0, EX3, the smoothed trimmed mean core (MS), the double-weighted core (DP), and the 55th percentile (P55). For more details, see box Update of the set of core inflation measures commonly considered by the BCB for economic outlook analysis in the June 2020 IR.

coefficients of these core measures at the 12-month horizon. The coefficients are lower than that of the headline IPCA and exhibit similar magnitudes – a nontrivial result, considering that these core measures follow quite distinct calculation methodologies.[7]

Figure 7 – Average of core inflation measures
Cumulative exchange rate pass-through, by horizon

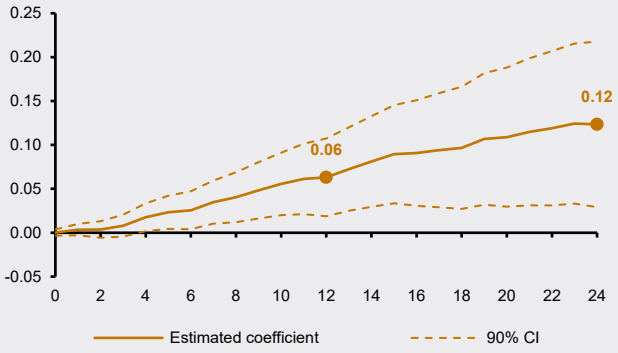
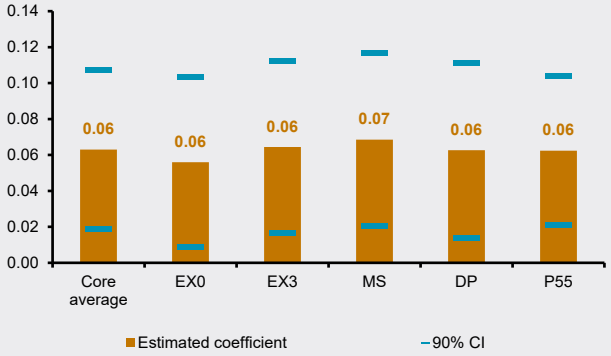


Figure 8 – Core inflation measures
12-month cumulative exchange rate pass-through



Analogous results can be observed in Figures 9 and 10, which examine in greater detail the two segments with the highest estimated pass-through – industrial goods and food-at-home – presenting the coefficients for some of their subcomponents in the 12-month horizon. In both cases, the estimated pass-through for the core measure of each segment[8] is lower than that estimated for its aggregate, in line with the pattern observed for the headline IPCA.

Figure 9 – Industrial goods and components
12-month cumulative exchange rate pass-through

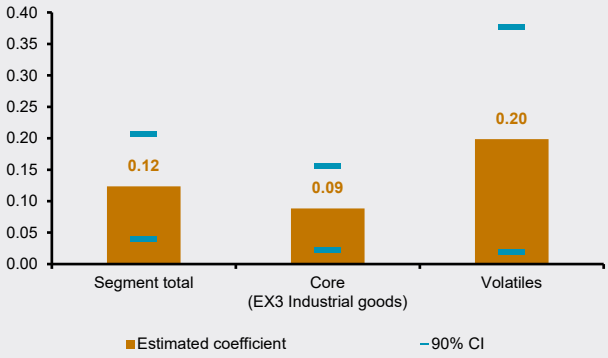
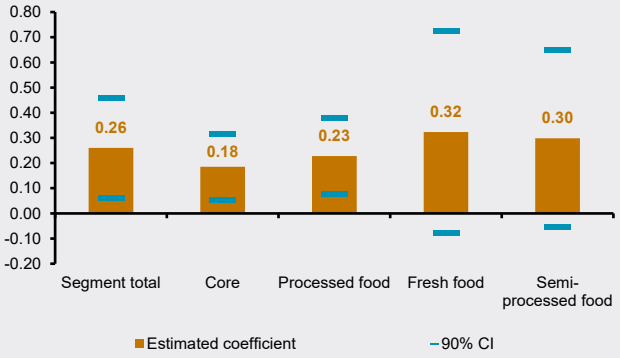


Figure 10 – Food-at-home and components
12-month cumulative exchange rate pass-through



In the case of industrial goods, in contrast with the lower pass-through obtained for the core measure (EX3 Industrial goods), a higher coefficient is estimated for goods with volatile prices. For food-at-home, coefficients are also estimated for the breakdown of the segment into processed, fresh, and semi-processed foods. Coefficients are high in all cases. The central results are particularly elevated for fresh and semi-processed foods, although they are not statistically significant.

The analyses presented so far considered the decomposition of market price products into services, food-at-home, and industrial goods. Although this segmentation is the most commonly adopted in outlook analysis, such as in this MPR, it is not the only possible breakdown. Alternatively, the market price segment may be decomposed into services, durable goods, semi-durable goods, and non-durable goods; or, similarly, into tradable and non-tradable products. Figures 11 and 12 show the pass-through coefficients estimated for these alternative segmentations, at the 12-month horizon.

7/ For more details on these methodologies, see the Technical Note *Núcleos de inflação e outras séries analíticas derivadas do IPCA: metodologia consolidada* (Portuguese only), published in December 2025.
8/ The food-at-home core in this case comprises the six food-at-home items that are included in the EX1 core: (i) flours, starches, and pasta; (ii) processed meats and fish; (iii) baked goods; (iv) beverages and infusions; (v) canned and preserved foods; and (vi) salt and condiments.

Figure 11 – Durables, semi-durables and non-durables
12-month cumulative exchange rate pass-through

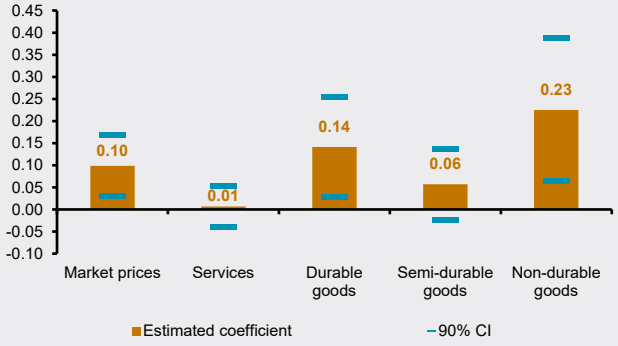
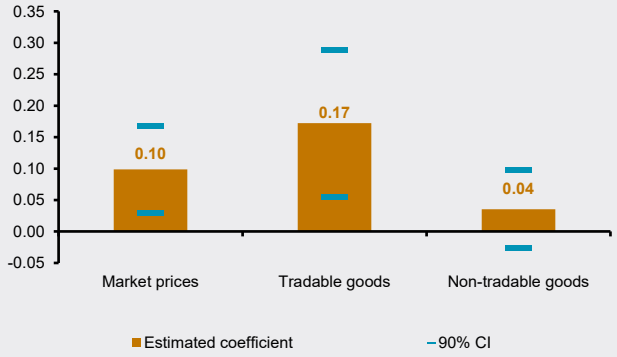


Figure 12 – Tradables and non-tradables
12-month cumulative exchange rate pass-through



Compared with the aggregate of market price goods, the estimated pass-through is slightly higher for durable goods, while it is slightly lower for semi-durables. The point estimate is substantially higher for non-durable goods, possibly reflecting the stronger pass-through observed in food-at-home (Figures 5 and 10), whose components fall into that category. However, as in the case for food–at–home, the uncertainty associated with these exchange rate pass-through estimates is particularly high, which precludes definitive conclusions.

Finally, in the segmentation between tradable and non-tradable goods, the estimated pass-through is higher for the former than for the latter. This is an expected result, given that the non-tradable group includes products with low export or import potential (such as services), while the tradable group comprises market price components that are more subject to external conditions.

Conclusion

The central estimates indicate sizable but heterogeneous exchange rate pass-through effects across the different IPCA components. For the headline index, the estimated coefficients stand at 0.10 and 0.16 over the 12- and 24-month horizons, respectively, while the average of the core measures shows more moderate, though still relevant, pass-through. Higher values are observed for industrial goods and, especially, for food-at-home, a segment in which the estimated pass-through is both strong and relatively fast. In contrast, the pass-through to services is very close to zero, consistent with the inherently lower sensitivity of this segment to exchange-rate movements.

Despite these patterns, the analysis reveals wide confidence intervals in all cases, indicating a high degree of uncertainty surrounding the estimates. Moreover, different approaches – such as structural models, semi-structural models, vector autoregressive models (VARs), or alternative specifications for local-projections – may produce different results. Therefore, although the coefficients presented here provide useful benchmarks for the possible order of magnitude of exchange rate pass-through, their interpretation should be carried out with caution.

References

SANTOS, T. T. O.; and SABBADINI, R. (2025). *O nível recente da inflação de serviços deveria causar surpresa?* BC Blog, BCB.