Inflation Dynamics in Latin America: Lessons from the COVID and other episodes*

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Abstract

The recent surge in inflation has posed challenges to the progress in macroeconomic management in Latin America. This work empirically analyzes the factors that explain inflation dynamics in Latin America post-COVID, inferring key differences with other episodes and advanced economies. We have the following main findings. First, Latin American inflation, traditionally higher and more volatile—except for energy—, converged with advanced economies in terms of levels and volatility during the pandemic. This convergence extends to CPI basket compositions, more closely resembling those of developed economies, albeit with greater emphasis on food and slightly less on energy and services than in other emerging markets. Second, the composition of driven factors behind the inflation surge in Latin America during 2021-2022 was more related to the persistence of inflation dynamics and the rise of inflation expectations than previous episodes (e.g., 2006-2008). Third, the propagation of inflationary shocks tends to be more intense in Latin America, especially when headline inflation or inflation expectations are elevated. Fourth, and in contrast to advanced economies, the reaction of Latin American monetary policy is more influenced by inflation expectations and the US monetary policy. These two elements help to explain the more aggressive and faster increase in the monetary policy rate in Latin America during 2021-2022 and the more gradual normalization afterward.

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1. Introduction

Similar to many other countries, the recent surge in inflation in Latin America has presented delicate macroeconomic challenges, necessitating policy measures to mitigate its impact while minimizing adverse effects on economic activity and employment. For Latin American countries, these challenges test their commitment to stabilizing inflation at a low level after decades of significant progress in this regard. The global decline in inflation over the past decades has been observed across various country groups and through multiple measures of inflation (e.g., Ha et al. (2019)). Consequently, policymakers have expressed concerns about the potential end of the period of low inflation in Latin America. Historical records of high inflation and less well-anchored inflation expectations further underscore these concerns.

In this context, our work aims to deepen the understanding of the drivers of inflation and the corresponding monetary policy responses in Latin America, with a particular emphasis on the recent post-COVID episode. Through comparative analysis with previous periods of inflationary pressures and with the experiences of advanced economies, we seek to provide a comprehensive macroeconomic assessment that yields key lessons. It is our hope that these lessons will contribute to strengthening monetary policy institutions and frameworks in Latin America, thereby consolidating inflation control at a low and stable level in the future.

Our purpose is to analyze the following questions. First, What are the recent empirical trends in inflation dynamics in Latin America? How do they compare with global patterns? Are there significant differences in the behavior of various components within the CPI basket? How have inflation expectations responded across different economies? In the recent episode, what drove core inflation in Latin America? How do these drivers compare with other episodes and with advanced economies? Section two will analyze these questions describing inflation patterns in Latin America.

Second, How have supply shocks propagated to impact inflation? Has the transmission of energy-related shocks to the CPI been distinct in Latin American countries? How have energy and food shocks influenced core CPI components, such as goods and services? Transmission of supply shocks to inflation will be the focus of section three.

Third, What role has monetary policy played during the COVID period and beyond? To what extent does the inflation response to economic policy in Latin American economies differ from that observed in advanced economies and with previous inflationary periods in Latin America? Section four will respond to these questions based on characterizing the monetary policy reaction in Latin America.

Our analysis leads to four main conclusions. First, it highlights a gradual convergence of inflation in Latin America, which has historically exhibited higher rates and greater variability, toward the more stable patterns observed in advanced economies. This trend, apart from energy inflation that has been notably more stable in Latin America, became increasingly apparent leading up to and was fully realized during the pandemic period. The CPI basket composition in Latin America mirrors this alignment, showing more similarities to those of developed economies than to other emerging markets, yet it maintains a distinct emphasis on food and allocates slightly less to energy and services compared to advanced economies. The increase in CPI components during 2021 and 2022 followed trends similar to those in advanced economies but was less intense. Moreover, Latin America initiated a disinflation process earlier than seen elsewhere, such that by early 2024, in most of the region only services inflation remains slightly above pre-pandemic levels.

Second, not only was the magnitude of the core inflation increase more severe during the 2021-2022 period compared to the 2007-2008 episode in Latin America, but the composition of its underlying factors also differed between these two periods. In the 2007-2008 episode, the output gap and other price shocks (such as energy and food) played a more significant role in explaining the inflationary pressures. However, during the 2021-2022 period, the persistence of inflation dynamics, particularly in goods, and inflation expectations, particularly in services, exerted a greater influence. Additionally, other price shocks were more influential in advanced economies than in Latin America in explaining the increase in core inflation during 2021-2022. While the rise in inflation expectations impacted both types of countries, it predominantly explains the increase in core inflation for services in Latin America, whereas the opposite holds true for core inflation for goods in advanced economies. Nevertheless, it is important to note that global factors seem to account for a significant portion of the inflation rise in Latin America during both the 2006-2008 and 2021-2022 periods.

Third, the propagation of inflationary shocks is amplified in Latin America when past headline inflation and inflation expectations are high. This amplification is not observed in advanced economies, suggesting that there is still potential to strengthen monetary frameworks and institutions in Latin America to prevent a reversal in the progress made in reducing inflation and stabilizing it over the last few decades.

Fourth, monetary policy in Latin America demonstrates greater sensitivity to inflation expectations compared to advanced economies. This characteristic helps to account for the faster and more intense increase in monetary policy rates observed in Latin America during 2021-2022. Additionally, the influence of the US Federal Funds rate on monetary policy strategy in Latin America is more pronounced than in advanced economies. Specifically, when the US adjusts its monetary policy in one direction, it becomes slightly more challenging to implement a coherent monetary policy in the other direction in Latin America. This dynamic contributes to the slower normalization of the monetary policy rate in Latin America since mid-2022, compared to what would be dictated solely by internal macroeconomic conditions.

It is important to note that our manuscript complements several recent efforts to analyze the surge in inflation since 2021 and its monetary policy implications in both advanced and emerging economies. A non-exhaustive list of this is Ball et al. (2022), Bajraj et al. (2023), Blanchard and Bernanke (2023), Ha et al. (2021), Ha et al. (2022), Ha et al. (2023), Harding et al. (2023), International Monetary Fund (2022), Jordà and Nechio (2023), among many others. We contribute to this literature with an updated view of the more salient lessons from this episode in the case of Latin America.

The rest of the manuscript is organized as follows. The next section uses different CPI components to characterize inflation dynamics patterns in Latin America. In that section, we also look at the inflation expectations behavior in Latin America, and we estimate Phillips curve equations to decompose the evolution of core inflation. Section three analyzes the propagation of energy and food price shocks in Latin America, exploring whether there are non-linearities in their transmission to core inflation linked to past headline inflation and inflation expectations. The reaction of Latin American monetary policy is studied in section four. In all these sections, particular attention is paid to the recent episode post-COVID, compared with what was observed in advanced economies in the same period and with another inflationary episode in Latin America during 2006-2008. Finally, section five has concluding remarks.

2. Describing inflation patterns in Latin America

This section analyzes the patterns of inflation in Latin America in the last decades with a special focus in the recent episode post-COVID. We compare these patterns with the ones observed in advanced economies. The first subsection uses the inflation on CPI components constructed by Ha et al. (2023) for a large sample of countries. The second subsection uses an updated database arranged by Bajraj et al. (2023) that builds harmonized disaggregated CPI for 55 countries. This database also includes both emerging and advanced economies. Using these harmonized CPI data, subsection three explores the role of weights of CPI components to explain difference in inflation dynamics between Latin America and advanced economies. Finally, subsection fourth analyzes the inflation expectations and estimate a simple Phillips curve for a panel of Latin American and Advanced economies to understand the inflation dynamics in the recent episode and during 2006-2008.

2.1. World Bank Database

We begin by delving into the inflation dynamics of Latin American countries versus those of several Advanced economies since 1997, leveraging the comprehensive inflation series from Ha et al. (2023). This dataset includes headline, core, food, and energy CPI inflation across a broad spectrum of countries.

Figure 1(a) illustrates the trajectory of headline inflation rates across Latin American and Advanced economies, featuring the median and the 25th and 75th percentiles of year-over-year data. The graph reveals greater volatility within the Latin American bloc, indicated by a wider interquartile range, denoting more pronounced swings around the median compared to the Advanced economies.[1] Over the analyzed period, Latin American countries persistently report higher median inflation rates; however, this disparity diminishes over time. An overarching downward trend in inflation is apparent from 1997 until the advent of COVID-19 in 2020, with the trend being more pronounced in Latin American countries. Notably, apart from the years surrounding the Global Financial Crisis, the inflation gap between Latin American and advanced economies not only narrows but also reverses in the latest observations. Post-2022, Latin America's inflation rates decreased more rapidly, descending from historic highs not witnessed in many years. This recent reversal in the inflation differential emphasizes the disparity in the pace and magnitude of the responses by central banks to the post-Covid inflationary surge, as discussed in Section 4.

[1] The list countries used for these computations is in table 7 in the appendix.

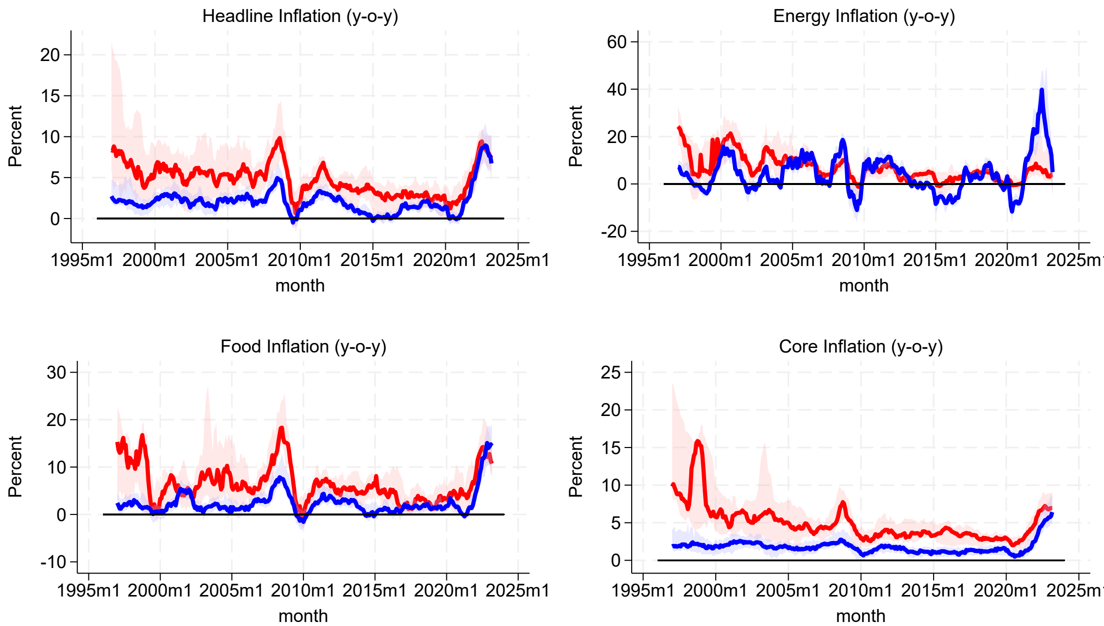


Figure 1: Inflation Patterns in Advanced and Latin American Economies

Notes: Key inflation indices in advanced (blue) and Latin American (red) countries. Monthly data, 12-month percentage change (logarithmic). Lines represent the median across countries within each group, while shaded areas indicate the 25th and 75th percentiles across countries. Source: Own calculations based on data from Ha et al. (2023).

Utilizing the granular inflation data available in the database of Ha et al. (2023), we proceed to examine whether the disparities and observed trends in headline inflation are reflected in its main components. Figure 1(b) displays the energy inflation rates for both blocs of countries. Interestingly, it appears that, on average, the energy inflation rates between Latin American economies and developed economies do not significantly diverge. However, a notably lower volatility in energy inflation is observed within Latin America. This may suggest the presence of more robust energy price regulations in the region's countries, exemplified by the case of MEPCO in Chile.[2]

[2]Established in 2014, MEPCO was implemented with the purpose of creating a stabilization mechanism for the domestic sale prices of automotive gasoline, diesel fuel, liquefied petroleum gas, and compressed natural gas, the latter two being for vehicular use.

On the contrary, food inflation in Latin American countries has been significantly higher and more volatile compared to developed economies. Figure 1(c) reveals that, historically, food inflation was systematically elevated and exhibited greater variability in Latin America, particularly leading up to 2016. In recent times, however, food inflation rates in the region have aligned more closely with those observed in developed economies. Currently, food inflation is marginally higher in developed economies, indicating a convergence in the dynamics of food prices between these contrasting economic regions.

Figure 1(d) reveals that core inflation has been systematically higher across Latin American economies throughout the period under review, including the years impacted by the COVID-19 pandemic. While a declining trend in core inflation is discernible in both Latin American and Advanced Economies, the decrease is markedly more substantial in the former. Additionally, core inflation in Latin America is characterized by greater volatility, though recent patterns indicate a convergence towards those observed in Advanced Economies, albeit at elevated levels. This emerging alignment suggests a gradual convergence in underlying inflationary pressures, notwithstanding the ongoing challenge faced by Latin American countries in dealing with higher and less stable inflation rates.

Analyzing the COVID-19 period, we observe a notable shift in inflationary trends between Latin American (Latam) and Advanced Economies (AEs). During this time, volatility surged in advanced economies, manifesting as a pronounced initial decline in 2020, succeeded by a sharper and more substantial inflationary uptick in 2021 and 2022. This fluctuation is consistent across the three main components of the Consumer Price Index (CPI)——core, food, and energy——with energy inflation experiencing the most significant variance. This distinction in energy inflation can be partially attributed to the substantial impact of the Russian invasion of Ukraine on European energy prices.

Employing the detailed inflation data provided by Ha et al. (2023), our analysis has yielded nuanced insights into the comparative inflation dynamics between Latin American and Advanced economies. Historically characterized by heightened volatility and elevated inflation rates, Latin American economies have, in recent periods, showed a trend towards convergence with the inflationary patterns observed in Advanced economies, particularly in the aftermath of the COVID-19 pandemic. This convergence is nuanced; average energy inflation rates exhibit minimal disparity in levels, but high (and increasing) disparity in volatility across blocs. Similarly, food and core inflation, traditionally more volatile and higher in Latin America, have begun to align more closely with those of Advanced economies, albeit Latin America maintains higher levels. The COVID-19 era and its ensuing years have marked a pivotal shift in inflationary trends, with Advanced economies witnessing a surge in volatility. This inversion in inflation differential, especially pronounced during the pandemic years, accentuates the intricate dynamics of inflation and the divergent responses of central banks to global economic disruptions.

2.2. Central Bank of Chile Database

In the preceding subsection, our analysis utilized official inflation series. However, as Bajraj et al. (2023) highlights, such comparisons are potentially flawed due to variances in the composition and weights of CPI baskets across countries, methodological differences in index computation, and inconsistencies in the availability and definitions of intermediate aggregates like CPI for goods or services. This subsection aims to explore the extent to which this heterogeneity in baskets, weights, and methodologies influences the observed inflation differences between Latin American countries and advanced economies.[3]

To address these complexities, we utilize an updated version of the database developed by Bajraj et al. (2023), which harmonizes the CPI structure across 55 countries in accordance with Eurostat's Harmonized Index of Consumer Prices (HICP) methodology. The authors outline a process for compiling this database that involves collecting highly disaggregated official CPI data, aligning it with the 93 HICP categories at the "class" level, and using them to calculate any desired aggregate index. This calculation may employ either the original weights provided by each country or a standardized set of weights. Applying this uniform methodology across all countries not only facilitates the generation of any aggregate index of interest but also ensures that each index accurately reflects the cost of a comparable basket of goods or services. This approach enables a nuanced analysis of the impacts of various weighting schemes on inflation dynamics. Furthermore, the comprehensive nature of this database, along with the availability of data, permits a detailed examination of inflation dynamics, especially in relation to the COVID-19 pandemic.

Figure 3 replicates the dynamics of the main CPI components for both groups of

[3]Latam countries and advanced economies used in this database are available in the table 8 in the appendix.

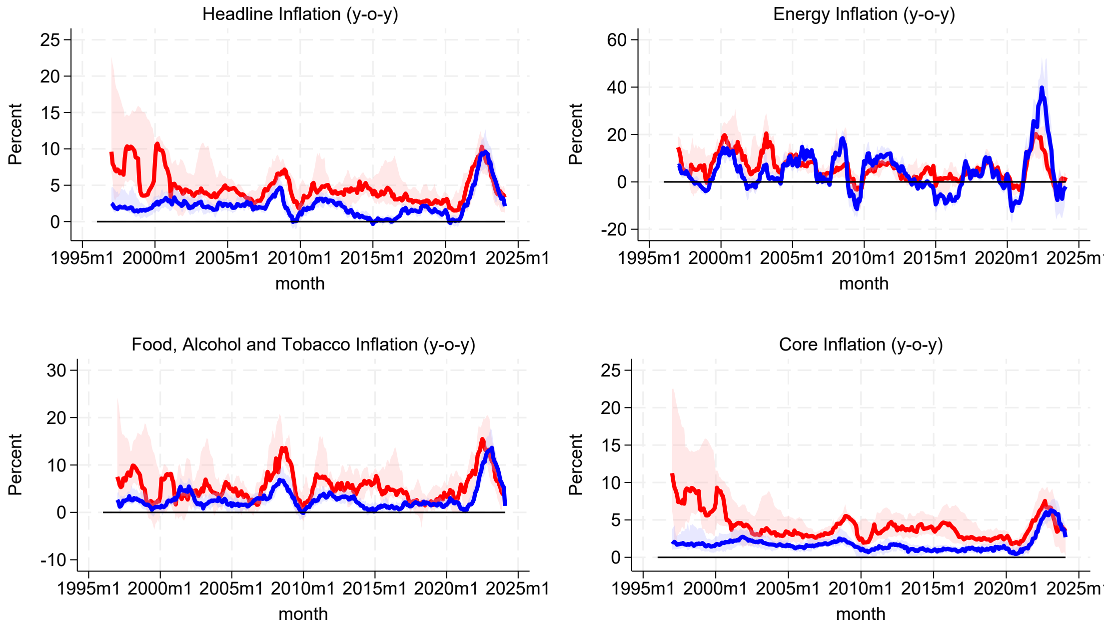


Figure 2: Inflation in Advanced and Latin American Economies (harmonized series)
Notes: Inflation in advanced (blue) and Latin American (red) countries. Monthly data represented as a 12-month percentage change (logarithmic). The lines denote the median inflation rate across countries within each group, with shaded areas highlighting the 25th and 75th percentiles. Price indexes are computed using the HICP methodology and baskets, applying each country's specific weights. Source: Own calculations based on data from Bajraj et al. (2023).

countries using harmonized series. Specifically, the HICP structure and methodology are applied to each country, but the weights of the 93 harmonized CPI components are still based on the most disaggregated official data available for each country[4]. Interestingly, despite the country samples not being identical at all points in time, the most striking patterns observed when comparing the original series from each country are retained in the harmonized series. Notably, except for energy, inflation in Latin American countries has been systematically higher and more volatile than in developed countries, while energy inflation in Latin America, on average, matches that of developed countries, albeit with significantly lower volatility. It also highlights the similarity in both groups of countries in inflationary dynamics during the Covid period and up to the present, in both levels and volatility, across the four

[4]For details on the harmonization procedure, see Bajraj et al. (2023).

series analyzed.

The overall similarity between the original and the harmonized series is largely expected since harmonization does not alter the weights of the underlying disaggregated components in each index but rather changes the structure and marginally modifies the basket of goods and/or services included in each index[5]. Nonetheless, there are notable differences between the series from both exercises, particularly for Latin American countries, where the original series seem to show a more significant and sustained decrease in inflation over the analyzed period.

2.2.1. Analyzing Core CPI Components: Disaggregated Inflation Trends in Goods and Services

We now delve into the nuanced examination of core CPI inflation by separating it into its two principal components: services, and goods excluding energy and food. The utilization of the harmonized database developed by Bajraj et al. (2023) affords us an opportunity to harness highly disaggregated data for this analysis. One of the advantages of this database is its capability to compute any intermediate aggregate index, facilitating a detailed decomposition of inflation. This analysis not only enhances our understanding of the inflationary dynamics within core CPI but also enables us to ascertain the distinct inflationary pressures stemming from goods and services.

Upon decomposing core inflation between goods and services, we find that—-consistent with the findings of Bajraj et al. (2023) for all economies-—service inflation has systematically exceeded that of goods (excluding energy and food) in both groups of countries. However, it is particularly noteworthy that this pattern is especially pronounced in advanced economies, where core goods inflation was very low and stable from the mid-1990s until the onset of COVID-19 (averaging 0.35% annually), whereas service inflation was much higher (averaging 2.3% between 1997 and February 2020), and exhibited a marked decline during the same period, especially following the global financial crisis. This divergence between services and goods is consistent with the documentation by Bajraj et al. (2023). In contrast, in Latin America, while the gap is significant on average, it is less consistent over time, due

[5]At the aggregate level, the main differences between the two types of series are due to the exclusion of elements not included in the HICP structure, such as owner-occupier imputed rent or gambling activities.

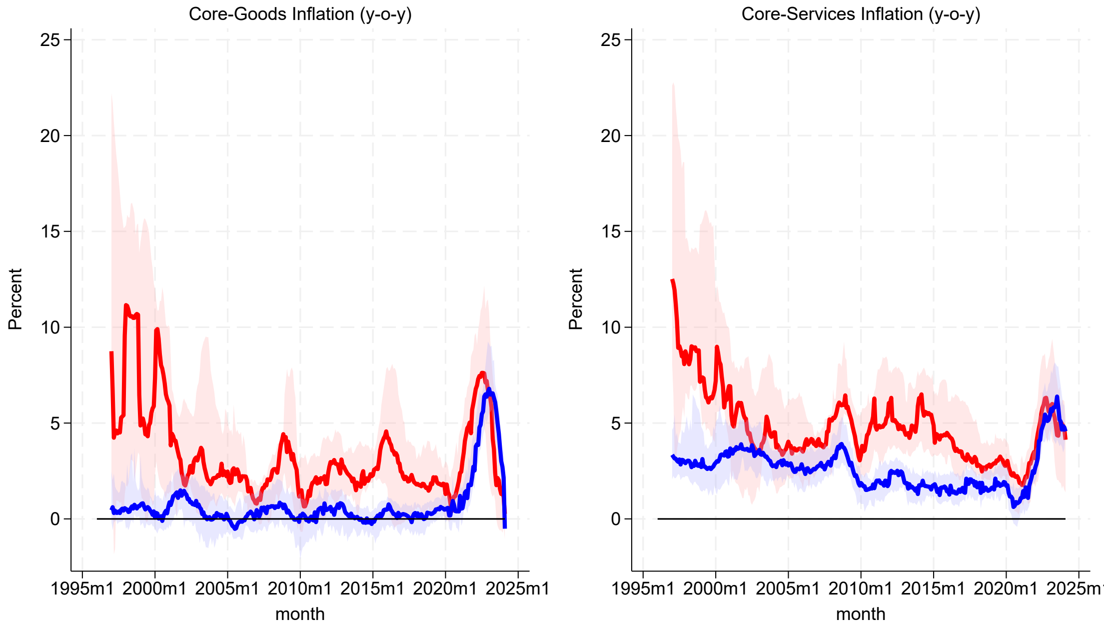


Figure 3: Core CPI Breakdown: Services vs. Goods (Exc.energy & food)

Notes: Inflation in advanced (blue) and Latin American (red) countries. Monthly data represented as a 12-month percentage change (logarithmic). The lines denote the median inflation rate across countries within each group, with shaded areas highlighting the 25th and 75th percentiles. Price indexes are computed using the HICP methodology and baskets, applying each country's specific weights. Source: Own calculations based on data from Bajraj et al. (2023).

to greater volatility in both services and core goods inflation.

The dynamics of goods and services inflation during COVID-19 have indeed been distinctive, displaying a high level of synchronization across both groups of economies. Core goods inflation experienced an earlier surge and reached higher peak levels than services inflation, leading to a negative gap between the inflation of services and goods across both groups of countries from the second half of 2020 to 2022. However, as the supply pressures that had emerged during the pandemic began to subside and the demand for services started to normalize, goods inflation sharply declined in both groups of countries. In contrast, services inflation increased and has subsequently been declining at a much slower pace. These variations in the dynamics of the two broad components of core inflation, which collectively constitute two-thirds of the CPI, highlight the critical need to understand the factors driving each component. Such insights are especially vital for devising an appropriate policy response to substantial deviations from inflation targets, as has been observed in recent times.

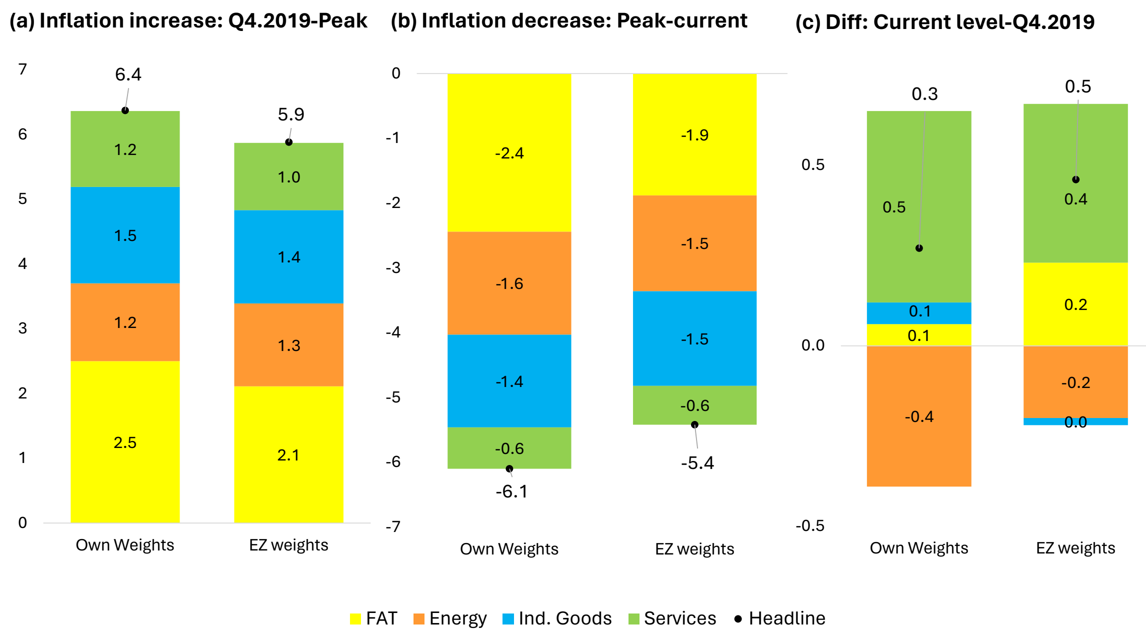


Figure 4: Average Incidence of Main CPI Components – Latin America
Notes: Contributions of main CPI components to changes in annual inflation, expressed in percentage points, using the HICP methodology and baskets. Inflation contributions are measured using each country's specific weights (own weights) and Eurozone weights (EZ weights). "FAT" refers to food, alcohol, and tobacco; "Ind. Goods" excludes energy. Source: Own calculations based on data from Bajraj et al. (2023).

2.3. The role of weights in Harmonized CPI inflation

In this subsection, we assess the role that the weights of CPI basket components play in shaping the overall dynamics of inflation. Our examination up to this point has unveiled both significant differences and strong co-movement in aggregate CPI inflation across different economies. This prompts an important inquiry: To what extent are the variations in inflation dynamics attributable to fluctuations in the inflation rates of disaggregated CPI components versus the distinctive weights allocated to these components in the CPI of each country? Disentangling these factors is not straightforward, as the differences in consumption baskets across countries are not just about weights. They also involve variations in what items are included or excluded from the baskets monitored by statistical offices and how each item is defined. The harmonized consumption baskets (Bajraj et al., 2023) help navigate these complexities by removing differences in both composition and definition, enabling us to compare inflation outcomes using each country's original weights with those using a common set of weights (specifically, the average weights of the Eurozone). This analysis, particularly focusing on the inflation surge during the COVID-19 episode and the subsequent normalization process, is the emphasis of this subsection.

We examine the contribution of the primary CPI components (energy, FAT, industrial goods excluding energy, and services) to the rise in inflation observed from 2021 to 2022 and to the subsequent easing trend. We use Q4 2019 as our baseline—the quarter before the pandemic began. We identify the peak inflation quarter for each country, usually Q2 or Q3 of 2022, and dissect the increase in headline inflation from Q4 2019 to this peak into contributions from each component. We then apply the same method to the reduction phase, calculating the decrease in headline inflation from its peak to the current quarter (Q1 2024) and breaking it down by component. This step helps us determine which components have reverted to pre-pandemic levels and which are still in the process of adjustment.

The analysis is carried out across three distinct groups of countries: Latin America, Advanced economies, and Emerging Market economies (excluding Latin America). We employ two different sets of weights for the 93 harmonized categories: (a) original weights from each country's disaggregated series, and (b) the average weights from the Eurozone, applicable to all countries and as reported by Eurostat. By comparing the decompositions from both sets of weights, we aim to evaluate the impact of varying weights on the level and changes of inflation.

Figure 4 displays the decomposition analysis for Latin American economies. The visualization suggests that the magnitude and composition of shifts in headline inflation are minimally impacted by the choice between national weights and those of the Eurozone. The increase from Q4 2019 to the pandemic peak averaged 6.4 percentage points (pp) using country-specific weights, and 5.9 pp with Eurozone weights (columns 1 & 2). This variation is primarily attributed to a higher incidence from

Table 1: Comparative Weights in Harmonized CPI Components

	FAT		Ind. Goods		Energy		Services	
	Own	EZ	Own	EZ	Own	EZ	Own	EZ
				All				
Mean	25	21	10	10	25	27	40	42
Median	22	20	9	10	26	27	41	42
				Latin America				
Mean	26	22	8	10	25	27	41	41
Median	25	22	9	10	24	27	41	41
				Advanced Economies				
Mean	20	20	10	10	26	27	44	43
Median	20	20	9	10	27	27	43	43
				Emerging Market Economies (ex Latam)				
Mean	33	21	11	10	23	28	33	41
Median	30	20	11	10	24	27	32	42

Notes: Average and median weights across countries in each group are reported in percentage terms. Period 2011-2024. Both exercises employ the HICP methodology and baskets, weighting the 93 harmonized CPI components using either each country's specific weights ("Own") or the average Eurozone-country weights for all countries ("EZ"). "FAT" refers to food, alcohol, and tobacco; "Ind. Goods" includes industrial goods excluding energy. The aggregate weights of the main CPI components using the EZ weights are not uniform across countries because some countries do not have the 93 harmonized categories. In that case, the weights of the available categories are normalized to sum up to 100%. Source: Own calculations based on data from Bajraj et al. (2023).

food (2.5pp with country-specific weights versus 2.1pp with EZ weights) and, to a lesser extent, services (1.2 vs 1.0pp, respectively). The decline from the peak shows a larger gap, with 6.1 pp under national weights and 5.4 pp under EZ weights, largely driven by the greater negative contribution from food when using national weights (columns 3 & 4). When comparing current inflation to Q4 2019 (columns 5 & 6), the data indicates that the impacts of core goods and food have reverted to pre-pandemic levels, whereas energy is marginally below in both assessments. Services, however, remain significantly above their 2019 levels.

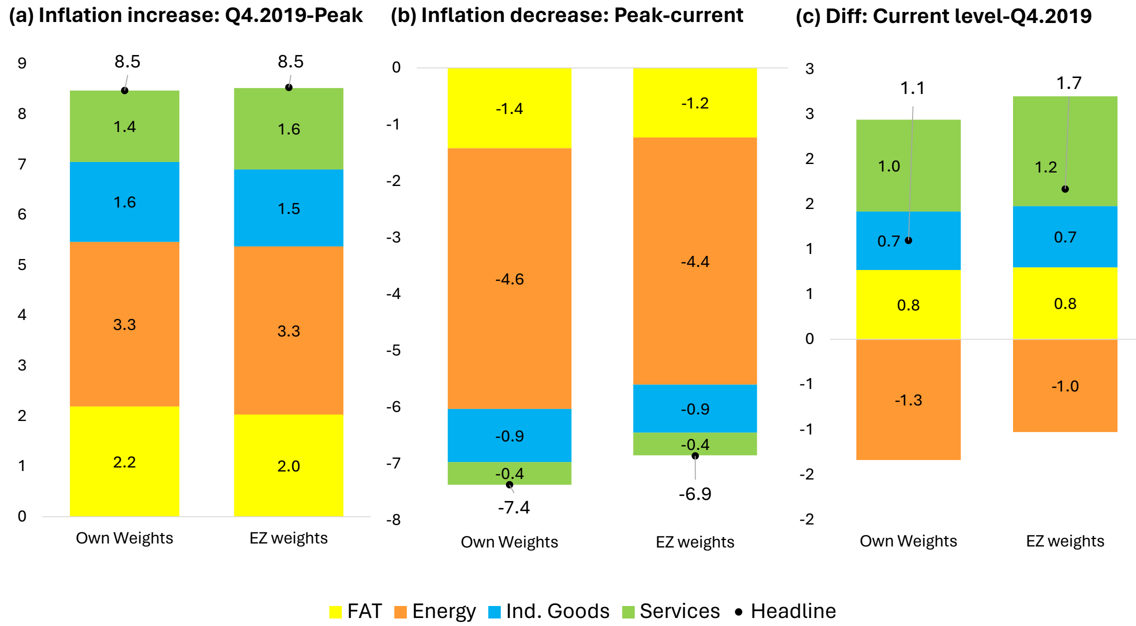


Figure 5: Average Incidence of Main CPI Components – Advanced Economies
Notes: See notes in Fig. 4. Source: Own calculations based on data from Bajraj et al. (2023).

These findings imply that, aside from certain differences in food and services, employing Eurozone weights for aggregate index calculations does not markedly alter the inflation estimations for Latin American countries when CPI baskets have been harmonized. This is consistent with the observation that there are no substantial differences in the weights of the primary CPI components between the baskets of Latin American countries and those of the Eurozone, with the exception of food, which is weighted more heavily in Latin American baskets (Table 1).

Figure 5 provides a decomposition of inflation's rise and subsequent fall during the pandemic for advanced economies (AEs), analyzing the impact of employing local versus Eurozone weights. The comparison reveals minimal differences in both the overall magnitudes and the specific contributions of inflation changes from Q4 2019. This lack of variance largely stems from the inclusion of several Eurozone countries in the sample of developed nations. Table 1 illustrates the congruence in weights across the four CPI components for both weight sets. Notably, the inflation spike from Q4 to its peak (averaging 8.5 percentage points for both calculations)

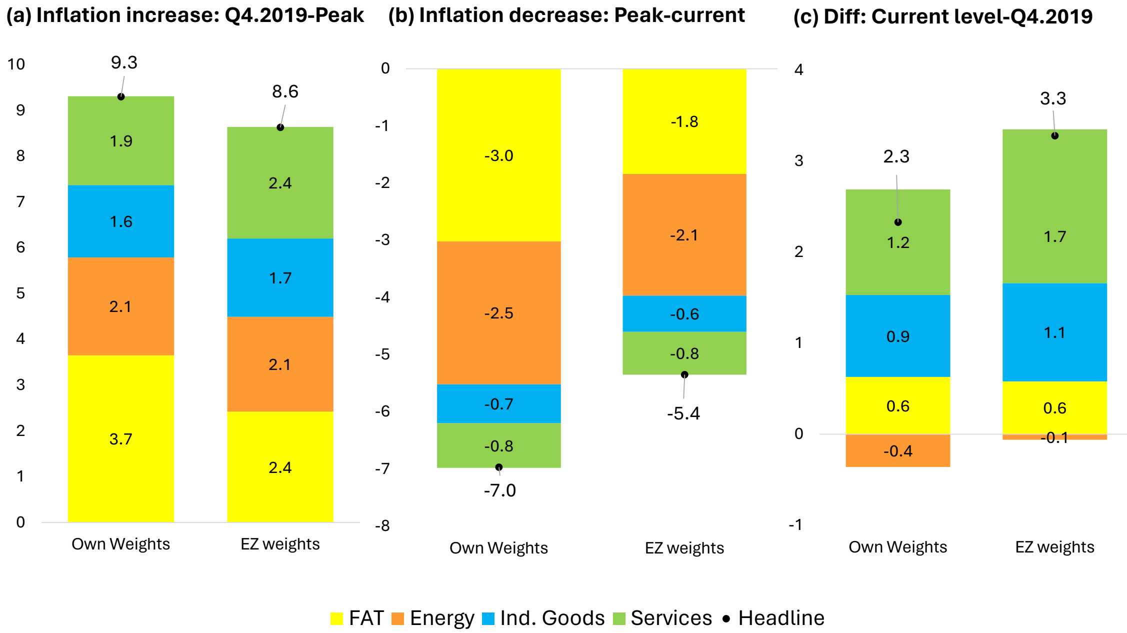


Figure 6: Average Incidence of Main CPI Components – EM Economies (ex Latam)
Notes: See notes in Fig. 4. Source: Own calculations based on data from Bajraj et al. (2023).

exceeds the increase observed in Latin American economies (ranging between 5.9 and 6.4 pp, according to Fig. 4). This rise is driven by significant contributions from energy inflation (3.3 pp) and food (2.2 pp), alongside notable increases in core components (industrial goods and services), which jointly contribute 3.0 pp to the headline inflation increase.

In examining the inflation reduction, energy stands out with a substantial negative impact of approximately -4.5pp, followed by decreases in food and core goods inflation, and lastly, services. The overall outcome (columns 5 & 6) indicates that food and the two core components remain significantly above their pre-pandemic levels, together contributing to an incidence nearly 2.5pp higher than pre-pandemic figures. However, this excess is obscured by the pronounced negative influence of energy prices.

Our investigation into the impact of employing different CPI basket weights on inflation estimations revealed no notable effects on either Latin American or Advanced Economies (AEs). Both regions' country-specific CPI basket weights largely align with those typical of the Eurozone (EZ), suggesting minimal influence from the choice of weights on inflation calculations in these contexts. However, the influence of weight selection becomes more pronounced when considering Emerging Market Economies (EMEs), excluding Latin America. Data from Table 1 indicate significant deviations in average weights between EMEs and the EZ. Notably, Food, Alcohol, and Tobacco (FAT) comprise a larger portion of the basket in EMEs—33% compared to the EZ's 21%—and services hold a smaller share, 33% relative to the EZ's 41%.

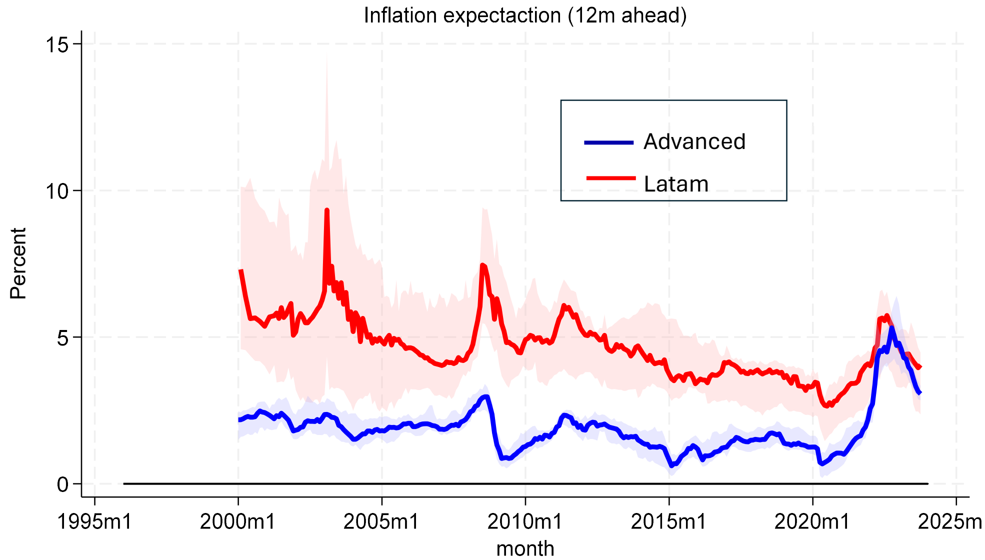
Figure 6 illustrates the tangible impact these weight differences have on inflation estimations. Inflation rise calculated with original weights registers at 9.3 percentage points (pp), versus 8.6 pp with EZ weights. Given the countervailing effects of food and services, compositional changes are accentuated—FAT's contribution alone shifts from 3.7pp under original weights to 2.4pp with EZ weights. More pronounced disparities emerge in the analysis of inflation decline—7.0pp with original weights versus 5.4pp with EZ weights, with FAT's contributions being -3.0 and -1.8pp, respectively. Additionally, evaluating the current inflation scenario presents significant differences: 2.3pp above the pre-pandemic level with country-specific weights, compared to a 3.3pp increase using EZ weights.

In essence, variations in CPI basket weights between different economic contexts can yield divergent interpretations of inflation dynamics. Such differences are particularly relevant for monetary policy formulation, underscoring the necessity of considering weight selection's potential effects on inflation analysis.

2.4. Inflation expectations and Phillips curve estimation

Inflation expectation data are from Consensus Forecast, which reports forecasts for annual inflation for December of the year of the survey and the next year. To generate a series for 12 months ahead of inflation expectation, we follow Brito et al. (2018), who use a weighted average between the forecast for December of the current year and the next one. The weight for the current year forecast corresponds to the months remaining in the year at the time of the survey divided by twelve. Figure 7 shows the evolution of the inflation expectations across advanced economies and its comparison with Latin American economies.

The level of inflation expectations has tended to be higher in Latin America than in advanced economies. Since 2000, the difference between these two types of countries has reduced until 2020. Also, we note more cross-country variation in Latin America than in advanced countries, as shown by the area marked by the 25-75 percentiles in figure 7. The increase in inflation expectations was more intense post-COVID and was more acute than in Latin America. In fact, advanced economies



Note: Own calculation based on Consensus Forecast data. Lines corresponds to the median across countries and shaded areas denote the 25 and 75 percentiles across countries.

seem to converge from below the level of inflation expectations in Latin America during 2021-2022. Inflation expectations have moderated from their peaks in the last part of 2022.[6] Hence, the gradual conquest of inflation expectations in Latin America has been under test after COVID.

In order to analyze in more detail the inflation dynamics in Latin America and its comparison with advanced economies, we estimate a hybrid Phillips curve using quarterly data from 2000Q1 to 2023Q3. The specification used is the following:

$$\pi^c_{i,t} = \beta_0 + \beta_1 \sum_{k=1}^{4} \frac{\pi^c_{i,t-k}}{4} + \beta_2 \pi^e_{i,t-1} + \beta_3 \sum_{k=1}^{4} \frac{y_{i,t-1}}{4} + \gamma' Z_{i,t-1} + u_{i,t} + \theta_t + \varepsilon_{i,t}, \quad (1)$$

where $\pi^c_{i,t}$ is quarter-over-quarter inflation rate annualized for core CPI in country i in quarter t, $\pi^e_{i,t}$ is inflation expectation 12 month ahead in country i in quarter t (from the Consensus Forecasts), y_t is the output gap computed using the Hodrick-Prescott filter applied on the log of the real GDP in country i in quarter t. Real GDP series (seasonally-adjusted) data were obtained from the International Monetary Fund's IFS.

[6]Data for inflation expectations are until September 2023 in figure 7.

Parameters β_1, β_2, and β_3 capture, respectively, the role of past inflation, inflation expectations, and economy slackness measured by the output gap. We include other controls contained in $Z_{i,t-1}$, such as the past inflation of food and energy The estimation also considers country fixed effects (u_i) and time fixed effects (θ_t).[7]

Since we are using quarterly inflation rate as the dependent variable, it is important to highlight that the quarterly inflation rate is seasonally adjusted. In fact, the Harmonized CPI constructed by Bajraj et al. (2023) are already seasonally adjusted. In the case of the CPI from Ha et al. (2023), we remove any eventually seasonality with quarter dummies estimated country by country.

The equation (1) is estimated separating the Latin America countries from advanced ones. Due to data availability, the sample for Latin America corresponds to Brazil, Chile, Colombia, Mexico and Peru. The list of advanced economies consists of intersection of countries presented in tables 8 and 10 in the appendix, when estimating with database in Bajraj et al. (2023). In the case of CPI from Ha et al. (2023), the list of advanced economies corresponds to the intersection in tables 10 and 7 in the appendix.

Table 2 has the results of the estimations. We denote the estimation with CPI from first database as "WB" (World Bank,Ha et al. (2023)), whereas the ones with the second database as "CBCh" (Central Bank of Chile, Bajraj et al. (2023)). Using quarter-over-quarter inflation rate reduces the size of the inflation persistence captured by the coefficient on lag inflation in comparison with other studies that use year-over-year inflation (see, for instance Kamber et al. (2020)). In any case, the persistence is slightly more evident in advanced economies than in Latin America.

Other salient result is the fact that lag inflation expectations has a substantial role to explain inflation dynamics in both Latin America and in advanced economies. The role of excess of demand is also present in both type of countries, with a lag output gap generating a rise in inflation. Interestingly, the estimation result for advanced economies is quite similar using either the database from Ha et al. (2023) for prices or from Bajraj et al. (2023). The estimation for the five Latin American countries tend to change more with using one database for prices or the other. In fact, the role of inflation expectations increases markedly and the size (and its statistically significance) of output gap coefficient reduces with the harmonized CPIs

[7]We also estimate other specifications, including the nominal exchange rate devaluation, but this variable turns to be statistically insignificant once the inflation expectations are included.

Table 2: Phillips Curve Estimation for core Inflation. World Bank and Central Bank of Chile databases

Database	WB		CBCh	
Countries	LA5	ADV	LA5	ADV
Variable				
lag inflation	0.188*	0.328***	0.163	0.231**
	(0.0745)	(0.110)	(0.0960)	(0.0905)
lag inf. expectation	0.464*	0.471**	0.693*	0.581***
	(0.191)	(0.196)	(0.263)	(0.145)
lag output gap	0.383***	0.105**	0.169	0.0913**
	(0.0546)	(0.0462)	(0.123)	(0.0423)
Observations	331	1,564	448	1,540
R-squared	0.660	0.436	0.670	0.597
N. countries	4	17	5	17

Additional controls are a constant, lags of inflation of other CPI's components, country fixed effects, and time fixed effects. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

obtained from Bajraj et al. (2023).

To analyze further the determinants of core inflation, we separate core inflation for goods and services using the database on harmonized CPI. Hence, we estimate Phillips curve as (1), but having as dependent variable the core inflation for goods and services separately. In this specification, we add also the possibility that core inflation in services propagates to core inflation in goods, and that past core inflation in goods affects also core inflation in services. The results for these estimations are shown in table 3. The estimation highlights some key difference in the dynamic of core inflation in goods and services. In the case of advanced economies, there is no much change in the relative importance of lag inflation and inflation expectations in explaining the dynamic of core inflation in goods or services. However, the output gap seems more determinant in influencing core inflation in services, but not necessarily in goods.

In the case of the Latin America, the estimation in table 3 shows more difference in the dynamics of core inflation in goods and services. We do observe much more

Table 3: Phillips Curve Estimation for core Inflation. Goods and Services components

Type	Core goods		Core services	
Countries	LA5	ADV	LA5	ADV
Variables				
Lag inflation	0.615***	0.261***	0.135	0.207**
	(0.0493)	(0.0755)	(0.0811)	(0.0732)
Lag Inf. expectation	0.392	0.631***	0.940*	0.576***
	(0.255)	(0.164)	(0.396)	(0.154)
Output gap	0.218**	0.0379	0.136	0.126**
	(0.0738)	(0.0620)	(0.132)	(0.0443)
Lag core good inf.	–	–	-0.0133	0.0149
	–	–	(0.0551)	(0.0576)
Lag core serv inf.	-0.518**	-0.0276	–	–
	(0.119)	(0.0911)	–	–
Observations	448	1,540	448	1,540
R-squared	0.719	0.497	0.597	0.505
N. countries	5	17	5	17

Additional controls are a constant, lags of inflation of other CPI's components, country fixed effects, and time fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

persistence of core inflation in goods with a lower and not statistically significance of the inflation expectations. At the same time, core inflation in goods in Latin America is more determined by output gap and past core inflation in services. The last feature suggests a relative price adjustment linked to the exchange rate since a rise in the price of services can be related to a real and nominal exchange rate appreciation that reduces the prices of imported goods in Latin American countries. In contrast, the core inflation in services in Latin America seems exclusively dominated by inflation expectations with a coefficient close to one, whereas lag inflation and output gap have no statistically significant effect.

To finalize this subsection, we use the previous Phillips' curve estimations to decompose the changes in core inflation in two different episodes in Latin America. One episode corresponds to the boom inflation in Latin America before the Global Financial Crises, specifically between the fourth quarter of 2006 and the fourth quarter of 2008 (2006Q4-2008Q4). The other episode is the more recent one, between the fourth quarter of 2020 and the fourth quarter of 2022 (2020Q4-2022Q4).

In each episode, we compute the increase in the accumulated quarter inflation over a year from the initial quarter and the last quarter for the five Latin American countries and then we take the simple average across the five countries. Table 4 shows the increase in core inflation in goods (year-over-year) was almost 2.1 percentage points during 2006Q4-2008Q4 and was close to 7.4 percentage points during 2020Q4-2022Q4. In the case of core inflation in services, the rise in core inflation in services was 2.6 percentage points during 2006Q4-2008Q4 and 5.6 percentage points during 2020Q4-2022Q4.

Using the Phillips curve estimated, we also calculate the contribution of each factor in the rise of the inflation in each type of items (goods and services) and for each episode. Formally, we compute the change in the different regressors during each episode multiplied by the estimated coefficient. For instance, the contribution of change in inflation expectations in country i to explain the change in core inflation in goods is computed as:

$$\hat{\beta}_2^g \frac{\left(\sum_{j=1}^{4} \pi^e_{i,T_f-j}\right) - \left(\sum_{j=1}^{4} \pi^e_{i,T_i-j}\right)}{\left(\sum_{j=0}^{3} \pi^{c,g}_{i,T_f-j}\right) - \left(\sum_{j=0}^{3} \pi^{c,g}_{i,T_i-j}\right)}$$

where T_i is the first quarter in the episode, T_f is the last quarter in the episode, $\pi^{c,g}_{i,t}$ is the quarter inflation rate for core goods in country i and quarter t, and $\hat{\beta}_2^g$ is the estimated coefficient for inflation expectations for core inflation in goods (see table 3). We then take average of this contribution across the five Latin American countries to obtain the associated percentage. Hence, the contribution of change in inflation expectation in core inflation for goods in Latin America is 12 percent during 2006Q4-2008Q4 and during 2020Q4-2022Q4. Equivalent computations are performed to obtain the contribution of persistence or lag inflation, output gap, and the past inflation of other prices. We also compute the effect of changes in the estimated time effects and the residuals.

The main messages derived from this estimation are the following. First, although it is well recognized that the inflation boom post COVID has been more intense that

Table 4: Decomposition of change in core inflation in Latin America. Separating Goods and Services

	Core goods		Core services	
Episode	2006Q4-2008Q4	2020Q4-2022Q4	2006Q4-2008Q4	2020Q4-2022Q4
Total (pp)	2.07	7.35	2.62	5.64 5
Factors:				
Persistence	3%	52%	3%	7%
Inf. expectations	12%	12%	24%	38%
Output gap	24%	7%	12%	6%
Other prices	21%	-5%	-4%	2%
Time FE	39%	34%	65%	47%
Error	0%	0%	0%	0%

the one observed during 2006Q4-2008Q4, the rise in core inflation in goods in the recent episode is almost four times bigger that the one experienced in the 2006Q4-2008Q4 episode. The comparison for core inflation in services is much moderated, with the recent episode being a little more than the double the increase in the previous episode. Second, output gap was relatively more important to explain the core inflation rise in goods and services during 2006-2008 than in the recent episode.

Third, the evolution of other prices was only more relevant to explain core inflation rise during 2006-2008. Fourth, the role of persistence is not high except in the recent episode for core inflation in services, which tends to explain around 50 percent of the rise. Fifth, the change in inflation expectations are crucial to explain the core inflation rise in services, but in the recent episode this factor are turned to be more determinant.

Finally, the change over time in common factors across Latin American countries not captured by lag inflation, inflation expectation, output gap, and other prices explain a substantial fraction of the change in inflation. This is measured by the role of changes in time-fixed effects (Time FE in table 4), which tends to explain between one-third and two-thirds of the rise of core inflation in these two episodes. These time effects might reflect the incidence of global factors for Latin American core inflation. In any case, they are more important to explain the core inflation increase in services, particularly in the 2006-2008 episode.

Table 5: Decomposition of change in core inflation 2020Q4-2020Q4 Latin America and Advanced economies. Separating Goods and Services

	Core goods		Core services	
Countries	LA5 economies	Adv. Economies	LA5 economies	Adv. Economies
Total (pp)	7.35	6.09	5.64	5.03
Factors:				
Persistence	52%	17%	7%	11%
Inf. expectations	12%	27%	38%	30%
Output gap	7%	0%	6%	2%
Other prices	-5%	9%	2%	7%
Time FE	34%	42%	47%	31%
Error	0%	5%	0%	19%

To extract more insights from the recent episode, we reproduce the decomposition of the core inflation rise in Latin America comparing it with advanced economies. This comparison is shown in table 5. The first salient observation is a more balanced role of persistence and inflation expectations in explaining core inflation for goods and services in advanced economies. A second observation is than other prices increases exerted a small, but a relevant role in the core inflation rise in goods and services during 2020Q4-2022Q4 in advanced economies. This last aspect is not part of the inflation dynamics in Latin America in the recent episode. A third conclusion is that the change in the time fixed effects was more important to explain the core inflation increase in goods than in services in advanced economies during 2020Q4-2022Q4, whereas the opposite occurs in Latin America.

3. Transmission of supply shocks to core inflation

A recurrent factor behind inflation fluctuations is the evolution of oil and energy prices. Many studies have documented the significant relevance of explaining the rise of headline and core inflation due to oil and energy price booms. Of course, the intensity of the pass-through of oil and energy prices to other prices has reduced compared to what we witnessed during the 1970s (e.g., Blanchard and Galí (2010)). However, the importance of oil and energy prices is still evident as a driver of inflation in many countries, as Ha et al. (2023) and Kilian and Zhou (2023) have recently shown. Moreover, the recent rise in inflation post-COVID was exacerbated by oil and energy prices during 2022. In this section, we revisit the propagation of supply shocks, such as energy prices to core inflation. Using the database on harmonized CPI, we estimate the pass-through to core inflation by comparing Latin America with advanced economies. We also analyze the pass-through of food price shock to core inflation. Like the literature that has explored the state-dependent nature of exchange rate pass-through (e.g., Carrière-Swallow et al. (2021), chapter 5 in Ha et al. (2019), Carriere-Swallow et al. (2023)), we estimate how the intensity of the pass-through of energy prices depends on the past level of headline inflation and inflation expectations.

Based on Jordà (2005) and Carriere-Swallow et al. (2023), we use the methodology of local projections to estimate the effects of energy price shock in core inflation. Formally, we estimate the following equation to determine the effect of energy price on core prices after h quarters:

$$p^c_{i,t+h} - p^c_{i,t-1} = \beta_h(p^e_{i,t} - p^e_{i,t-1}) + \theta'_h M_{i,t-1} + \gamma_i + \gamma_t + \epsilon_{i,t}, \tag{2}$$

where $p^c_{i,t}$ is the log of the core CPI in quarter t in country i, $M_{i,t-1}$ is a vector of country specific controls. These controls are lagged core inflation, lagged energy inflation, lagged food inflation, lagged inflation expectation, and lagged exchange rate devaluation. The specification in (2) also includes country fixed effects (γ_i) to account for cross-country differences that are unvarying over time (such as average inflation). The time-fixed effects (γ_t) capture unobservable time-varying factors common to all countries in the estimation. We are interested in parameter β_h that captures the effect of energy price shock on core price h quarters ahead.

We estimate (2) separating Latin America from Advanced Economies. For the price indices, We use the database by Bajraj et al. (2023), which has core prices separating goods and services. Hence, we can estimate (2) using either core prices for goods or services.[8]

Figure 8 shows that energy prices tend to have a higher propagation to core inflation in Latin American countries than in Advanced countries. To analyze how the propagation of energy price shock to core inflation has changed, we split the sample into two sub-periods: 2000Q1-2011Q4 and 2012Q1-2023Q4. The estimated responses separating these two sub-periods are shown in figure 9. Panel A has the responses in the two sub-periods for advanced economies and panel B for Latin American economies.

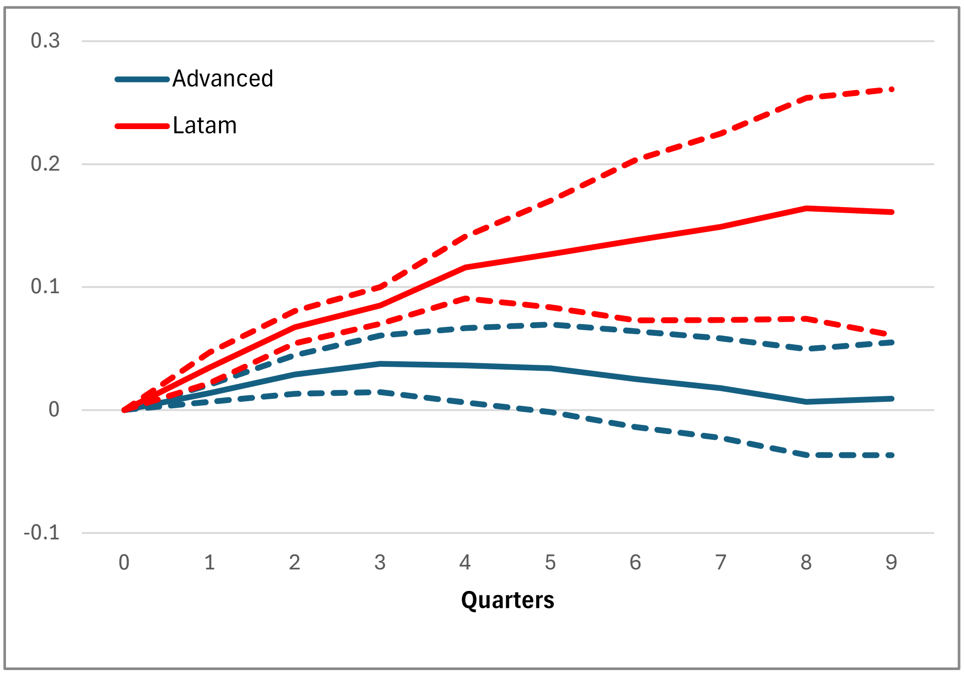
We see little difference in the propagation of energy prices in advanced economies across sub-periods. In the case of Latin America, we observe more differences across sub-periods, with a few smaller responses to core inflation in the more recent period at longer horizons. However, there is no evidence of a very statistical difference across sub-periods in the case of Latin America, mainly due to more imprecise estimation in the first sub-period. In any case, the conclusion that energy price shocks transmit more intensively in Latin America than in Advanced economies is preserved when we estimate these effects in the more recent period.

Using the database by the Central Bank of Chile, we can re-estimate equation (2) separating core inflation in goods from services. In this specification, we add past core inflation in services as control when the dependent variable is the change in core prices in goods. Similarly, we add control core inflation in goods in the estimation to explain the change in core service prices. The estimated responses to energy price shocks separating core prices in goods and services are shown in figure 10. Panel A of this figure has responses for good prices that separate Latin America from advanced economies. Panel B does the same for the case of responses to service prices.

Figure 10 stresses that the higher propagation in Latin America than in Advanced economies is obtained similarly in either goods or services. Why is the propagation of energy price shocks higher in Latin America than in advanced economies? One simple explanation would be to argue that the share of energy as input for producing and distributing several goods and services is higher in Latin America than in advanced economies. Is that explanation enough to reconcile these differences in the propagation of energy price shocks? To analyze other possible explanations, we try to extend our previous estimation in equation (2) to allow for changes in the propa-

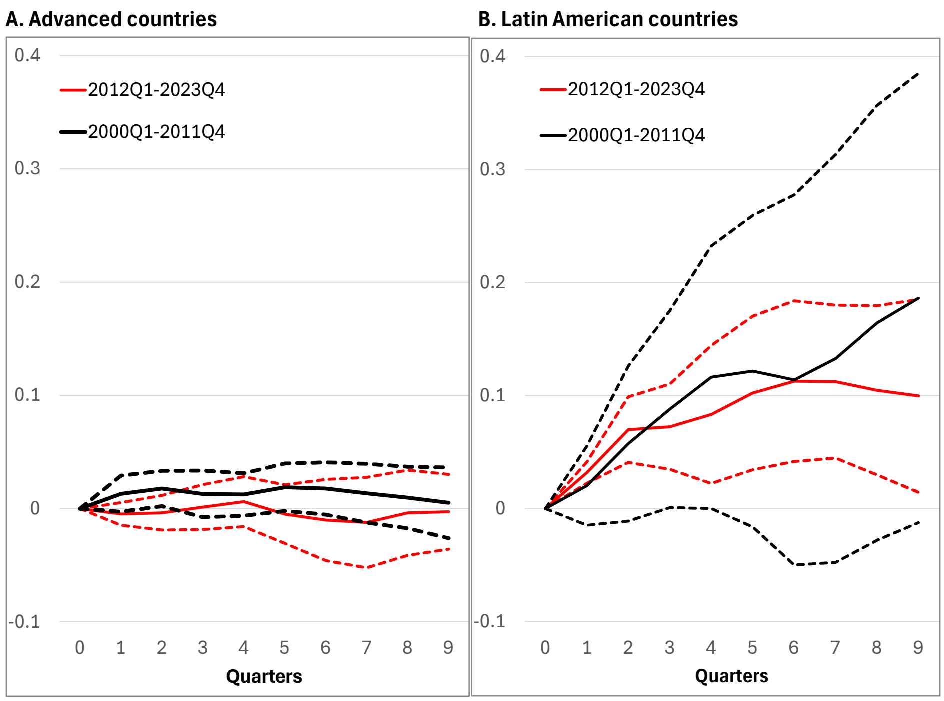
[8]The list of countries used corresponds to the intersection of countries with data in the Central Bank of Chile database in table 8 and countries with data on inflation expectations in table 10.

Figure 8: Response of core CPI to energy price shock



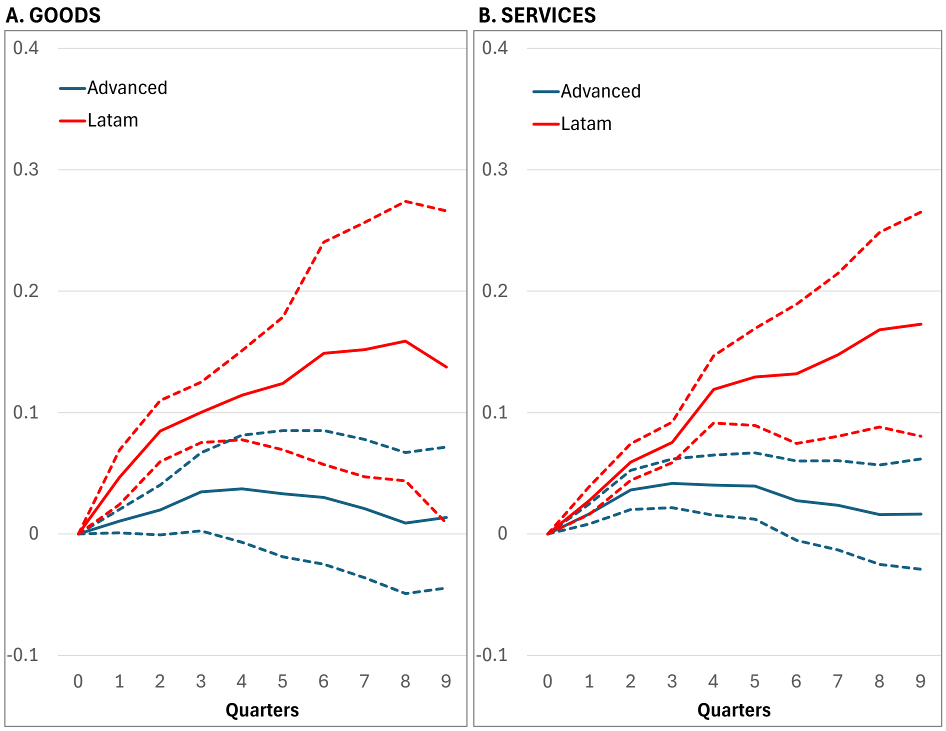
Note: Percentage points; 90 percent confidence interval marked with dashed lines.

Figure 9: Response of core CPI to energy price shock. Comparison across different samples



Note: Percentage points; 90 percent confidence interval marked with dashed lines.

Figure 10: Response of core CPI to energy price shock. Comparing goods and services



Note: Percentage points; 90 percent confidence interval marked with dashed lines.

gation of energy price shocks with the state of the economy. This idea is similar to what has been considered for the case of exchange rate pass-through. The variation of the exchange rate pass-through to inflation across countries is related to the nature of the shock-triggering currency movements and country-specific characteristics. Moreover, Carriere-Swallow et al. (2023) shows that the exchange rate pass-through varies with the level of headline inflation, the business cycle position, and the level of uncertainty. In this work, we will analyze how headline inflation and inflation expectations could affect the intensity of the pass-through of energy price shock to other prices.

In the same manner as the exchange rate pass-through has shown variation over time related to country characteristics at the moment of the shock, we can explore if the transmission of energy prices depends on the state of the economy. Analyzing whether the level of headline inflation or inflation expectations affect the size of propagation of energy price shock requires modifying the equation (2). In particular, we are interested in including the fact that the effect of energy price shocks depends on the level of headline inflation. To implement this, we follow Auerbach and Gorodnichenko (2012), who propose a smooth transition VAR estimation to estimate the fiscal multiplier in expansion and recession. In doing so, we modify equation (2) to incorporate the possibility that an additional effect of energy price shock to core price when the level of headline inflation is high:

$$\begin{aligned} p^c_{i,t+h} - p^c_{i,t-1} &= f(z_{i,t-1})\beta_{1,h}(p^e_{i,t} - p^e_{i,t-1}) + \beta_{0,h}(p^e_{i,t} - p^e_{i,t-1}) \\ &\quad + f(z_{i,t-1})\theta'_{h,1} M_{i,t-1} + \theta'_{h,0} M_{i,t-1} + \gamma_i + \gamma_t + \epsilon_{i,t} \end{aligned} \tag{3}$$

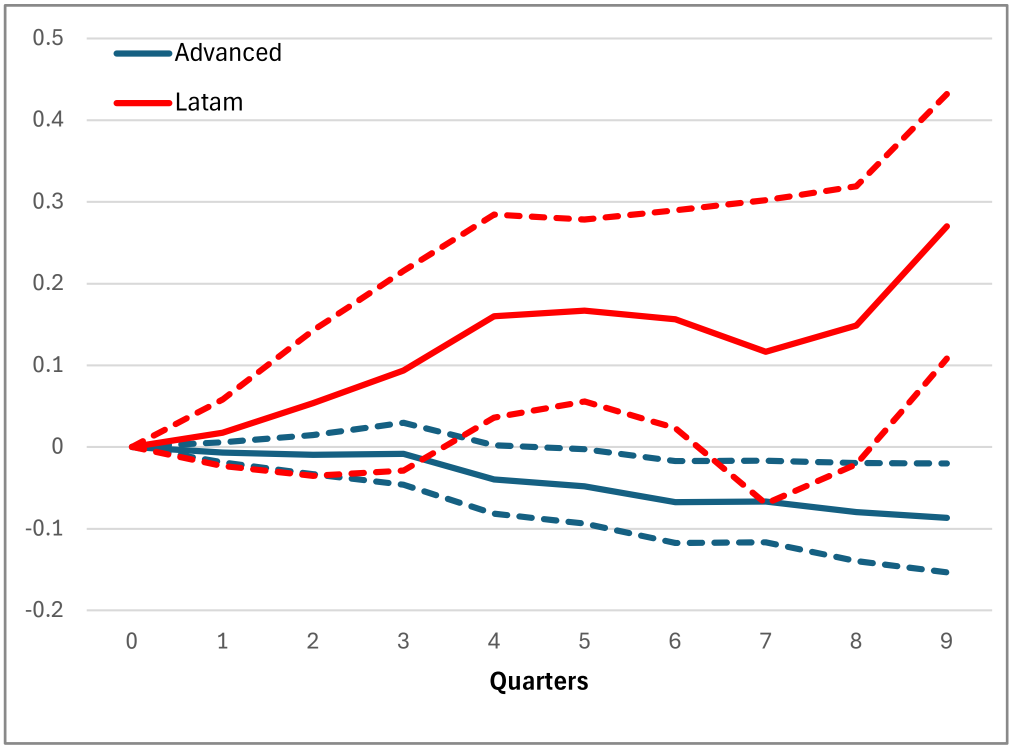
$$f(z_{i,t}) = \frac{\exp(\gamma z_{i,t})}{1 + \exp(\gamma z_{i,t})} \tag{4}$$

where $z_{i,t}$ is a normalized variable for the headline inflation (year-over-year) level in country i at quarter t. We compute the quarter-moving average for the annual headline inflation for each country, denoting this variable as $x_{i,t}$. Then, $z_{i,t} = (x_{i,t} - \mu_{x,i})/\sigma_{x,i}$, where $\mu_{x,i}$ and $\sigma_{x,i}$ are the sample mean and standard deviation of variable $x_{i,t}$ for country i. We set $\gamma = 2.5$, which is within a range of values used in other studies that use this type of specification (e.g., Auerbach and Gorodnichenko (2012); **?**). It is worth noting that this specification is equivalent to the one used by Carriere-Swallow et al. (2023)to estimate exchange rate pass-through depending on the level of inflation and other variables that can affect the state of the economy.

In the specification given by equations (3)–(4), when $f(z_{i,t-1})$ is close to one means the economy has been in a regime of high level of headline inflation. In contrast, when $f(z_{i,t-1})$ is close to zero, it captures the opposite situation, and the economy has been at a low level of headline inflation. In consequence, $\beta_{0,h}$ will measure the effect of energy price shocks on core prices h quarters ahead under a regime of low level of headline inflation, whereas $\beta_{1,h}$ will estimate the *additional* effect of energy price shocks (relative to the low level of headline inflation) when the economy is in a regime of high level of headline inflation.

The estimation for $\beta_{1,h}$ are presented in figure 11. This figure highlights that when the headline inflation has been high, the pass-through of energy price shocks to core inflation is higher in Latin America. More importantly, this additional effect is not present in the case of advanced economies when we see a smaller negative additional effect. This means that when headline inflation has been high in advanced

Figure 11: Response of core CPI to energy price shock. Additional effect under a regime of high level in headline inflation

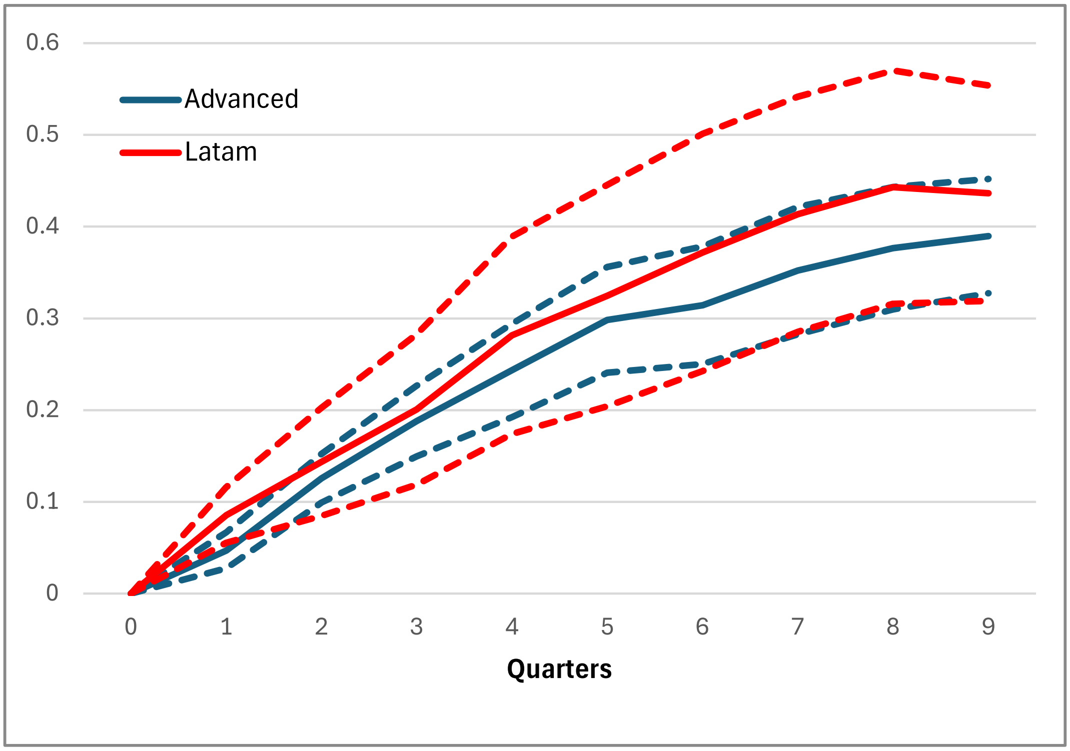


Note: Percentage points; 90 percent confidence interval marked with dashed lines.

economies, the propagation of energy price shocks to core prices tends to reduce. This result is in line with Carriere-Swallow et al. (2023), who find that the exchange rate pass-through to inflation is higher under a regime of high headline inflation in a sample of both emerging and advanced economies. In our case, we find evidence that this additional effect of shocks to core inflation under high headline inflation is observed in Latin America, but not for advanced economies.

Presumably, food prices are more relevant in Latin America than in advanced economies to explain total inflation. We apply the same type of estimation given in (2) to find out whether food price shock has a higher propagation to core inflation in Latin America than in advanced economies. Thus, we use the local projection approach to estimate the responses of core prices to food price shocks using the

Figure 12: Response of core CPI to food price shock.



Note: Percentage points; 90 percent confidence interval marked with dashed lines.

following equation:

$$p^c_{i,t+h} - p^c_{i,t-1} = \beta_h(p^f_{i,t} - p^f_{i,t-1}) + \theta_h' M_{i,t-1} + \gamma_i + \gamma_t + \epsilon_{i,t} \tag{5}$$

where now $p^f_{i,t} - p^f_{i,t-1}$ corresponds to the change (in logs) of the food prices in the country i in quarter t. We use the same controls as described for equation (2).

Figure 12 has the estimated responses separating Latin America and advanced economies. Surprisingly, we do not find evidence that the responses to core prices are higher in Latin America than in advanced economies. In both countries, the propagation tends to be more intense than the one estimated for energy prices.

As previously discussed, the pass-through of food price shocks to core inflation may depend on the state of the economy. For that reason, we estimate the following version of the equation (3) in the case of food price shocks:

$$\begin{aligned} p^c_{i,t+h} - p^c_{i,t-1} &= f(z_{i,t-1})\beta_{1,h}(p^f_{i,t} - p^f_{i,t-1}) + \beta_{0,h}(p^f_{i,t} - p^f_{i,t-1}) \\ &\quad + f(z_{i,t-1})\theta'_{h,1}M_{i,t-1} + \theta'_{h,0}M_{i,t-1} + \gamma_i + \gamma_t + \epsilon_{i,t} \end{aligned} \tag{6}$$

$$f(z_{i,t}) = \frac{\exp(\gamma z_{i,t})}{1+\exp(\gamma z_{i,t})} \tag{7}$$

In contrast to the case of energy price shocks, we assume two alternative specifications for defining the regime through variable $z_{i,t}$. One will be based on past headline inflation, and the other on past inflation expectations.

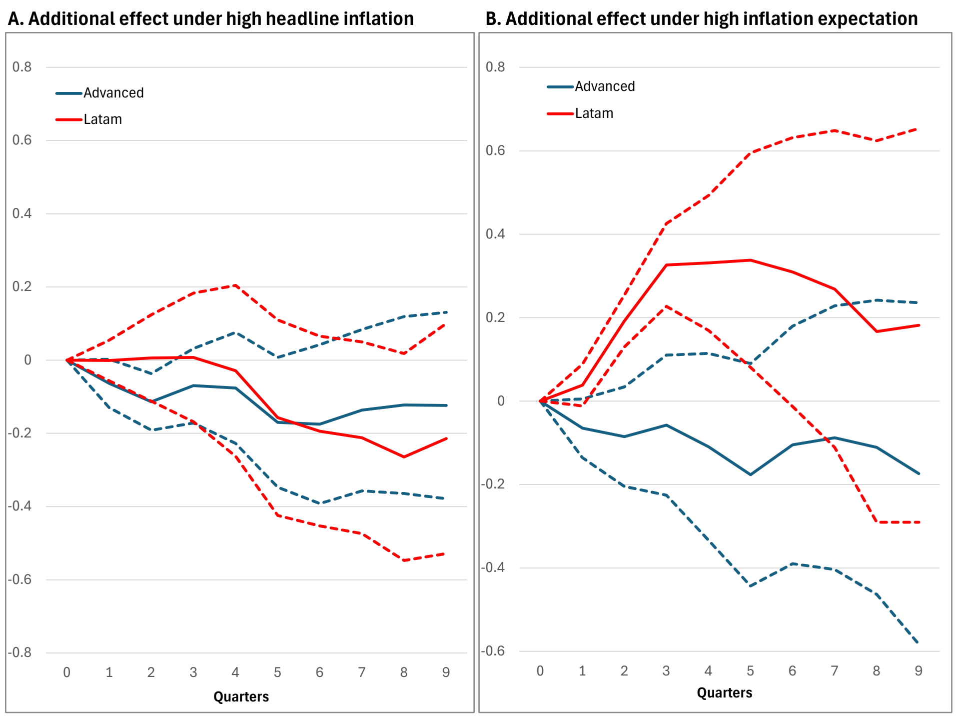
The coefficient $\beta_{1,h}$ now measures the additional effect of food price shock on core prices when the headline inflation is high or when the inflation expectations are high. Figure 13 has the estimated responses, again separating Latin America and advanced economies.

Panel A in figure 14 shows the additional effect of food price shock when the headline inflation is high. In contrast, panel B has an additional response when the inflation expectations are high. We have no evidence that the propagation of food prices to core prices is more intense in Latin America when headline inflation is high, something that is also observed in the case of advanced economies (see panel A).

However, in panel B, we observe that the transmission of food price shocks is more intense in Latin America when the inflation expectations are elevated. Moreover, this additional effect under high inflation expectations is not present in the case of advanced economies. This is a key result since if it is well established that emerging economies tend to have inflation expectations less well-anchored (e.g Kose et al. (2019)). Moreover, Carrière-Swallow et al. (2021) and Cuitiño et al. (2022) have evidence that economies with inflation expectations better anchored around the inflation target are able to have a lower exchange rate pass-through. This evidence highlights the benefit of monetary policy credibility in stabilizing inflation over the medium-term. That credibility helps to reduce the propagation of shocks to inflation. A similar argument can be derived for the transmission of supply shocks such as food price shocks. Our result in figure 13 suggests that the problem of credibility in inflation expectations and its effect in intensifying food price shocks in present in Latin America, but not in advanced economies.

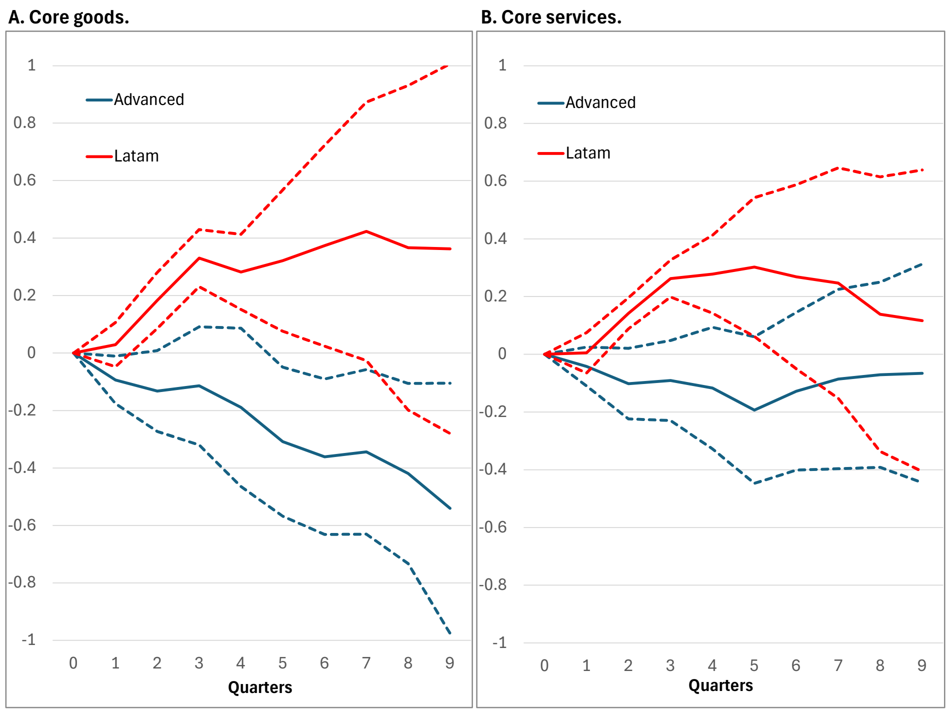
Since food price shocks propagate more intensively in Latin America under high inflation expectations, a natural follow-up question is to analyze if these additional

Figure 13: Response of core CPI to food price shock. Additional effects



Note: Percentage points; 90 percent confidence interval marked with dashed lines.

Figure 14: Response of core CPI to food price shock. Additional effects under high inflation expectations



Note: Percentage points; 90 percent confidence interval marked with dashed lines.

effects are also present separately in the case of core prices in goods and services. Figure 14 shows the estimated additional responses when inflation expectations are high. Panel A contains the additional responses for core prices in goods separating Latin America and advanced economies. Panel B shows the same in the case of responses for core price in services. The higher propagation of food price shocks to core prices under high inflation expectations is present in both goods and services in the case of Latin America. As in the aggregate core prices, the higher propagation of food price shocks does not manifest in the case of advanced economies. Moreover, the propagation of food price shocks tends to reduce magnitude when the inflation expectations are high in advanced economies.

This section's main message is that the persistence of inflation can have several non-linearities related to the past level of headline inflation or inflation expectations.

This can make inflation shocks more persistent when they coincide. Nevertheless, we found evidence that these non-linearities in the propagation of shocks are present in Latin America. In contrast, advanced economies seem immune to worsening in the propagation of energy price and food price shocks.

Is this higher propagation of inflationary shocks in Latin America one reason to explain a more aggressive monetary policy response in these countries than in advanced economies in 2021 and 2022? The following section tries to answer this question, estimating Taylor-type rules for a sample of Latin American countries and advanced economies.

4. Monetary policy reaction in Latin America

A long tradition in macroeconomics has sought to characterize the systematic response of monetary policy with a reaction function that captures its predicted component. Since Taylor (1993), a growing literature has described the monetary policy rate as a function of inflation and output. These Taylor-type rules have been estimated for advanced economies (e.g., Clarida et al. (1998), Lubik and Schorfheide (2007)) and emerging economies (e.g., Mohanty and Klau (2005), Aizenman et al. (2011), Caputo and Herrera (2017)). In this section, we aim to characterize the monetary policy reaction to macroeconomic variables in five Latin American countries: Brazil, Chile, Colombia, Mexico, and Peru.[9]

In contrast to most previous studies that estimate Taylor-type rules, we are interested to understand the changes in monetary policy rates in the recent episode and in the previous ones. Hence, we would like to find a characterization of the variables that determines the changes in the policy rates in periods of rising inflation. Also, explaining changes in the rates allows us to compare the the magnitude of monetary policy increases across country groups, namely Latin America vis-a-vis advanced economies.

For those reasons, we follow the approach in Brandao-Marques et al. (2020) and Kamin (2023), and we propose an equation to explain the changes in the monetary policy rate in country i as follows:

$$\Delta R_{i,t} = \alpha_1 \pi^{c,a}_{i,t} + \alpha_2 y_{i,t} + \alpha_3 \pi^{e}_{i,t} + \alpha_4 \Delta \pi^{c,a}_{i,t} + \alpha_5 \Delta y_{i,t} + \alpha_6 \Delta \pi^{e}_{i,t} + u_i + \nu_{i,t} \qquad (8)$$

[9] See Werner (2023) for a recent effort to estimate simple long-term Taylor rules for the same five Latin American countries.

where $\pi^{c,a}_{i,t}$ year-over-year core inflation rate in the country i quarter t, $y_{i,t}$ is the output gap, $\pi^{e}_{i,t}$ is the inflation expectations one year ahead (from Consensus Forecasts). The specification also includes the change in these three variables. We estimate this equation in a panel for the five Latin American countries, including country fixed effects (u_i). The data is the same as in section 2 for estimating the Phillips curve, starting in 2005. The monetary policy rates are obtained from the IFS database (concept: Monetary Policy-Related Interest Rate, Percent per Annum). We estimate the same specification (8) for a different panel for five advanced economies: Canada, Norway, Sweden, United Kingdom, and United States.[10]

Column two in table 6 presents the result for the estimation of equation (8) for the Latin American panel (LA5-M1). Column three has the results for the advanced economies panel (ADV-M1). One emerging result is that the change in inflation expectations is a key determinant of the size of monetary policy changes in both sets of countries. However, the sensitivity of changes in the monetary policy rate to changes in inflation expectations is four times higher in Latin America than in advanced economies. Thus, when the change in inflation expectations rises by one percent, the size of the increase in the monetary policy rate also rises by one percent. In the set of advanced economies, the increase in monetary policy rate only rises around 0.25 percent for the same one percent change in inflation expectations.

The inflation expectations have more incidence in the size of monetary policy changes in advanced economies than in the Latin America panel. Moreover, this latter effect is not statistically significant in the case of Latin American countries.

In this specification (8), both sets of countries show that the changes in monetary policy have a counter-cyclical orientation, which is captured by the reaction to the output gap. In the case of Latin America, the magnitude of monetary policy changes increases exclusively with the level of the output gap. Still, the changes in the output gap do not affect the changes in monetary policy. In contrast, both the level and change in the output gap explain the monetary policy changes in advanced economies.

Is this higher reaction of monetary policy in Latin America to inflation expectations the reason behind the aggressive monetary policy post-COVID? How do these recent responses compare with other episodes of higher inflation expectations in Latin America? To draw answers to these questions, we use the estimated version of the

[10]We try an additional specification that includes the exchange rate, but this variable is not statistically significant once we control for inflation expectations in the estimation.

Table 6: Taylor type-rule estimation

Variables	LA5 - M1	ADV - M1	LA5 - M2	ADV - M2	LA5 - M3	ADV - M3
Lag change MP rate			0.380***	0.402***	0.453***	0.459***
			(0.0384)	(0.0472)	(0.0369)	(0.0429)
Core inf. ($\pi^{c,a}$)	0.0217	0.0263	-0.00827	0.0305	0.119***	0.0218
	(0.0358)	(0.0283)	(0.0309)	(0.0239)	(0.0342)	(0.0237)
Output gap (y)	0.0517***	0.0213*	0.0117	-0.000701	0.0145	-0.00826
	(0.0141)	(0.0108)	(0.0126)	(0.00903)	(0.0122)	(0.00906)
Inf. exp. (π^e)	0.0793	0.127***	0.0672	0.0136	0.0586	0.0426
	(0.0527)	(0.0350)	(0.0456)	(0.0308)	(0.0445)	(0.0304)
Change in $\pi^{c,a}$	0.347***	0.0255	0.0312	-0.00986	-0.110	-0.0281
	(0.0706)	(0.0513)	(0.0698)	(0.0432)	(0.0685)	(0.0432)
Change in π^e	1.050***	0.240***	1.093***	0.369***	1.033***	0.342***
	(0.0955)	(0.0552)	(0.0820)	(0.0503)	(0.0808)	(0.0501)
Change in y	-0.0111	0.0196*	0.0163	0.0154*	0.0165	0.0188**
	(0.0136)	(0.0111)	(0.0118)	(0.00898)	(0.0116)	(0.00895)
Lag change MP rate US			0.360***	0.195***		
			(0.0679)	(0.0377)		
Lag Diff. MP rate w/US					-0.106***	-0.0644***
					(0.0155)	(0.0114)
Constant	-0.394***	-0.356***	-0.214*	-0.101**	-0.152	-0.127***
	(0.129)	(0.0504)	(0.113)	(0.0467)	(0.110)	(0.0462)
Observations	433	460	431	368	431	368
R-squared	0.504	0.281	0.639	0.555	0.654	0.561
N. countries	5	5	5	4	5	4

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

equation for Latin America, and we compute the fitted value of the changes in monetary policy in two periods. One period is post-COVID, between 2021Q1 and 2023Q1. The other period is between 2006Q3 and 2008Q3, when inflation expectations rose substantially in Latin America (recall figure 7 in section 2). We take the average of the fitted values of policy rate changes across the five Latin American countries. We compare these average fitted values with the average of the actual changes in the policy rates. Figure 15 shows the actual and fitted changes in policy rates in both periods for the Latin America panel.

The estimated equation resembles part of the aggressive rise in monetary policy rates in Latin America post-COVID, but not the size of all observed increases (panel B in figure 15). In particular, the estimated equation (8) falls short in explaining the average increases in the last part of 2021 and 2022. Hence, the estimated equation would suggest a reduction in the monetary policy rate in 2022Q4 as the inflation expectations were easing from their peaks. However, in that quarter, the actual monetary policy shows an average increase of one percent in the rates in Latin America.

The other episode in Latin America, in which inflation expectations rose, was during 2006Q3-2008Q3. Panel A in figure 8 highlights that in this episode, the predicted changes tend to call for a more aggressive reaction than actual monetary policy rate changes.

We also compare the actual monetary policy changes with the predicted ones for advanced economies in the same recent period: 2021Q1-2023Q1. In this case, we use the estimated equation in column three in table 6 (ADV-M1) to obtain the predicted changes in the advanced economies. This comparison is shown in panel B in figure 16. In that figure, we reproduce the actual and predicted changes in monetary policy in Latin America during 2021Q1-2023Q1 in panel A. We can observe that the actual increases in the monetary policy rate in advanced economies during 2021 were lower than in Latin America and lower than the predicted changes suggested by the estimation for advanced economies. Since mid-2022, the actual increases in the monetary policy rates are higher than the predicted ones. This behavior in the monetary policy rate is also evident in the case of the US

Going back to the case of Latin America, an additional question would be to consider whether this behavior in advanced economies in the recent period modifies the monetary policy strategy in Latin America. Does the monetary policy in the US affect the monetary policy in Latin America? For instance, Caputo and Herrera

Figure 15: Changes in monetary policy rates in Latin America. Comparison between period 2006Q3-2008Q3 and 2021Q1-2023Q1

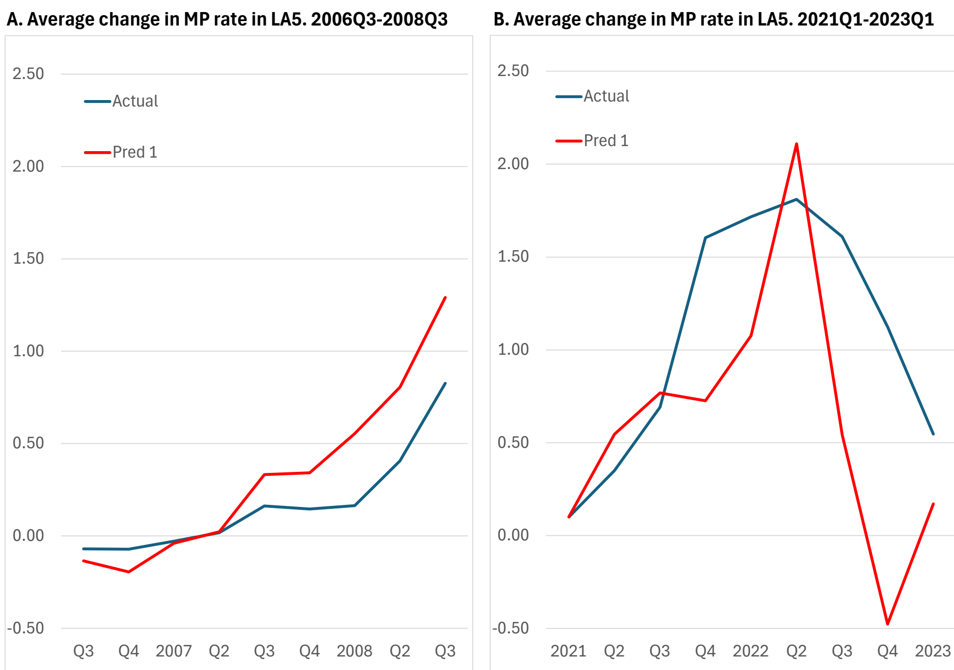
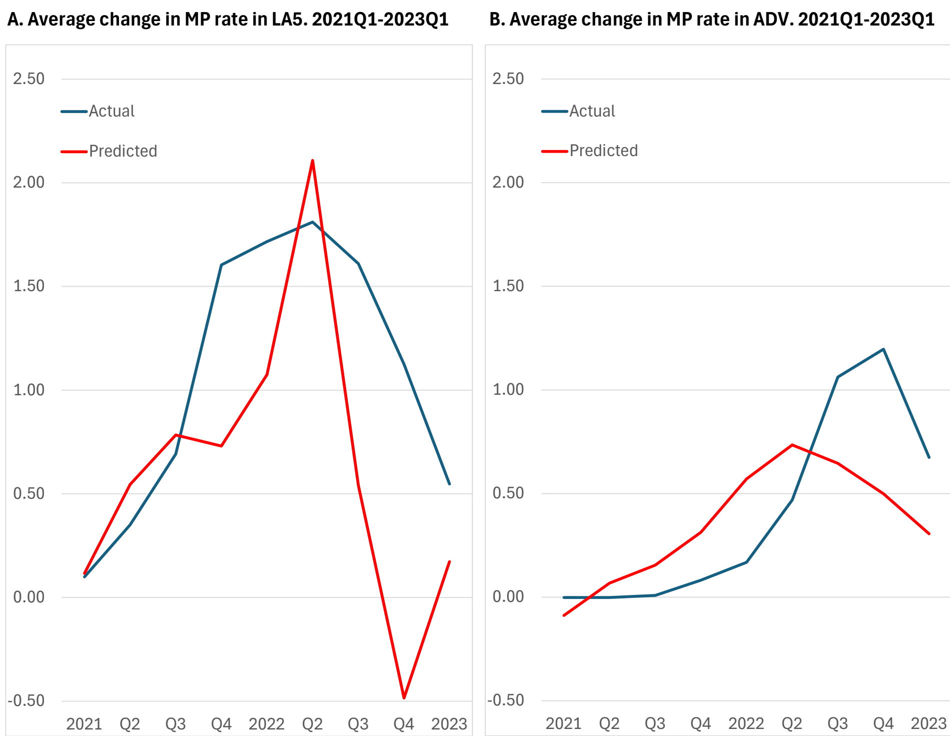


Figure 16: Changes in monetary policy rates 2021Q1-2023Q1. Comparison between Latin America and Advanced economies



(2017) argues from theoretical and empirical points of view that, in open economies with an Inflation-targeting regime, the monetary policy rule depends on the Fed Funds rate. This observation is also related to the evidence that US monetary policy is crucial in determining several financial variables in the rest of the world (e.g., Miranda-Agrippino and Rey (2020)).

To explore the role of the US monetary policy in the other economies, we estimate two alternative specifications for equation (8). The first one incorporates the past changes in the US monetary policy rate (the Fed Funds rate) and the past changes in its monetary policy rate:

$$\begin{aligned} \Delta R_{i,t} &= \alpha_0 \Delta R_{i,t-1} + \alpha_1 \pi^{c,a}_{i,t} + \alpha_2 y_{i,t} + \alpha_3 \pi^{e}_{i,t} + \alpha_4 \Delta \pi^{c,a}_{i,t} \\ &\quad + \alpha_5 \Delta y_{i,t} + \alpha_6 \Delta \pi^{e}_{i,t} + \alpha_7 \Delta R_{US,t-1} + u_i + \nu_{i,t} \end{aligned} \tag{9}$$

The other specification includes the past difference in its monetary policy rate with the US and the past changes in its monetary policy rate:

$$\begin{aligned} \Delta R_{i,t} &= \alpha_0 \Delta R_{i,t-1} + \alpha_1 \pi^{c,a}_{i,t} + \alpha_2 y_{i,t} + \alpha_3 \pi^{e}_{i,t} + \alpha_4 \Delta \pi^{c,a}_{i,t} \\ &\quad + \alpha_5 \Delta y_{i,t} + \alpha_6 \Delta \pi^{e}_{i,t} + \alpha_8 \left(R_{i,t-1} - R_{US,t-1} \right) + u_i + \nu_{i,t} \end{aligned} \tag{10}$$

In columns three to seven in table 6 are the estimation results from these two alternative specifications, separating Latin America and advanced economies.[11] These alternative specifications stress the robustness of the role of inflation expectations in Latin America compared to advanced economies. Monetary policy changes are more sensitive to changes in inflation expectations in Latin America than in advanced economies.

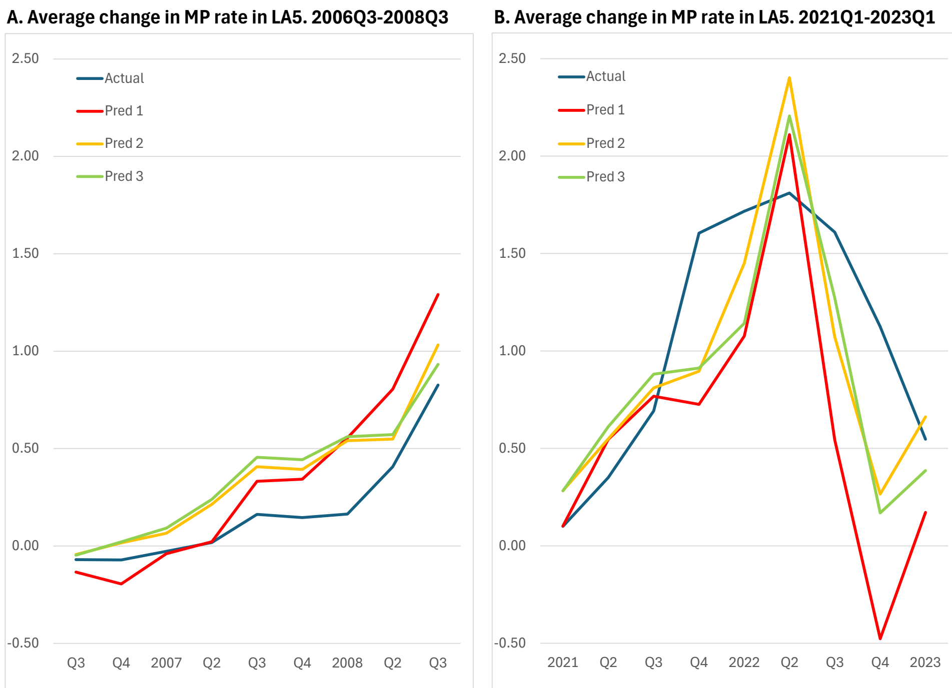
For the specification (9), we also infer that past US monetary policy changes affected more Latin America than advanced economies in our sample. Similarly, using the specification (10) suggests that Latin America can deviate less from US monetary policy than advanced economies. Besides, the coefficients in these alternative specifications have a prominent level of statistical significance.

To finalize our discussion of the reaction of monetary policy in Latin America, we reproduce the changes in monetary policy in figure 15, adding the predictions derived from an estimation of equations (9) and (10).[12] Figure **??** has these alternative

[11] Since the US policy rate has a special role in these two specifications, the estimations only comprise Canada, Norway, Sweden, and the United Kingdom in the case of advanced economies.

[12] Since these specifications include the past changes in the monetary policy rate, these prediction are obtained recursively for this variable in the two periods considered.

Figure 17: Changes in monetary policy rates in Latin America. Adding the role of past changes and the FED rate



predictions together with the actual changes and the prediction shown already in figure 15. These alternative specifications are a little closer to the exact changes in monetary policy in Latin America. In particular, the observed reduction in the monetary policy rate in 2022Q4 in Latin America can be attributed in part to the behavior of the US monetary policy that was still raising the Fed Funds rate.

5. Final remarks

After experiencing several decades of declining inflation, the various shocks that occurred post-COVID have tested the resolve of central banks to maintain inflation at a low level. This test was particularly critical for Latin America, given the region's history of very high inflation rates during the 1970s and 1980s. Moreover, with less well-anchored inflation expectations, monetary policy in Latin America encountered more macroeconomic dilemmas compared to advanced economies.

The objective of this study was to comprehend the distinctive features of inflation dynamics in Latin America, with a specific emphasis on both the recent episode and the period from 2006 to 2008. Additionally, the analysis aimed to rationalize the monetary policy responses to the recent inflation surge in comparison to those observed in advanced economies and during the 2006-2008 episode.

We have the following main conclusions. First, Latin American inflation, traditionally higher and more volatile, has experienced a remarkable convergence in both levels and volatility over the last few decades. This convergence has seen inflation patterns in the region aligning with those observed in advanced economies, marking a significant shift in economic dynamics. One notable indication of this convergence can be observed in the composition of CPI baskets. Surprisingly, despite a surge in inflation across Latin America after the COVID, there was no significant deviation from the levels observed in advanced economies. In a curious reversal, inflation in advanced economies appeared to be converging upwards towards levels more commonly seen in Latin America.

Second, the core inflation rise in 2021-2022 was more severe than in 2007-2008 in Latin America, with several factors driving it. In the earlier episode, the output gap and price shocks were more significant contributors. However, in the recent episode, persistence in inflation dynamics and expectations had a greater impact, especially for services. Additionally, other price shocks were more influential in advanced economies than in Latin America. Still, global factors explain an important fraction of the inflation increase in Latin America during 2021-2022.

Third, the transmission of inflationary shocks in Latin America is more pronounced when there is high headline inflation and elevated inflation expectations. These additional effects of inflationary shocks are not observed in advanced economies. This result suggests that enhancing monetary policy credibility to anchor inflation expectations in Latin America could provide clear benefits in macroeconomic stabilization.

Fourth, monetary policy in Latin American countries tends to react more to changes in inflation expectations compared to advanced economies. Additionally, the Federal Funds rate has a greater impact on monetary policy in Latin America than in advanced economies. Consequently, it becomes more challenging to implement a coherent monetary policy direction in Latin America if the US adopts a divergent stance. The first factor elucidates why central banks in Latin America raised their rates faster and more aggressively from 2021 to 2022. The second factor contributes to understanding the slower normalization of the monetary policy rate in Latin America since mid-2022.

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Appendix

Table 7: List of countries from the World Bank Database

Advanced Countries	Latam Countries
Australia	Bolivia
Austria	Brazil
Belgium	Chile
Canada	Colombia
Croatia	Costa Rica
Cyprus	Dominican Republic
Czechia	Ecuador
Denmark	El Salvador
Estonia	Grenada
Finland	Guatemala
France	Guyana
Germany	Haiti
Greece	Honduras
Hong Kong	Jamaica
Iceland	Mexico
Ireland	Nicaragua
Israel	Panama
Italy	Paraguay
Japan	Peru
Korea, Rep.	St. Kitts and Nevis
Latvia	St. Lucia
Lithuania	Uruguay
Luxembourg	
Macao	
Malta	
Netherlands	
New Zealand	
Norway	
Portugal	
San Marino	
Singapore	
Slovak Republic	
Slovenia	
Spain	
Sweden	
Switzerland	
Taiwan, China	
United Kingdom	
United States	

Table 8: List of countries from the Central Bank of Chile Database

Advanced Countries	Latam Countries
Austria	Bolivia
Belgium	Brazil
Canada	Chile
Croatia	Colombia
Cyprus	Costa Rica
Czechia	Ecuador
Denmark	Mexico
Estonia	Paraguay
Finland	Peru
France	Uruguay
Germany	
Greece	
Iceland	
Ireland	
Italy	
Japan	
Korea, Rep.	
Latvia	
Lithuania	
Luxembourg	
Malta	
Netherlands	
Norway	
Portugal	
Singapore	
Slovak Republic	
Slovenia	
Spain	
Sweden	
Switzerland	
Taiwan, China	
United Kingdom	
United States	

Table 9: List of countries from the Inflation Expectations Database

Advanced Countries	Latam Countries
Austria	Bolivia
Belgium	Brazil
Canada	Chile
Denmark	Colombia
Finland	Costa Rica
France	Dominican Republic
Germany	Ecuador
Greece	El Salvador
Ireland	Guatemala
Israel	Honduras
Italy	Mexico
Netherlands	Nicaragua
Norway	Panama
Portugal	Paraguay
Spain	Peru
Sweden	Uruguay
Switzerland	
United Kingdom	
United States	

Table 10: List of countries used for the Phillips curve estimation

Advanced Countries	Latam Countries
Australia	Brazil
Belgium	Chile
Canada	Colombia
Denmark	Mexico
Finland	Peru
France	
Germany	
Greece	
Italy	
Netherlands	
Norway	
Portugal	
Spain	
Sweden	
Switzerland	
United Kingdom	
United States	