INTERNATIONAL MONETARY FUND

Services Inflation and the Exchange Rate in Türkiye

Tara Iyer, Agustin Roitman, James Walsh

WP/26/6

2026
JAN

WORKING PAPER

 WP/26/6

IMF Working Paper
European Department

Services Inflation and the Exchange Rate in Türkiye

Prepared by Tara Iyer, Agustin Roitman, and James Walsh

Authorized for distribution by Kristina Kostial
January 2026

ABSTRACT: Inflation in Türkiye has been high since 2021. This paper investigates the sources of this inflation and the impact of mitigating exchange rate volatility. Two main findings emerge. First, there has been a significant divergence in inflation dynamics across CPI components since late 2021—in particular, services inflation has exhibited more inertia than goods inflation, a result that stands out in both historical and cross-country contexts. The persistence in services inflation has been generally broad-based, with rental services playing an important role. Second, exchange rate shocks are estimated to have a smaller impact on services inflation than on goods inflation. The peak services inflation response to a nominal exchange rate shock is estimated to be fairly muted, at just one-tenth the size of the shock. Indeed, since mid-2023, there has been an unusually sharp rise in the relative price of services, as goods inflation has been more sensitive to exchange rate movements. These findings suggest that when inflation persistence—especially in services—is relatively high, inflation stabilization may require complementary policies to break inertia beyond a stable currency.

JEL Classification Numbers: E31, E58, C32, O52

Keywords: Türkiye; Services Inflation; Inflation Inertia; VAR; Exchange Rate Pass-Through

Author's E-Mail Address: TIyer@imf.org, ARoitman@imf.org, JWalsh@imf.org

*

WORKING PAPERS

Services Inflation and the Exchange Rate

Prepared by Tara Iyer, Agustin Roitman, and James Walsh[1]

[1] The views expressed in this paper are those of the authors and do not necessarily represent the views of the International Monetary Fund, its Management, or its Executive Directors. The authors are grateful for useful comments and suggestions from colleagues in the IMF Monetary and Capital Markets department and the Turkish authorities.

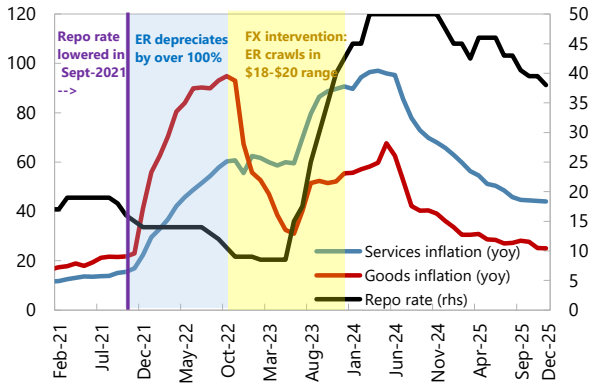
Table of Contents

I. Introduction

Türkiye is transitioning from a period of high inflation. Inflation surged to 85 percent y/y in late 2022, up from under 20 percent y/y before September 2021. Different CPI components were unevenly affected, both in magnitude and timing. In particular, goods and services inflation responded differently. Goods inflation (red line in Figure 1a) initially surged as the exchange rate depreciated sharply and households faced falling real interest rates. Goods inflation then declined toward the end of 2022, coinciding with an extended period of lira stabilization. Services inflation (blue line) rose more steadily, following goods inflation with a lag, and did not decline similarly when the exchange rate stabilized. Instead, it continued to rise—outpacing goods inflation and exhibiting greater persistence.

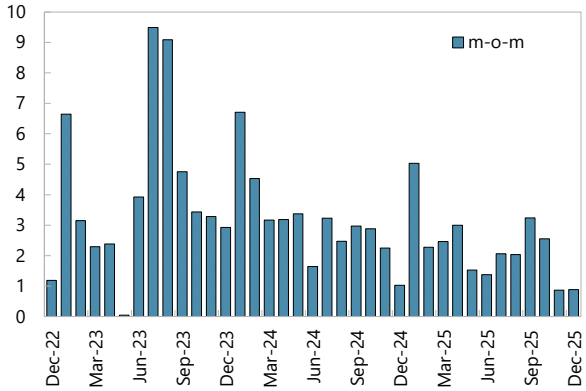
Figure 1. Policy Shifts and Inflationary Dynamics in Türkiye: 2021–25

a. Services and goods inflation and policy rate (percent)



Sources: TurkStat and IMF staff calculations.

b Sequential CPI inflation (percent)



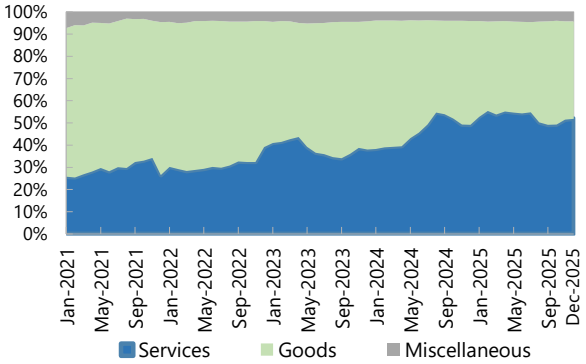
Sources: Turkstat and IMF staff calculations.

A policy shift since mid-2023 gradually increased the repo rate from 8.5 to 50 percent within less than a year by March 2024, accompanied by policies to simplify financial regulation and reduce financial distortions. A stable lira has contributed to contain further increases in sequential inflation after the summer of 2023, but sequential (m/m) inflation remained higher than expected and relatively sticky. This was mainly due to services inflation—goods inflation reacted more favorably to tight monetary policy and exchange rate stabilization, but services inflation proved more persistent.

Changing Composition of Inflation

Services have become a dominant driver of inflation in Türkiye in recent years. Their contribution to overall inflation increased from around 6 percentage points (pp) in September 2021 to 31pp in July 2024 and has since outstripped the contribution of goods. While the services inflation contribution was half that of goods three years ago, the relative contributions have now changed (Figure 2). Even though services account for under 40 percent in the CPI basket, they have contributed to 50-55 percent of headline inflation in 2024 and 2025, up from under 30 percent in late-2021. This represents the highest contribution of services inflation in Türkiye since 2010.

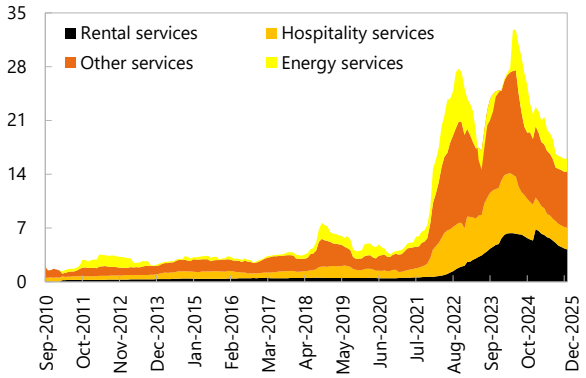
Fig 2. Contribution of Services and Goods Inflation in Türkiye



Note: Contributions based on weighted yoy rates.
Sources: Haver Analytics and IMF staff calculations.

The increase in services inflation has been broad-based among its components, with rental services playing an increasing role since 2022 probably due, at least in part to backward looking indexation and some restrictions to adjust contracts (e.g., rent). Rental inflation (accounting for around 13 percent of the services basket) contributed under 5 percent to total service inflation in Jan 2022, but its contribution has been rising and reached over 25 percent by the end of 2024. Indeed, rental inflation reached 120 percent y/y in summer 2024, and since then the 25 percent rent increase cap has been lifted.

Fig 3. Historical Drivers of Services Inflation in Türkiye



Note: Contributions based on weighted yoy rates.
Sources: Haver Analytics and IMF staff calculations.

While rental inflation has accelerated, there has also been a broad-based increase in the other components of services inflation including hospitality services, housing related energy services, and other services, which include education, health, communication, transportation (Figure 3). Rents, hospitality, and energy-related housing services all contributed between 5–6 pp to headline inflation toward the end of 2024. Of note is that services inflation increased across the board despite the implementation of price controls and administered prices (for example, around 60 percent of the price of energy is subsidized for households and, until recently, there was a rental price cap). In the absence of administered pricing, services inflation would have likely been much higher.

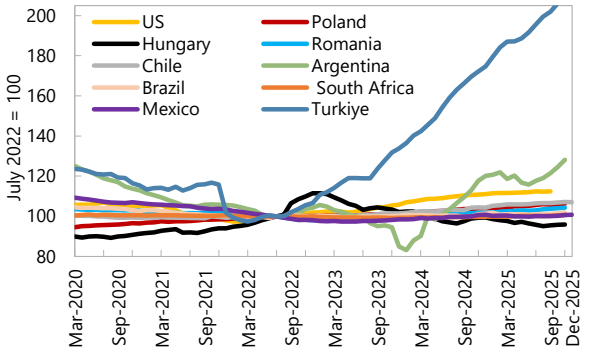
Relative Price of Services in Türkiye

How unusual is the rise in services inflation in Türkiye compared to other countries? Indeed, the relative price of services to goods diverged sharply from trend across many countries over the pandemic as households switched

their spending patterns toward purchasing relatively more goods during the lockdown, and then rotated toward services as the pandemic ended (see, for example, IMF, 2024). Thus, the composition of inflation shifted toward services in many countries as inflation surged, with services inflation proving more inertial during the disinflation process. But even in a cross-country context – the rise in the relative price of services in Türkiye has been striking.

The price of services relative to goods in Türkiye has increased by more since mid-2022 compared to other countries (Figure 4). This coincides with the dynamics of the nominal exchange rate. The relative price of services dropped as the lira depreciated significantly after 2021 due to the surge in goods inflation. However, as the exchange rate was stabilized from mid-2022, the relative price of services in Türkiye rose more sharply than other countries. It continued rising through the policy tightening cycle due to the fall in goods inflation y/y and greater inertia in services inflation, a worldwide phenomenon, but as shown in the graph—much starker in Türkiye.

Fig 4. Cross Country Dynamics: Relative Price of Services



Sources: Haver Analytics and IMF staff calculations.
Notes: The relative price is the ratio of the services CPI to the goods CPI.

Related Literature

To the best of our knowledge, this is the first paper focusing specifically on services inflation and the impact of the exchange rate. Studies have usually focused on exchange rate passthrough to headline and/or core inflation, but not on services. However, it seems natural to focus on services at least in context of global consumer spending patterns over the course of the pandemic that affected the relative price of services and led to a divergence in inflationary dynamics.

The rise in the relative price of services in Türkiye is unusual in a cross-country context and corresponds with exchange rate changes. By estimating the effects of exchange rate shocks on services and goods inflation, this paper contributes to the literature on exchange rate pass-through to inflation and inflation inertia and also fits within the literature on the effect of exchange rate changes on tradable and non-tradable goods inflation. While we do not provide an exhaustive literature survey, we discuss some of the related studies here.

The relationship between inflation, its persistence, and the exchange rate is the subject of extensive literature. Alogoskoufis and Smith (1991) find that changes in the exchange rate regime lead to rises in inflation persistence. Taylor (2000) also finds a positive relationship between exchange rate pass-through and persistence of inflation. Stock and Watson (2007) for the US and Fischer et al. (2006) for the euro area have also shown similar positive relations between exchange rate changes and inflation persistence. Both studies note challenges for forecasting

inflation because of weakening links between inflation and selected leading indicators, including money growth, when inflation is low and relatively low and stable. We document instead that recent changes in the exchange rate regime in Türkiye are associated with an unequal increase in persistence across the components of inflation.

Exchange rate shocks in this paper are further estimated to lead to a significantly more muted response of services inflation relative to goods inflation. Hobijn et al. (2019) and García-Cicco and García-Schmidt (2020) find different responses of tradable and non-tradable consumer price inflation to the changes in exchange rate. In addition, Hobijn et al. (2019) note that, in case of the UK, the exchange rate pass-through to tradable goods with high import content is more than that of non-tradable goods with low import content. García-Cicco and García-Schmidt (2020) show that conditional exchange rate pass-through to prices of tradable goods is always higher than that of non-tradable items in Chile.

The paper also contributes to the literature on pass-through estimates for Türkiye. For example, Ogunc et al (2018) find a 17 percent pass-through over 2 years to headline inflation corroborating the results in Kara and Ogunc (2012) who also estimate a 17 percent pass-through to the CPI in two years and around 15 percent in a year. Ozmen and Topaloglu (2017) use a bottom-up approach for over 150 sub-components, and find a similar 17 percent pass-through to CPI, while around 12 percent and 25 percent to core goods and services prices. Koca and Yilmaz (2018) examines differences in pricing dynamics between core goods and services. Leigh and Rossi (2002) find a 60 percent pass-through to wholesale prices and 45 percent to the CPI. We expand on these previous studies by (i) developing an alternate identification strategy in a parsimonious empirical model, (ii) estimating this model over historical periods as well as a time period of significant exchange rate volatility, 2018–24 and (iiii) importantly, estimating the differential pass-through to core services and core goods prices, given the recent sharp rise in services inflation inertia associated with exchange rate changes. We estimate core services inflation as headline services inflation less energy and transport services inflation.

The rest of this paper proceeds as follows. Section II documents differences in inertia in services vs goods inflation, discusses the role of exchange rate stabilization in Türkiye during recent years, and presents cross country experiences related to services inflation persistence as well as tackling inflation inertia during selected successful inflation stabilization programs. Section III describes the empirical model and identification scheme we use to estimate the impact of exchange rate shocks on services and goods inflation, Section IV reports and contextualizes empirical results and conducts sensitivity analysis. Section V concludes.

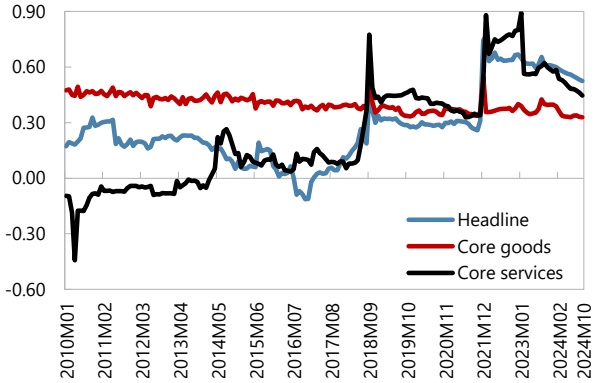
II. Inflation Inertia and the Exchange Rate Channel: Türkiye and International Experience

This section documents the rise in inflation inertia in Türkiye, possibly associated with exchange rate changes. The exchange rate has traditionally been the strongest inflation driver in Türkiye. This accords with the international price system (Gopinath, 2015), which predicts that exchange rate pass-through will be higher in countries where a greater share of imports are invoiced in currencies that are not their own. In Türkiye, over 90 percent of imports are invoiced in foreign currency (60 percent in USD), and exchange rate movements have historically had a high correlation with inflation.

Since mid-2022 following a sharp depreciation at the end of 2021, and except during the summer of 2023, the lira has been observed as relatively stable, and moving at a monthly pace that has been, on average, lower than

sequential inflation. Yet, after 18 consecutive months of policy tightening since mid-2023 until October 2024, sequential inflation has not been in a downward trend consistent with CBRT forecasts during 2024. A simple measure of CPI inflation inertia suggests that persistence has increased since late 2021.[1] Inertia was broadly constant until 2013, then declined until 2016–17, subsequently jumping up in 2018 and further up at the end of 2021. We now observe a gradual and slow decline since mid-2023, but its level remains high (Figure 5).

Fig 5. Inertia in Headline, Core Goods, and Core Services Inflation



Sources: TurkStat and IMF staff calculations.

One reason behind the high headline inflation—despite efforts to maintain a stable lira—could be the recent increase in services inflation persistence, which jumped up towards the end of 2021 following a large depreciation and has stayed relatively high until October 2024.[2] While persistence has increased across the board, inflation inertia in services has exceeded that of goods since late 2021—in a break from the past—contributing to the sharp rise in the relative price of services. Prior to the policy easing cycle, services inflation persistence had been, on average, lower than persistence in goods inflation. But the lira was stabilized since mid-2022, and this suggests that core services inflation could be less responsive to exchange rate stabilization than core goods inflation. Indeed, Türkiye's 2018–19 policy tightening, which also stabilized the lira, led to broadly unchanged core services inflation, while core goods inflation fell to almost a quarter.

International Divergence in Services and Goods Inflation Inertia

It is useful to contextualize the dynamics of services and goods inflation in Türkiye relative to selected comparators (emerging markets and inflation targeting countries). Core goods sequential inflation has recently been about twice its pre-pandemic average and around double that of the average of these comparators (Figure 6). However, services sequential inflation has recently been over five times higher than the average of

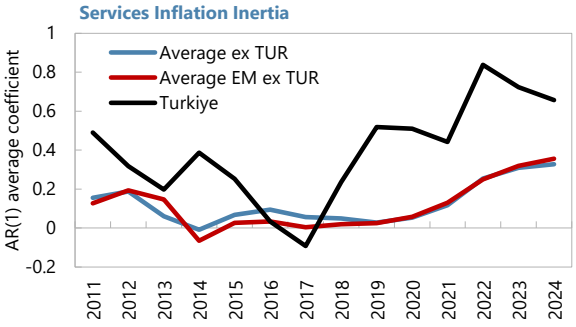
[1] The charts present estimates of inflationary inertia using univariate rolling regressions. They plot estimated AR(1) coefficients of univariate regressions of monthly inflation rates using a 36-month rolling window and 95 percent confidence bands of the univariate regressions of month-on-month inflation rates. Similar calculations have been used in the literature (see, for example, Edwards and Lefort, 2002).

[2] Forces other than policy shifts affecting inflation inertia may include: i) more backward looking households' and corporates' expectations in Türkiye (possibly influenced by periods of unconventional policies), ii) specific regulations in selected markets (e.g., frequency and size limits to adjusting specific prices and/or contracts) which were either circumvented or triggered excessively high initial pricing in new contracts, anticipating limits to adjust those later, iii) staggered contracts, iv) backward looking indexation, v) administered prices and public wages growing in real terms.

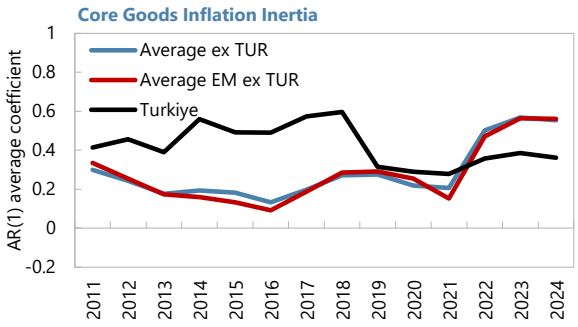
the comparators, reflecting a fivefold increase relative to its own pre-pandemic average. While services inflation surged rapidly, its decline has been more gradual.

Moreover, inflation inertia in recent years has been higher in Türkiye than in the average of selected comparators. Services inflation inertia rose in Türkiye after 2018, and then again in 2022. In contrast, core goods inertia declined following the 2018 currency crisis, remained stable, and—since the exchange rate stabilization of 2022—appears lower than in comparators, where it increased after the COVID-19 pandemic.

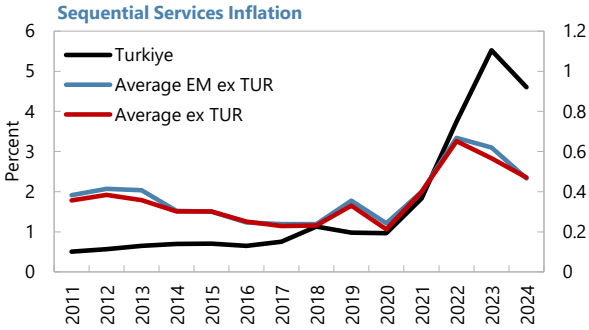
Fig 6. Inertia in Türkiye vs EMs



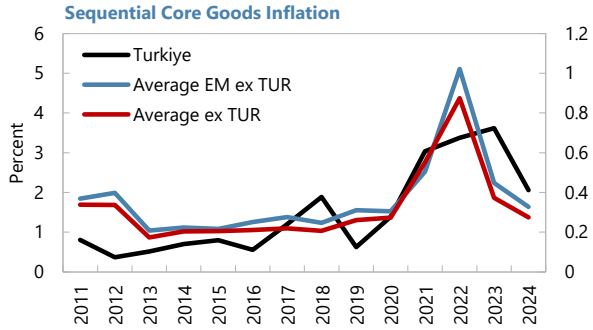
Note: AR(1) average coefficient per year. Average ex TUR includes: Brazil, Chile, Hungary, Mexico, Poland, Romania, South Africa, and U.S. Average EM ex TUR excludes Chile and U.S. from the Average ex TUR.
Sources: Haver Analytics and IMF staff calculations.



Note: AR(1) average coefficient per year. Average ex TUR includes: Brazil, Chile, Hungary, Mexico, Poland, Romania, South Africa, and U.S. Average EM ex TUR excludes Chile and U.S. from the Average ex TUR.
Sources: Haver Analytics and IMF staff calculations.



Note: Average mom inflation per year. Average ex TUR includes: Brazil, Chile, Hungary, Mexico, Poland, Romania, South Africa, and U.S. Average EM ex TUR excludes Chile and U.S. from the Average ex TUR.
Sources: Haver Analytics and IMF Staff Calculations.



Note: Average mom inflation per year. Average ex TUR includes: Brazil, Chile, Hungary, Mexico, Poland, Romania, South Africa, and U.S. Average EM ex TUR excludes Chile and U.S. from the Average ex TUR.
Sources: Haver Analytics and IMF Staff Calculations.

International Experience Tackling Inflation Inertia under Disinflation Programs

Inflation inertia has characterized many inflation stabilization programs (Calvo, Vegh, 1994). Inertia may result from, among other factors, lack of credibility, or widespread backward indexation (Pazos,1972). Price and wage controls might temporarily help fight inflation inertia and make a program more credible, and “buy some time” to implement deep(er) reforms to address the root causes of imbalances feeding inflation. However, evidence suggests that price and wage controls cannot solve the underlying problems related to lack of credibility, and sooner or later, they are circumvented. Rather than resorting to price controls, the best policy is probably to switch from backward- to forward-looking indexation in a rules-based manner. That is, to adjust prices and/or wages at the beginning of an inflation stabilization program according to a relevant measure of expected inflation and eliminate backward-looking indexation. Discretion would feed skepticism about timing, effectiveness, commitments, duration, and/or size of adjustments, possibly hindering credibility.

Different inflation stabilization programs have complemented traditional nominal anchors (i.e., exchange rate, or monetary aggregates) with various reforms to tackle and eliminate inflation inertia. Selected relevant programs include:

Argentina 1991. The "Convertibility" law established a currency board, complemented by the prohibition of indexation clauses or any other monetary alterations in the terms of contracts, and wage agreements resulting from collective bargaining had to be accompanied by agreements on productivity (Cavallo, Cavallo, 1996).

Brazil 1994. The backbone of the "Real" plan was the elimination of indexation in the exchange market, the labor market, public utility prices—including oil and gasoline—and some generally used contracts—especially those applying to rents, private schools and medical insurance (Fonseca 1998). After July 1994, wages, public utility prices, and prices settled by legal contracts could no longer be raised in line with past inflation: any increase occurring before a one-year interval was forbidden. Another fundamental aspect of the plan was that the new currency that was created in July 1994—the real—was initially pegged to the dollar. The Central Bank committed itself to a fixed maximum exchange rate.

Chile 1975. Because of its chronic inflation, Chile had developed indexation mechanisms to deal with the uncertainty associated with unpredictable levels of inflation. These indexation mechanisms had built in enough inertia in inflation dynamics to make any shock treatment in the form of a monetary crunch difficult to sustain due to the excessive unemployment they would bring (Corbo, Fisher, 1993). Kiguel and Liviatan (1988), argue that the adjustment would have been less costly if the massive fiscal adjustment and associated monetary crunch had been accompanied by incomes policies to break the inflationary inertia. Corbo and Solimano (1991) found that the slow pace of disinflation in the 1975–1978 program was due in large part to the exchange rate and wage rules in place. From a counterfactual simulation they concluded—as should have been expected—that the aggressive nominal devaluations of 1975, introduced to produce a real devaluation in response to the severe external shocks of that year, slowed down the pace of disinflation. Edwards (1992) concluded that the Chilean economy displayed considerable inertia during this period, and the sensitivity to past inflation did not decrease following the fixing of the exchange rate. These results confirm the view that the PPP exchange rate rule and the wage indexation rule were a major source of inertia in Chile.

Israel 1985. After an initial devaluation the exchange rate was pegged to the dollar. There was a suspension of wage contracts (including indexation) and the granting of a general, one- time wage increase, pending negotiations between the employers and the national trade union. There was a price freeze and a prohibition to hold dollar-linked short-term deposits (Fisher 1986).

Peru 1990. In the area of prices and wages, discipline was maintained on public sector wages while prices and wages in the private sector were allowed to find their own level (Werner, Santos, 2015). Price controls were lifted and in August 1990 the government mandated a one-time cost-of-living bonus for all employees in the public and private sectors equivalent to 100 percent of their July 1990 wage, but with a floor equivalent to 200 percent of the minimum wage. It also announced that wages would be increased again once the magnitude of the initial price shock was clear, and a further 100 percent increase was decreed for all workers in the public sector in late August 1990, while the minimum wage was raised by 300 percent. In September 1990, the government announced that private sector wages would be determined freely, abolished wage indexation in public enterprises, and made wage increases subject to government approval. Subsequently, public sector salaries and the minimum wage were reduced significantly in real terms, while average real wages in the private sector increased. Public sector prices were raised again in December 1990 (fuel prices were raised by 50 percent and

water and electricity tariffs by 30 percent). A policy of smaller and more frequent adjustments in these prices was instituted during the second quarter of 1991.

III. Model

In this section, we estimate the impact of exchange rate shocks on services and goods inflation. To assess the impact of exchange rate stability on inflation, it is important to first identify the structural shocks.

We develop a tractable empirical model aimed to be specific to the Türkiye context to estimate the impact of the exchange rate on different components of inflation. The recursive identification scheme is flexible enough to accommodate various variables. We account for the inflation inertia present in the data by incorporating relevant lagged effects. The key shock of interest is to changes in the lira. After the model is estimated, the pass-through of shocks to the exchange rate on a specific component of prices is calculated as the cumulative change in the price level with respect to the cumulative change in the exchange rate over a given time period.

In the model, the impact of exchange rate movements on services and goods inflation is identified through a six-variable baseline identification scheme. The endogenous variables are core services inflation, core goods inflation, the unemployment gap, oil inflation, nominal exchange rate depreciation, and the repo rate.[3] Supply shocks are identified by the oil price variable, while labor market tightness and wage demand pressures are identified by the unemployment gap, following the recent literature (eg. Dao et al, 2024). Later, a set of robustness checks replaces oil prices with gas prices, and the unemployment gap with the minimum wage, given the prevalence of informality in the economy.[4] Goods inflation is assumed to impact services inflation with a lag, as the services sector uses intermediate goods.[5]

The system of equations can be represented as follows:

$$[1]\ \Delta o_t = E_{t-1}[\Delta o_t] + \varepsilon_t^{\Delta o}$$

$$[2]\ \Delta u_t = E_{t-1}[\Delta u_t] + \beta_1 \varepsilon_t^{\Delta o} + \varepsilon_t^{u}$$

$$[3]\ \Delta \pi_t^{g} = E_{t-1}[\Delta \pi_t^{g}] + \gamma_1 \varepsilon_t^{\Delta o} + \gamma_2 \varepsilon_t^{u} + \gamma_3 \varepsilon_t^{g}$$

$$[4]\ \Delta \pi_t^{s} = E_{t-1}[\Delta \pi_t^{s}] + \mu_1 \varepsilon_t^{\Delta o} + \mu_2 \varepsilon_t^{u} + \mu_3 \varepsilon_t^{g} + \varepsilon_t^{s}$$

$$[5]\ \Delta e_t = E_{t-1}[\Delta e_t] + \theta_1 \varepsilon_t^{\Delta o} + \theta_2 \varepsilon_t^{u} + \theta_3 \varepsilon_t^{s} + \theta_4 \varepsilon_t^{g} + \varepsilon_t^{\Delta c}$$

$$[6]\ i_t = E_{t-1}[i_t] + \alpha_1 \varepsilon_t^{\Delta o} + \alpha_2 \varepsilon_t^{u} + \alpha_3 \varepsilon_t^{s} + \alpha_4 \varepsilon_t^{g} + \alpha_5 \varepsilon_t^{\Delta c} + \varepsilon_t^{i}$$

where i_t is the repo rate, Δe_t is the nominal depreciation rate, Δo_t is oil price inflation in dollars, Δu_t is the unemployment gap, $\Delta \pi_t^{g}$ is core goods inflation, $\Delta \pi_t^{s}$ is core services inflation, and the ε_t's are the corresponding

[3] All variables are in annual rates, apart from the repo rate and unemployment gap. We use headline goods and services inflation in alternate versions of the model. Oil prices are found to be useful in predicting inflation in Ogunc (2019), but we also replace oil with gas prices to account for administered pricing. The identification scheme is further tested by including inflation expectations.

[4] As robustness checks, we also use the unemployment rate and an alternate estimation of the unemployment gap.

[5] While the model separates services and goods, and there is no specific prior example of identifying these specific shocks, conceptually similar recursive ordering in the SVAR has used before, for example, in Leigh et al (2002) and Laudes (2007) which order CPI before PPI, and non-tradable output before tradable output.

serially uncorrelated structural shocks. The $E_{t-1}[.]$'s are conditional expectations based on information available in the previous month and are assumed to be replaced by linear projections of the lags of the six variables, as in some previous papers including McCarthy (1999). Similar to other models of pricing along a distribution chain, where inflation is assumed of comprise of several components, there are no contemporaneous effects as the identification scheme assumes that variables affect each other with a lag based on their ordering. Under these assumptions, the structural model can be estimated as a recursive VAR. This identification scheme assumes that current values of inflation, unemployment and the exchange rate are observed by the Central Bank before it sets its policy rate. In an alternate identification scheme, the exchange rate is determined subsequent to the repo rate, which allows shocks including developments in financial markets during the current period to have a direct impact on the exchange rate.[6]

IV. Empirical Results

The SVAR is estimated in monthly frequency covering the period from January 2010 to November 2024. We are interested particularly in core services and core goods inflation. We retrieve core goods inflation directly from TurkStat, while we calculate core services inflation using a bottom-up approach using the relevant time-varying weights for the different components. Core services inflation is estimated as headline services inflation less energy and transport services inflation. We also define an alternative bottom-up measure of core services, excluding just energy.

Regarding the other variables in the model, the nominal exchange rate is the lira-USD exchange rate, while we use the repo rate to represent monetary policy. The natural rate of unemployment is estimated through a standard filter, and given estimation uncertainty, also through alternative methods including a historical average and two-year moving average process. The domestic price of oil is obtained by converting the price of Brent crude oil in USD using the average monthly nominal exchange rate, and similarly for the domestic price of gas. In sensitivity analysis later, inflation expectations represent one-year ahead market expectations of headline inflation. Summary statistics for the variables are provided in the Appendix, along with accompanying data sources.

Model Estimation

The SVAR is estimated in stationary terms and is found to be stable, with unit roots less than 1. Orthogonalized IRFs are estimated in response to one percentage point shocks to the variable of interest. Lag length selection was informed by a number of information criteria including the Bayesian information criterion (BIC) and the Akaike information criterion (AIC) and determined to be of the order of five for the baseline system. We vary the lags in the sensitivity analysis later. Figure 5 displays the estimated orthogonalized IRFs with 95 percent confidence bands for services inflation, goods inflation, the unemployment gap, and the depreciation rate to a one-unit shock to the nominal depreciation rate. The responses are estimated over the period of one year.

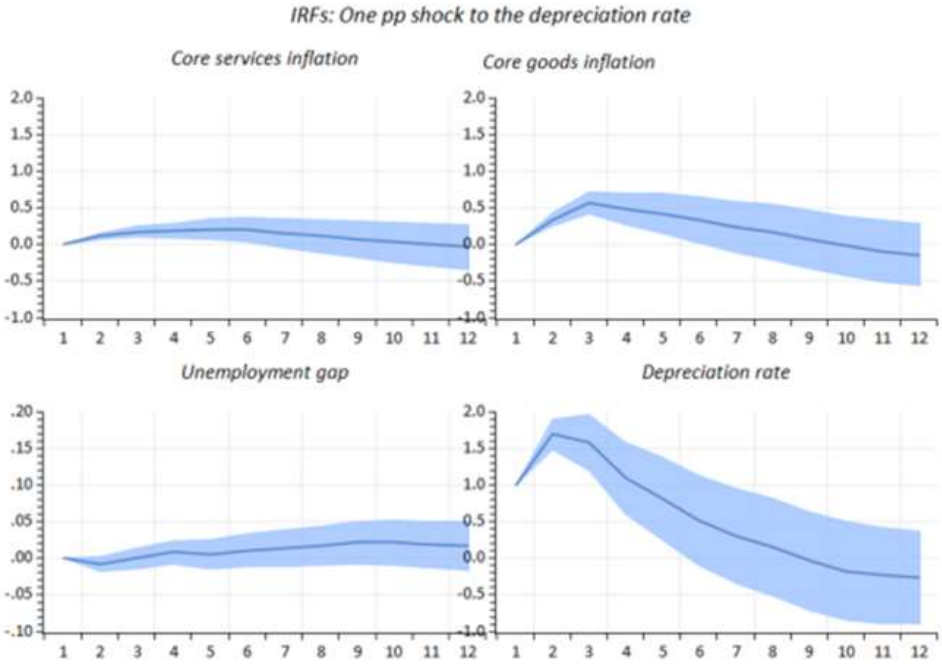
We can see that inflation generally rises as the lira depreciates, while the unemployment gap also increases. The rise in unemployment in response to exchange rate depreciation is in line with the typical experience in emerging markets , and one channel could be the higher costs for importers. Moreover, services and goods inflation react very differently to a lira shock. The core services inflation response is fairly muted, while core goods

[6] The results are robust to either ordering, suggesting that the shocks identified are exogenous.

inflation faster and by more. However, core goods inflation also reverses faster, suggesting greater and faster pass-through to prices.

Indeed, a 10pp depreciation shock to the exchange rate is estimated to lead to a lagged increase in goods inflation by around 5pp and services inflation by around 1pp after 3 months, as services inflation is found to be much less responsive than goods.[7] While these are the peak impacts, it is also useful to assess the total pass-through to price levels. As shown in Figure 8, around 15 percent and 35 percent of the cumulative exchange rate depreciation passes through into services and goods prices respectively within 3 months (around 20 percent and 45 percent by 6 months). The exchange rate pass-through is mostly complete by 6 months. These results point to both a relatively fast and asymmetric impact of exchange rate shocks on inflation.

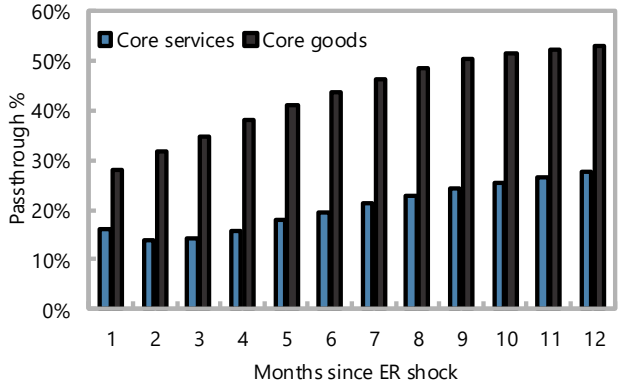
Figure 7: Response of Core Services and Core Goods Inflation to the Exchange Rate



Note: The figure reports OIRFs in response to a one-unit shock to the nominal lira-dollar depreciation rate. The model is estimated over the period of January 2010-November 2024.

[7] Exchange rate shocks have symmetric effects in this model. While we describe the dynamics following a depreciation, an exchange rate appreciation shock would similarly lead to a more muted response of services inflation.

Figure 8: Pass-Through of Exchange Rate to Core Services and Core Goods Prices



Sources: TurkStat and IMF staff calculations.

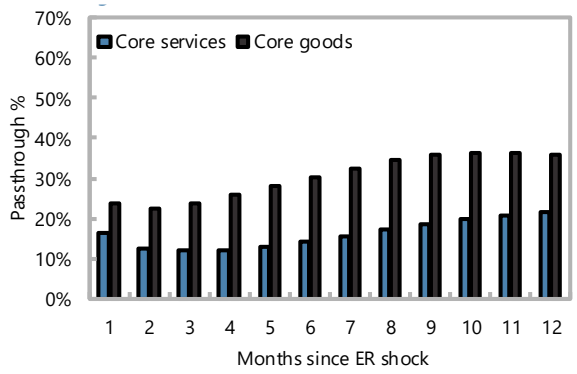
Time Variation in Pass-Through

The greater inertia in services inflation relative to goods bears further investigation. The baseline period of estimation, 2010–24, provides the average impact. A more granular period-by-period analysis suggests that exchange rate pass-through into prices has changed over time. We present the results for 2010–19 and 2020–24 (Figure 9). It appears that pass-through has increased over time to both core goods and core services – but significantly more for core goods. This could be an important factor to explain the greater sensitivity of goods prices to the exchange rate, leading to the unusual rise in the relative price of services and the changing composition of inflation in Türkiye.

From 2010–19, the exchange rate pass-through into core services and core goods was close to 15 and 30 percent respectively after six months. The estimated pass-through into core services and core goods increased to around 25 and 60 percent in 2020–24. The greater increase in pass-through into core goods suggests that exchange rate stabilization not only affects services and goods prices asymmetrically, but also has been significantly more effective for goods prices over time. This could be an important factor explaining why services inflation has been more persistent than goods inflation, and less responsive to exchange rate shocks.

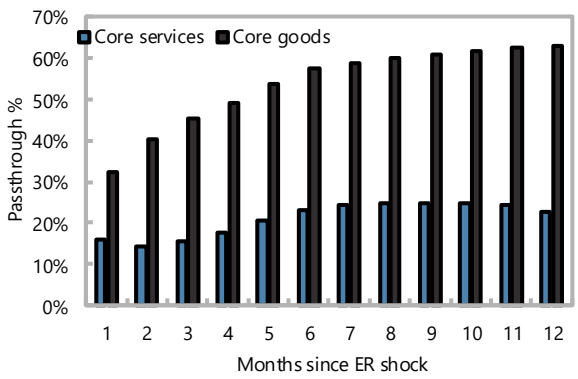
Figure 9. Time Variation in Exchange Rate Pass-Through

Estimation period: 2010–19



Sources: TurkStat and IMF staff calculations.

Estimation period: 2020–24

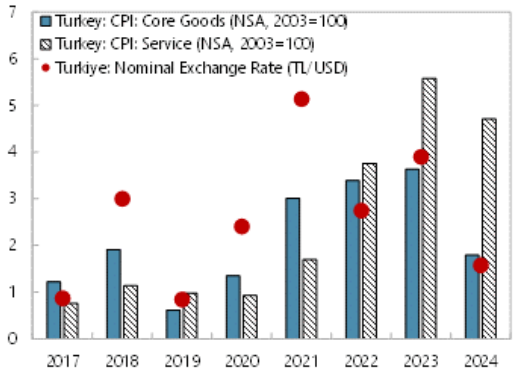


Sources: TurkStat and IMF staff calculations.

Figure 10 compares the average annual sequential inflation in services and goods relative to exchange rate changes. While persistence (defined as sequential inflation exceeding the rate of lira depreciation) has increased in both, that in services is comparatively greater than in goods, corresponding with our empirical results on the more muted response of core services inflation to lira stabilization.

Figure 10. Exchange Rate Changes and Sequential Inflation

(Average mom percent change per year)



Sensitivity Analysis

We conduct a range of robustness exercises on the system:

- Alternative specifications of the labor market shock by replacing the unemployment gap by the minimum wage, to control for potential wage-price feedback. We also estimate the model using the simple unemployment rate, as well as the two other alternate definitions of the unemployment gap.
- Alternative modeling of inertia in services and goods inflation by varying the lags from 3 to 6.
- Alternative definition of services and goods inflation by using headline goods and services inflation, instead of core measures. We also estimate the model using the second definition of core services, which excludes just energy.
- Alternative specification of the exchange rate to the nominal effective depreciation rate, instead of the USD-lira depreciation rate.
- Alternative specification of supply shocks using gas, instead of oil, to account for administered pricing.
- Alternative recursive ordering, by having the exchange rate react to the repo rate.
- Accounting for changes to the monetary base and bank lending by including money growth and credit growth in the SVAR, ordered after services and goods inflation.
- Accounting for the impact of inflation expectations. This is included as a seventh variable, ordered after the exchange rate and repo rate to account for an adaptive expectations process. We also vary the ordering to have expectations precede monetary policy to account for a forward-looking framework.

The core set of results regarding the fast and asymmetric effects of exchange rate shocks on services and goods inflation remain broadly unchanged. The results from several of these models can be found in the Appendix.

VI. Conclusion

In light of recent inflationary dynamics in Türkiye, this paper analyzes inertia in services and goods inflation separately, as well as the role of a stable exchange rate. To our knowledge, it is the first paper to focus specifically on services inflation and the role of the exchange rate.

We find that services inflation in Türkiye is less responsive than goods inflation to exchange rate shocks and exhibits greater persistence. This has led to a sharp rise in the relative price of services (in terms of goods) in recent years. Services inflation dynamics have been unusual both relative to Türkiye's own historical experience and compared with other countries. In recent years, services inflation in Türkiye has been more persistent than goods inflation relative to comparators. This pattern has also been observed in disinflation programs, which have often featured more persistent inflation in non-tradable services than in tradable goods.

The peak impact on services inflation in response to a 10 pp exchange rate shock is estimated to be on the order of 1 pp, while goods inflation is substantially more responsive, increasing by close to 5 pp. The corresponding exchange rate pass-through is around 20 percent for services prices and 45 percent for goods prices over six months, by which time pass-through is largely complete. Exchange rate pass-through was smaller—especially for goods—prior to 2021. The impact of exchange rate stabilization is therefore time-varying and asymmetric across services and goods.

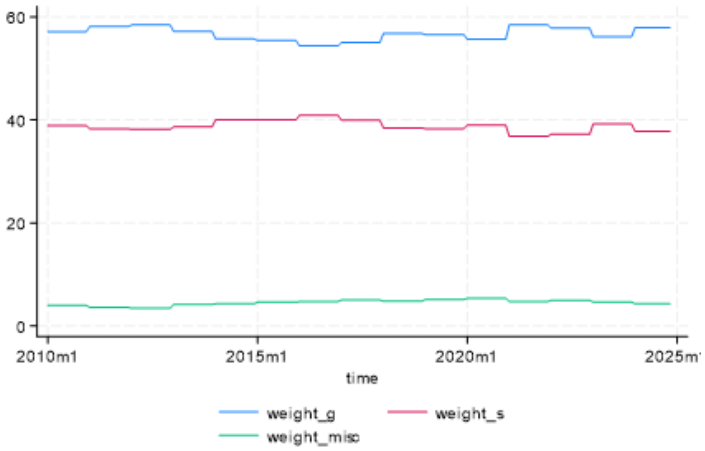
The empirical results highlight the importance of addressing inflation inertia and backward-looking indexation in inflation stabilization programs. Macroeconomic policies aimed at reducing inflation inertia should complement a stable exchange rate during a disinflation process.

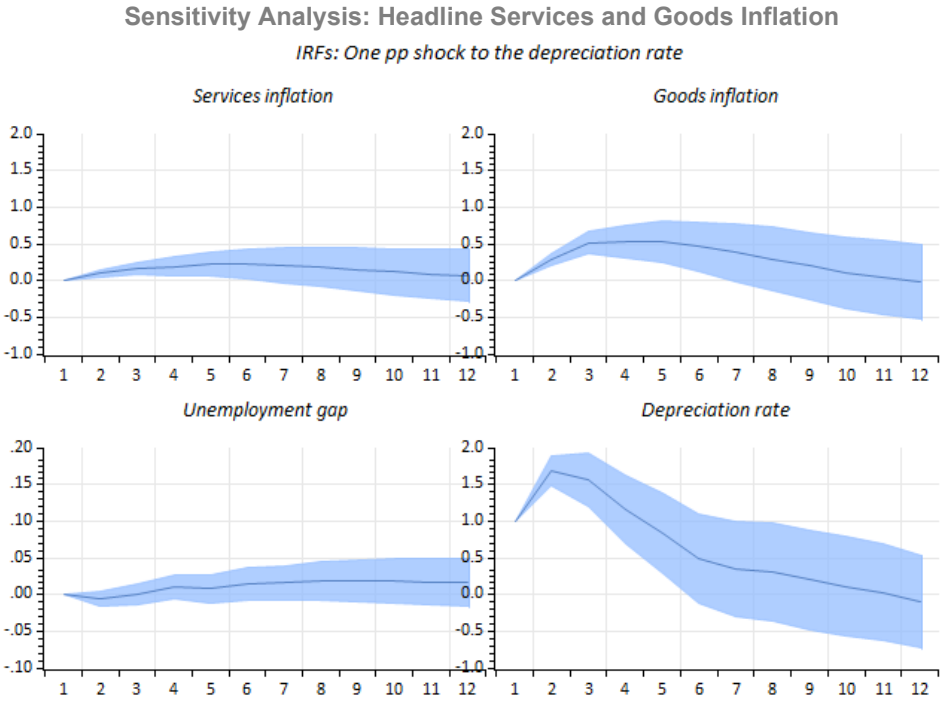
Appendix.

Summary statistics and data sources

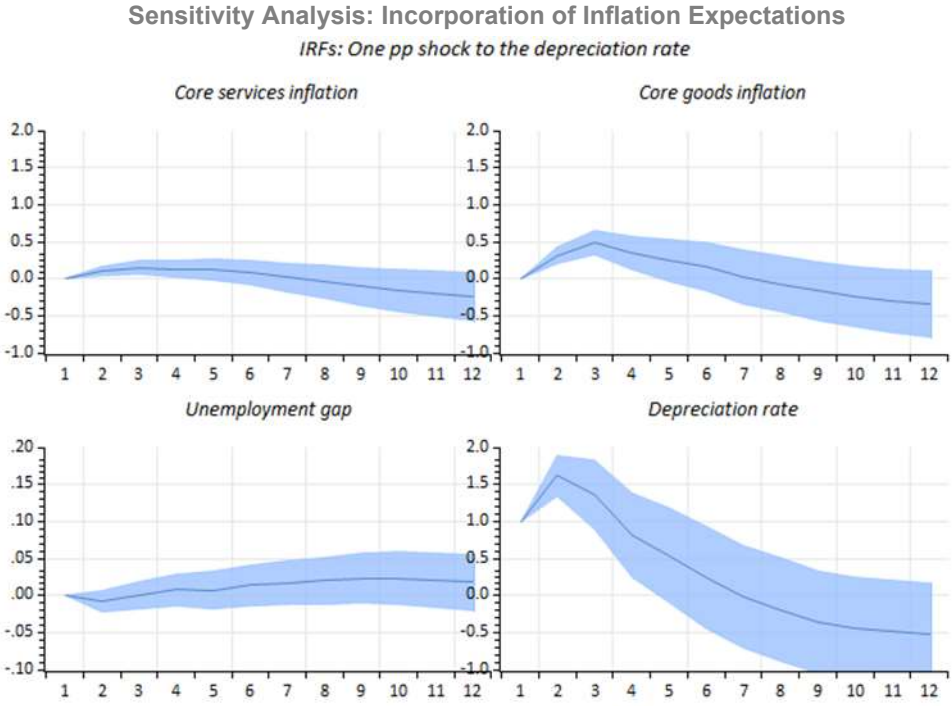
	Mean	Std. dev.	Min	Max	Source
Core services inflation	19.7	23.3	2.7	86.4	TurkStat
Core goods inflation	18.5	18.5	1.1	79.7	TurkStat
Headline services inflation	20.8	25.1	3.6	97.0	TurkStat
Headline goods inflation	21.0	21.6	4.1	94.9	TurkStat
Unemployment gap	-0.2	1.2	-2.5	2.8	TurkStat
Minimum wage inflation	28.1	31.5	7.9	179.7	TurkStat
Money growth	33.2	22.6	2.8	98.9	TurkStat
Credit growth	29.4	15.0	-5.4	69.2	TurkStat
Inflation expectations (12m)	13.8	10.7	6.1	45.8	TurkStat
Oil price inflation (lira)	35.8	58.9	-55.4	227.3	IFS
Gas price inflation (lira)	79.8	216.0	-77.1	1187.2	IFS
Nominal depreciation rate	24.8	25.1	-10.3	114.6	TurkStat
Repo rate	13.4	11.4	4.5	50.0	TurkStat

Weights of services and goods inflation in the CPI basket: 2010–24

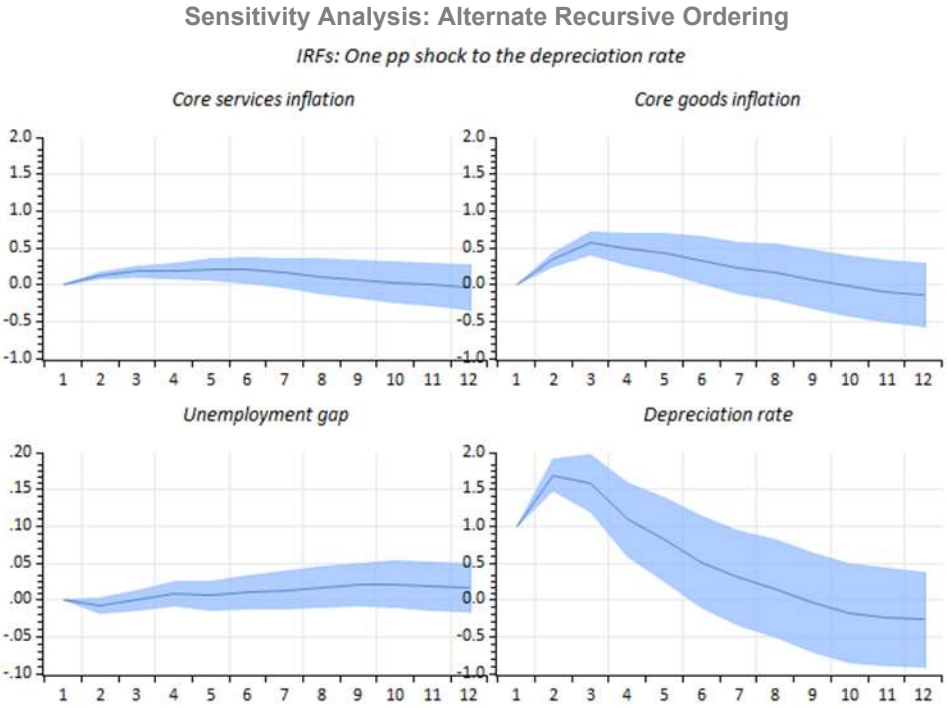




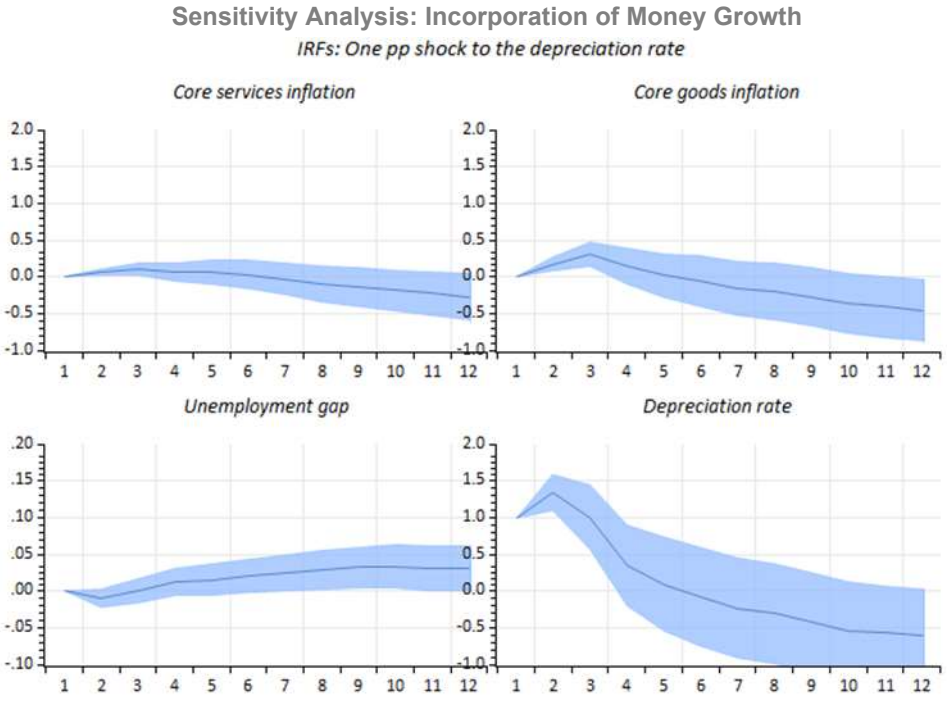
Note: The figure reports OIRFs in response to a one-unit shock to the nominal lira-dollar depreciation rate. The model is estimated over the period of January 2010-November 2024.



Note: The figure reports OIRFs in response to a one-unit shock to the nominal lira-dollar depreciation rate. The model is estimated over the period of January 2010-November 2024.

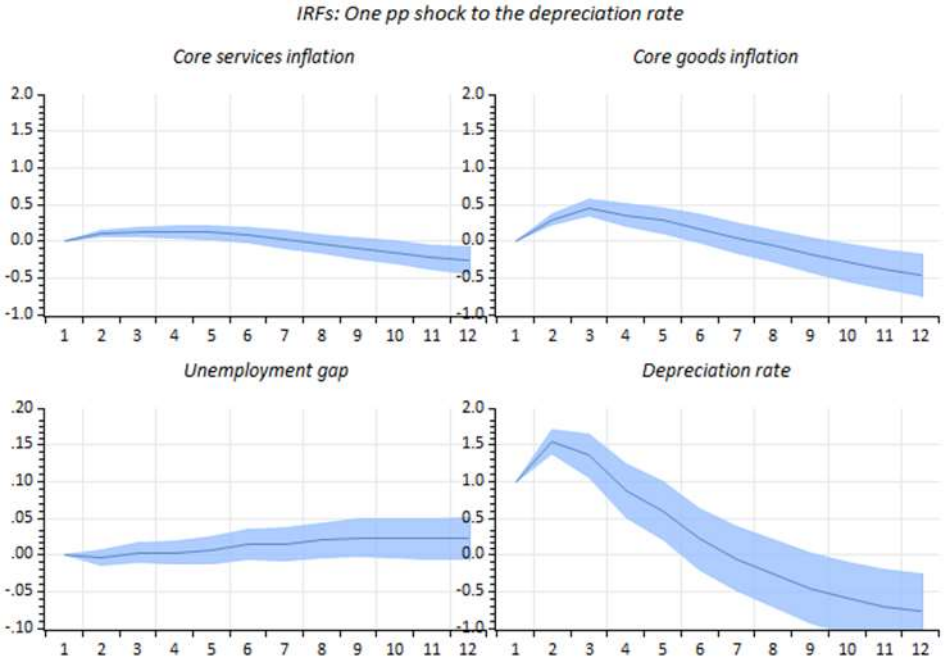


Note: The figure reports OIRFs in response to a one-unit shock to the nominal lira-dollar depreciation rate. The model is estimated over the period of January 2010-November 2024.



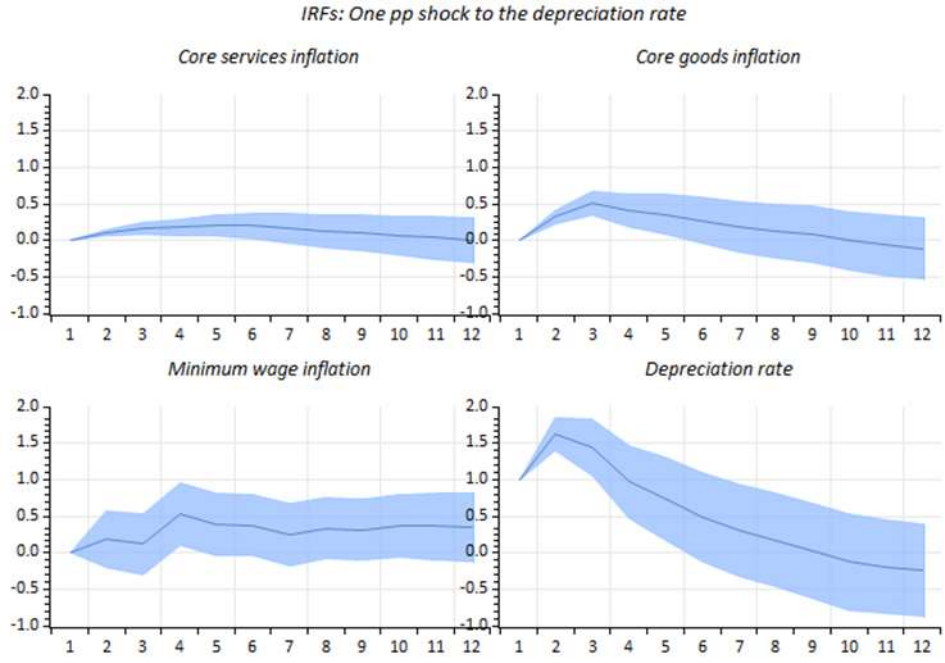
Note: The figure reports OIRFs in response to a one-unit shock to the nominal lira-dollar depreciation rate. The model is estimated over the period of January 2010-November 2024.

Sensitivity Analysis: Alternative definition of supply shocks to gas prices



Note: The figure reports OIRFs in response to a one-unit shock to the nominal lira-dollar depreciation rate. The model is estimated over the period of January 2010-November 2024.

Sensitivity Analysis: Alternative definition of labor market shocks to minimum wages



Note: The figure reports OIRFs in response to a one-unit shock to the nominal lira-dollar depreciation rate. The model is estimated over the period of January 2010-November 2024.

References

Calvo, Guillermo A., and Carlos A. Végh. 1994. “Inflation Stabilization and Nominal Anchors.” *Contemporary Economic Policy 12 (2): 35–45.*

Cavallo, Domingo, and Sonia Cavallo. 1996. “Lessons from the Stabilization Process in Argentina, 1990–1996.” In *Proceedings of the Symposium on Achieving Price Stability,* 169–178. Jackson Hole, WY.

Corbo, Vittorio, and Stanley Fischer. 1994. “Lessons from the Chilean Stabilization and Recovery.” Documentos de Trabajo 158, Instituto de Economia, Pontificia Universidad Católica de Chile.

Corbo, Vittorio, and Andres Solimano. 1991. “Chile’s Experience with Stabilization, Revisited.” Policy Research Working Paper Series 579, The World Bank.

Da Fonseca, Manuel A. R. 1998. “Brazil’s Real Plan.” *Journal of Latin American Studies* 30 (3): 619–639.

Dao, Mai Chi, Pierre-Olivier Gourinchas, Daniel Leigh, and Prachi Mishra. 2024. “Understanding the International Rise and Fall of Inflation since 2020.” *Journal of Monetary Economics* 148 (S): 103658.

Edwards, Sebastian. 1992. “Exchange Rates as Nominal Anchors.” NBER Working Paper 4246, National Bureau of Economic Research, Inc.

Edwards, Sebastián, and Fernando Lefort. 2002. “Stabilization, Persistence, and Inflationary Convergence: A Comparative Analysis.” In *Indexation, Inflation and Monetary Policy,* edited by Fernando Lefort and Klaus Schmidt-Hebbel, 65–104. Central Banking, Analysis, and Economic Policies Book Series 2. Santiago: Central Bank of Chile.

Fischer, Stanley. 1987. “The Israeli Stabilization Program, 1985–86.” *American Economic Review* 77 (2): 275–278.

García-Cicco, Javier, and Mariana García-Schmidt. 2020. “Revisiting the Exchange Rate Pass Through: A General Equilibrium Perspective.” *Journal of International Economics* 127: 103387.

Gopinath, Gita. 2015. “The International Price System.” NBER Working Paper 21646, National Bureau of Economic Research.

Hobijn, Bart, Fernanda Nechio, and Adam Hale Shapiro. 2019. “Using Brexit to Identify the Nature of Price Rigidities.” FRBSF Economic Research Working Paper 2019-13, Federal Reserve Bank of San Francisco.

IMF. 2024. “The Great Tightening: Insights from the Recent Inflation Episode.” In *World Economic Outlook: Policy Pivot, Rising Threats*, 47–78. Washington, DC: International Monetary Fund.

Kara, Hakan, and Fethi Öğünç. 2012. “Döviz kuru ve ithalat fiyatlarının yurt içi fiyatlara etkisi.” *Iktisat Isletme ve Finans* 27 (317): 9–28.

Kiguel, Liviatan. 1988. “Inflationary Rigidities and Orthodox Stabilization Policies: Lessons from Latin America.” *World Bank Economic Review* 2 (3): 273–298.

Koca, Mehmet, and M. Tahsin Yilmaz. 2018. “A Closer Look at Core Inflation Dynamics with a Historical Perspective.” Working Paper, Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Llaudes, Ricardo. 2007. “Monetary Policy Shocks in a Two-Sector Open Economy: An Empirical Study.” ECB Working Paper 799, European Central Bank.

McCarthy, Jonathan. 1999. “Pass-Through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies.” Staff Report 111, Federal Reserve Bank of New York.

Ogunc, Fethi. 2019. “A Bayesian VAR Approach to Short-Term Inflation Forecasting.” Working Paper 1925, Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Ogunc, Fethi, Mustafa Utku Ozmen, and Cagri Sarikaya. 2018. “Inflation Dynamics in Turkey from a Bayesian Perspective.” Working Paper 1810, Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Ozmen, Mustafa Utku, and Meltem Topaloglu. 2017. “Disaggregated Evidence for Exchange Rate and Import Price Pass-Through in the Light of Identification Issues, Aggregation Bias and Heterogeneity.” Working Paper 1708, Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Pazos, Felipe. 1972. *Chronic Inflation in Latin America.* New York: Praeger.

Rossi, Marco, and Daniel Leigh. 2002. “Exchange Rate Pass-Through in Turkey.” IMF Working Paper 2002/204, International Monetary Fund.

Stock, James H., and Mark W. Watson. 2007. “Why Has U.S. Inflation Become Harder to Forecast?” *Journal of Money, Credit and Banking* 39 (s1): 3–33.

Taylor, John. 2000. “Low Inflation, Pass-Through, and the Pricing Power of Firms.*” European Economic Review* 44 (7): 1389–1408.

Werner, Alejandro, and Alejandro Santos. 2015. *Peru: Staying the Course of Economic Success.* Washington, DC: International Monetary Fund.

PUBLICATIONS