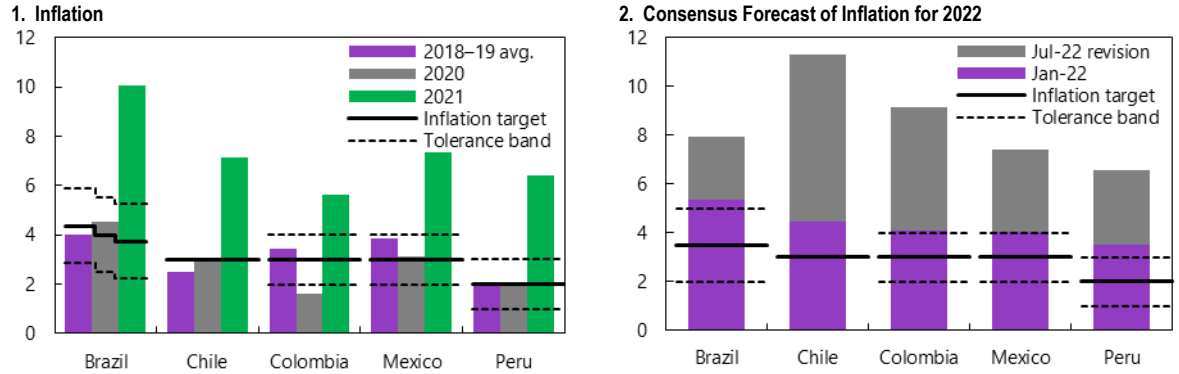
The Inflation Surge: Policy Trade-offs Amid Uncertainty[1]
(Background Paper 2)

This chapter presents an in-depth analysis of Latin America's current inflationary episode, a discussion of the risks of inflation becoming entrenched and monetary policy implications. Inflation is the highest in nearly two decades, and, while global factors explain much of its initial sharp increase, domestic factors have been increasingly contributing to the inflationary process recently as inflation became more broad-based. Moreover, inflation dynamics is showing increasing persistence, pointing to considerable risks of entrenchment and to the need for continued vigilance. Swift policy actions by the region's main central banks have helped keep inflation expectations broadly anchored—a key ingredient to tame inflationary pressures—despite multiple short-term inflation surprises. However, high levels of inflation, rising wages, and short-term expectations point to increasing risks of de-anchoring. Policymakers should remain focused on the long-term and hard-won benefits of low inflation, rather than the short-lived impact of monetary policy on output. Effectively communicating data-dependent policy decisions and contingency plans will be key to maintain expectations anchored amid an uncertain inflation outlook.

Introduction

After fluctuating around the central banks' targets in previous years, inflation accelerated markedly throughout Latin America in 2021, breaching the central banks' tolerance bands (Figure 1, panel 1). Initially, inflation expectations pointed to a quick return of inflation within the central banks' tolerance bands by end-2022. However, the Russian invasion of Ukraine in early 2022 and its impact on international commodity prices added a new inflationary shock (Figure 1, panel 2). As a result, inflation in the largest economies of the region is at its highest since the inception of inflation-targeting regimes, testing the hard-won credibility of these monetary frameworks.

Figure 1. LA5: Inflation
(End of period; year-over-year percent change)



Sources: Haver Analytics; Consensus Economics; national authorities; and IMF staff calculations.
Note: LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).

Against this backdrop, this chapter studies the ongoing inflationary episode and attempts to answer the following questions: (1) what are the main drivers of inflation in Latin America?; (2) are there material risks of inflation becoming entrenched?; (3) are policies helping tame inflationary pressures?; and (4) as economic activity weakens, should central banks recalibrate their monetary policy factoring in the impact on economic activity? The rest of the chapter documents key patterns and presents econometric evidence to shed light on these questions.

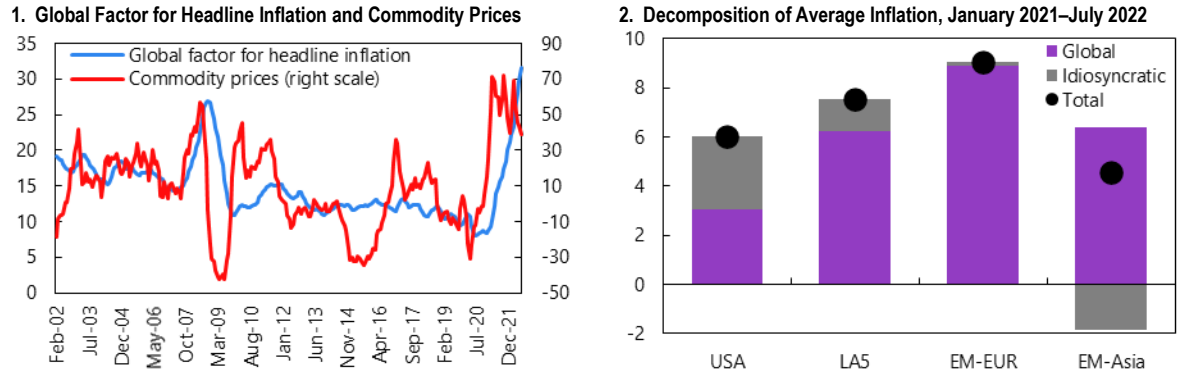
[1]Maximiliano Appendino (lead), Takuji Komatsuzaki, and Samuel Pienknagura prepared this chapter under the supervision of Gustavo Adler and Anna Ivanova. Jorge Roldós provided invaluable guidance in the initial phases of this project. Evelyn Carbajal, Erdem Dorjkhand, Genevieve Lindow, and Gabriel Moura Queiroz provided excellent research assistance. The authors are grateful to Chao He (Western Hemisphere Department), Rafael Portillo, Aneta Radzikowski, and Pedro Rodriguez (all Research Department) for their support with the IMF's Western Hemisphere Module general equilibrium model.

Drivers of Inflation

This section explores the drivers of inflation to shed light on the nature and persistence of the inflationary process, key to the analysis of monetary policy actions.

Global factors explain a significant share of the variance of inflation in Latin America, although domestic factors have also contributed to price pressures. We estimate a dynamic factor model that exploits the evolution of the cross-country variation of headline inflation over the past decades to calculate an autoregressive global factor of inflation (see Annex 1). The global factor is strongly correlated with commodity prices (Figure 2, panel 1) and likely reflects a globally synchronized demand recovery as well as the supply-side shocks related to the pandemic and the war in Ukraine. In contrast to the pattern observed for the United States—where domestic factors appear to dominate—this global factor explains the bulk of inflation since the beginning of 2021 in large Latin America economies (LA5)[2] as well as in peer emerging market regions (Figure 2, panel 2). Domestic factors are comparatively more important in LA5 than in European and Asian emerging market economies. These differences are partly explained by the heterogeneity in policy support across countries during the pandemic, as most LA5 economies deployed larger policy packages than emerging market economies on average, although less than the United States.[3]

Figure 2. Global Factor of Inflation
(Year-over-year percent change)

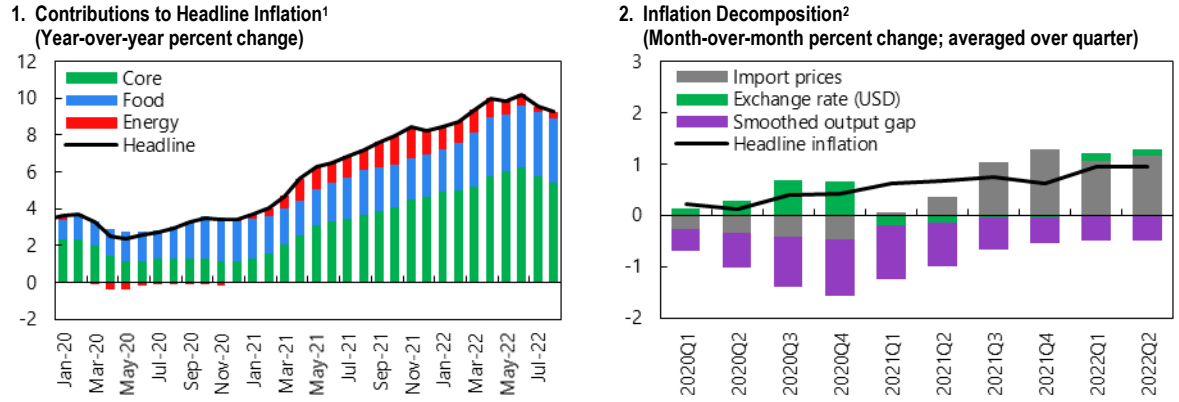


Sources: Consensus Economics; Haver Analytics; IMF, World Economic Outlook database; and IMF staff calculations.
Note: See Dynamic Factor Model in Annex 1. EM-Asia = emerging Asia; EM-EUR = emerging Europe; LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru); USA = United States.

Global sources of inflation are also visible in the contributions of food and energy prices to headline inflation, while accelerating core inflation points to the rising importance of domestic factors (Figure 3, panel 1). This is confirmed by empirical estimates of the main drivers of inflation in LA5 economies using local projection method (Figure 3, panel 2; and Annex 2). Estimates point to the key role of import prices in explaining headline inflation since the beginning of 2021—a result that is consistent with the previously mentioned role of the global factor. Exchange rate movements and the output gaps have contributed as well. In particular, the depreciation of LA5 currencies at the onset of the pandemic played an important role in driving inflation, although its impact subsided in 2021. On the other hand, the sharp and sudden decline in economic activity in early 2020 (reflected in a negative output gap) brought about deflationary pressures, although these pressures have declined since the second quarter of 2021 as output gaps have been closing.

[2]LA5 includes Brazil, Chile, Colombia, Mexico, and Peru.
[3]See Chapter 1 of the October 2022 *World Economic Outlook*.

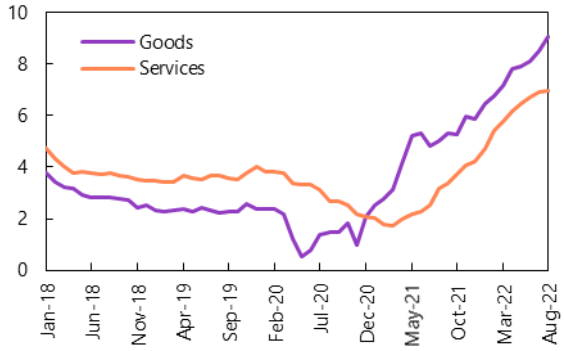
Figure 3. LA5: Inflation Decomposition



Sources: Haver Analytics; IMF, World Economic Outlook database; national authorities; and IMF staff calculations.
Note: Purchasing-power-parity GDP-weighted average. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru); USD = US dollar.
[1]Core inflation is defined as headline inflation less food and energy.
[2]Decomposition uses coefficients of the panel local projection estimation in which imports prices, local currency/USD exchange rate, and smoothed output gap are included as explanatory variables of headline inflation, along with their lags and country-fixed effects. See Annex 2.

Another key feature of the inflationary surge has been the delayed rise in services prices relative to goods prices. As support measures boosted demand for goods in the largest Latin American economies in the early months of the pandemic, core goods inflation moved in tandem, helped by imported inflation. More recently, with the lifting of mobility restrictions and recovery in the demand for services, inflation became more broad-based, as reflected in the rise in core services inflation, contributing to increased persistence in inflation dynamics (Figure 4). This pattern is also visible in other economies (for example, the United States).

Figure 4. LA4: Core Goods and Services Inflation
(Year-over-year percent change)



Sources: Haver Analytics; national authorities; and IMF staff calculations.
Note: Core goods exclude food, transport, and housing items. Core services exclude transport and housing items. The analysis does not include Peru as data on consumer price index subcomponents stop by end of 2021 because of a change in the classification. LA4 = Latin America 4 (Brazil, Chile, Colombia, Mexico).

Persistence and Risk of Entrenchment

This section studies how persistent and potentially entrenched inflation in LA5 economies has become, using various empirical methodologies.

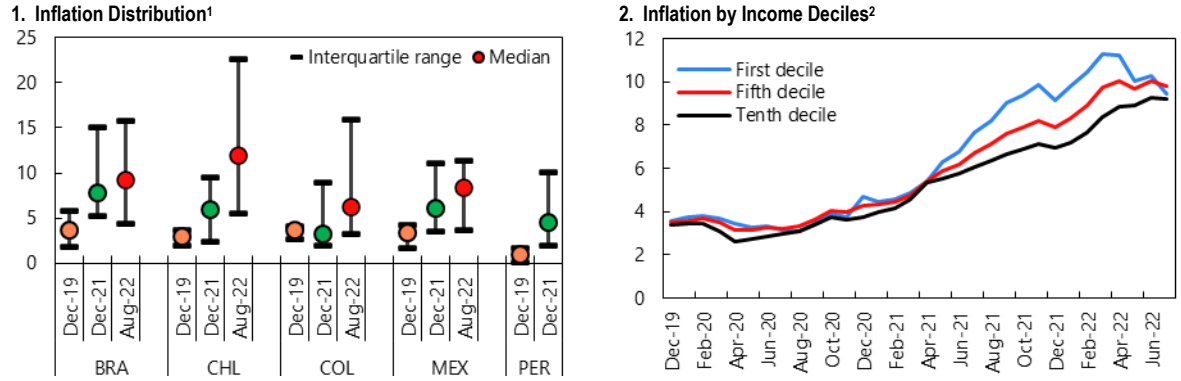
Analysis of disaggregated consumer price index data indicates that inflationary pressures have become broad-based. In fact, a glance at the evolution of the distribution of the subcomponents of consumer price index (using their consumer price index weights)[4] indicates that, in all cases, the median inflation of these subcomponents (and in most cases also the 25th percentile) has been trending upwards, thus pointing to inflationary pressure in a growing number of consumer price index subcomponents.[5] The

[4]The number of subcomponents for this exercise vary by country due to data availability. This analysis used 116 subcomponents for Brazil, 41 for Chile, 95 for Colombia, 49 for Mexico, and 32 for Peru—due to a change in the classification of subcomponents in 2022, the analysis for Peru stops by end of 2021.
[5]Alternative underlying inflation indices aim at estimating more precisely the evolution of the general level of prices with the correction of potential biases that headline inflation may have. Core inflation excludes volatile subcomponents such as food and energy, and median inflation focuses on the center of the distribution of subcomponents instead of the average headline consumer price index that could reflect extreme movements of only some subcomponents. Alternative measures such as trimmed average or median consumer price index or the predicted value of a dynamic factor model confirm the increasingly broad-based inflationary process.

increasingly dispersed inflation, as proxied by the interquartile range among subcomponents of headline consumer price index, supports the same pattern and warns about the rising persistence of inflation (see Ha and others 2019; and Figure 5, panel 1).

The inflationary process has also been largely regressive, until recently. This is visible when estimating the inflation levels faced by each decile of the households' income distribution, which can be done by exploiting information on the differences in consumption baskets across income distribution, as reported in harmonized expenditure surveys (Partnership for Market Readiness 2021).[6] Results show that the current surge in inflation in LA5 was regressive initially, largely reflecting the fact that food and energy prices were the main culprits of price pressures, and that poorer households tend to spend a larger share of their budgets on these items. This pattern has reversed somewhat in recent months as inflation has become more broad-based (Figure 5, panel 2).

Figure 5. LA5: Disaggregated Consumer Price Index
(Year-over-year percent change)

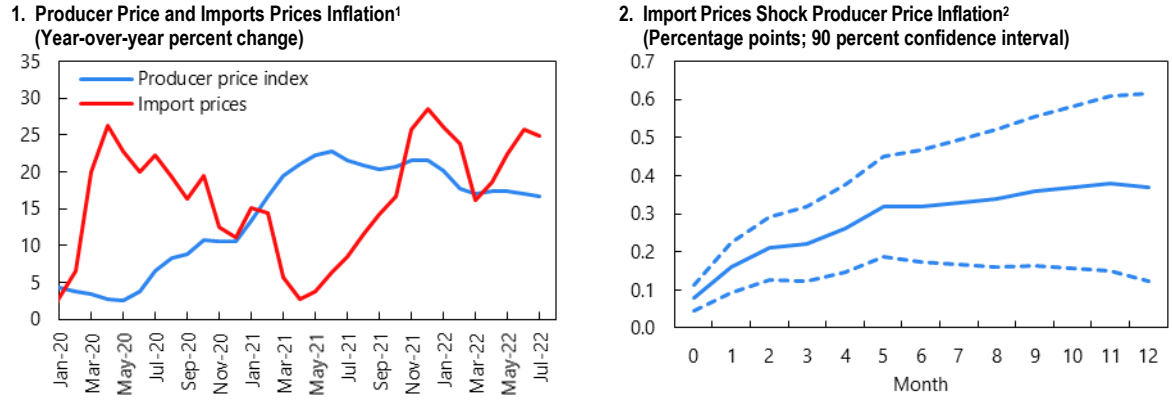


Sources: Haver Analytics; national authorities; and IMF staff calculations.
Note: Data labels use International Organization for Standardization (ISO) country codes. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).
[1]See footnote 4 in the main text. The analysis does not include Peru as data on consumer price index subcomponents stops by end of 2021 because of a change in the classification.
[2]For each decile, inflation is calculated using product weights from harmonized household surveys from Partnership for Market Readiness (2021).

Pressures on consumer prices may resume as imported inflation picks up steam. The acceleration of producer price indices in the second half of 2020 was likely due the depreciations of LA5 currencies at the onset of the pandemic and mobility restrictions that resulted in increased costs. Since the second half of 2021, producer prices have been decelerating gradually in LA5—a pattern that typically preceded a deceleration in consumer price index inflation (as a local projection exercise shows). However, similar local projection estimates show that the apparent acceleration in import prices due to the shock from the war in Ukraine may exert an upward pressure on producer price indices inflation and, consequently, on consumer price index inflation with a lag (see Annex 2; and Figure 6).

[6]In particular, the exercise calculates consumption weights for energy, food, and core, and uses those weights to calculate a decile-specific inflation rate.

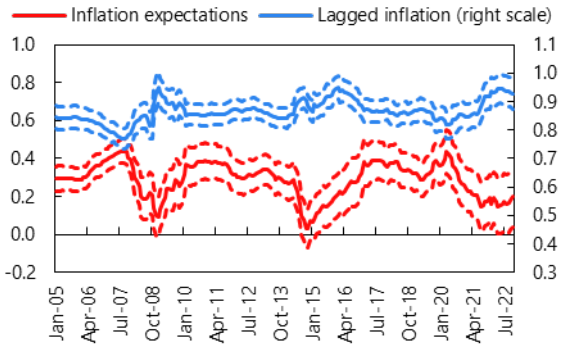
Figure 6. LA5: Producer and Imports Prices



Sources: Haver Analytics; IMF, World Economic Outlook database; national authorities; and IMF staff calculations.
Note: Purchasing-power-parity GDP-weighted average. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).
[1]Import prices in local currency are reported.
[2]Impact of one percentage point increase in import prices on producer prices, estimated by panel local projection estimation in which imports prices, local currency /USD exchange rate, and smoothed output gap are included as explanatory variables of producer price indices inflation, along with their lags and country-fixed effects. See Annex 2.

Inflationary pressures also appear to be increasingly persistent. To shed light on the persistence of inflationary pressures, we estimate a 60-month rolling window Phillips Curve for LA5, using panel data (see Annex 3). The persistence of inflation is captured by the autoregressive component of headline inflation, conditional on inflation expectations, trading partners' inflation, changes in the nominal effective exchange rate, the domestic output gap, and changes in commodities prices. Results show a rise in persistence—consistent with a doubling of the implied half-life of an inflation shock, from about 4 to 8 months—as well as a decline in the coefficient on inflation expectations, suggesting that inflation dynamics has become more backward-looking (Figure 7). This pattern is similar to those observed in previous episodes of spikes in inflation (for example, during the global financial crisis).

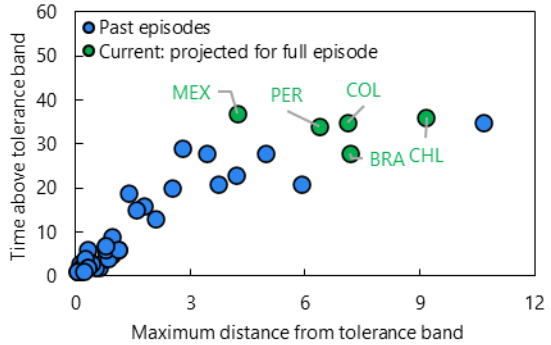
Figure 7. LA5: Persistence Coefficient from Rolling Phillips Curve Estimations
(Index; 90 percent confidence interval)



Source: IMF staff calculations.
Note: Specification also includes inflation expectations, trading partner inflation, changes in the nominal effective exchange rates, domestic output gap, and changes in the commodities price index. See Annex 3. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).

The expected duration of this inflationary episode is in line with past episodes, although the exceptional level of current inflation increases uncertainty about the forecast. An analysis of inflationary episodes in LA5 economies over the period 2000–19 indicates that, historically, large deviations of inflation from the central bank's tolerance band have been associated with long periods of convergence back into the band. In fact, there is a strong and positive correlation between the magnitude of the inflation shock (defined as the maximum deviation of inflation from the ceiling of the central bank's tolerance band) and the duration of the episode (Figure 8). The expected duration of the current episode in LA5 economies, based on the October 2022 *World Economic Outlook* projections, is aligned with this historical pattern. However, the current episode displays the largest inflation deviations from the central banks' tolerance bands in recent history, reducing the precision of any extrapolation of the past episodes and pointing to the possibility of an even more persistent inflationary in the current episode.

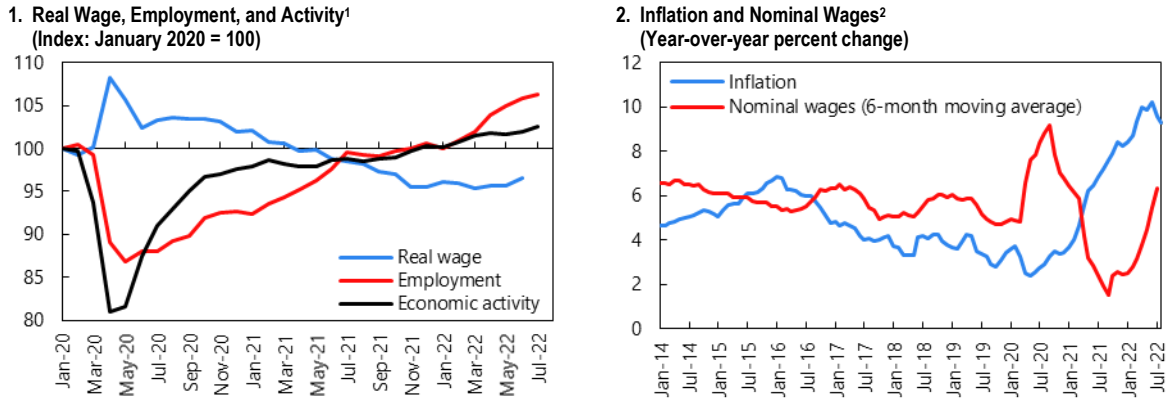
Figure 8. LA5: Inflation Episodes
(X-axis: percentage points; Y-axis: months)



Sources: Haver Analytics; IMF, World Economic Outlook database; national authorities; and IMF staff calculations.
Note: Inflationary episodes are consecutive months with year-over-year inflation above the central banks' tolerance bands—1 percentage point above target for Chile. Blue dots plot the maximum distance from the tolerance band of each past inflationary episode in LA5 since 2000 against its duration in months. Green dots plot the maximum distance from the tolerance band expected in the October 2022 *World Economic Outlook* projections for the ongoing inflationary episode against its duration once inflation converges to the tolerance band. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).

Accelerating wages may add to inflationary pressures. Amid a strong recovery in activity and, especially, employment, real wages appear to have reached bottom (Figure 9, panel 1). Thus far, nominal wage growth has lagged inflation, partly because prices have increased on account of other factors (Figure 9, panel 2). This was also the case, on average, during past inflation episodes. However, nominal wages are accelerating and may add to inflationary pressures as firms pass through their higher labor costs to consumers, especially as the economic slack prevailing in 2020–21 has largely disappeared (see Chapter 1). Moreover, minimum wages increased above inflation last year and may lead to broader nominal wage pressures, especially in the region's large informal sectors. The presence of indexation mechanisms–amid a history of high inflation in the region—as well as the delayed adjustment of administered prices are further risks to high inflation becoming entrenched.

Figure 9. LA5: Labor Markets



Sources: Haver Analytics; IMF, World Economic Outlook database; national authorities; and IMF staff calculations.
Note: LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).
[1]Seasonally adjusted. Real wage and employment are labor-force-weighted averages. Economic activity is purchasing-power-parity GDP-weighted average.
[2]Purchasing-power-parity GDP-weighted average. Nominal wage is six-month-moving average of the sum of real wage growth and inflation.

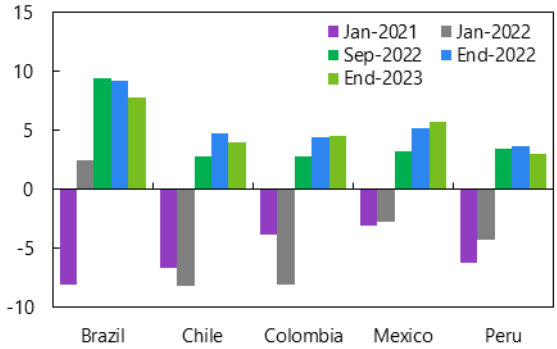
The Role of Policies

Are Policies Helping Tame Inflationary Pressures?

The withdrawal of pandemic-related policy stimuli since 2021 has helped contain inflationary pressures. Monetary policy supported the economy at the onset of the pandemic with policy rates at unprecedented low levels and largely negative real rates in most countries. The monetary policy cycle turned rapidly with the first signs of high inflation, although still mostly negative real rates continued to support the recovery in LA5 over most of 2021 (see October 2021 *Regional Economic Outlook: Western Hemisphere*). With further tightening in 2022, real policy rates have turned positive and the monetary stance contractionary in most cases. Monetary authorities have signaled their commitment to increase policy rates further, if needed, to ensure that inflation returns to target, although market participants' expectations

indicate that policy rates are close to their terminal rates. Sustaining current nominal policy rates, consistent with market participants' expectations, would likely imply a further tightening as real rate would rise with moderating inflation expectations (Figure 10). The return of fiscal policy to a neutral stance (see Chapter 1) has also supported the ongoing monetary policy effort.

Figure 10. LA5: Real Policy Rates
(Percent)

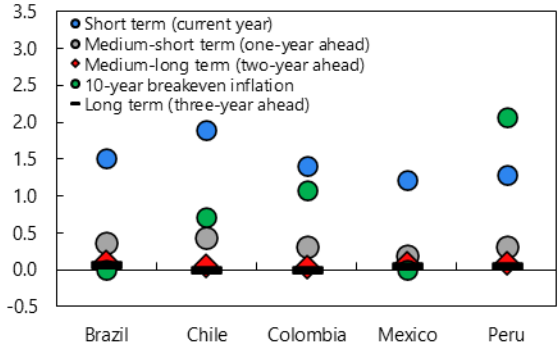


Sources: Bloomberg Finance L.P.; Haver Analytics; IMF, World Economic Outlook database; national authorities; and IMF staff calculations.
Note: Real rates ex ante are estimated as the difference between nominal policy rates and October 2022 *World Economic Outlook* forecasts for year-over-year inflation over the next four quarters. September 2022 refers to September 23, 2022; end-2022 and end-2023 are from Bloomberg survey. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).

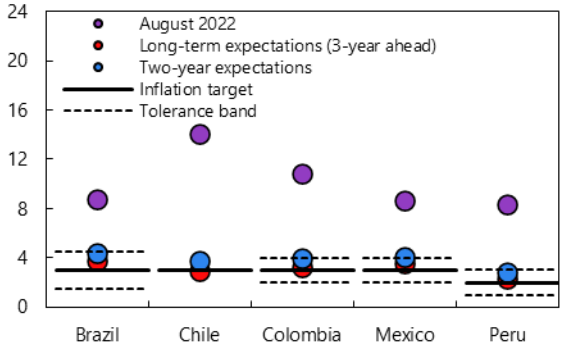
Swift monetary policy action by the region's central banks has helped keep long-term inflation expectations broadly anchored. With one inflationary shock on top of another, short-term inflation expectations, and market-based expectations in some cases, have been revised upwards in recent quarters and are measurably outside the central banks' tolerance bands (Figure 11, panel 1).[7] However, long-term inflation expectations, measured with three-year-ahead inflation expectations, have remained broadly unchanged and anchored within the tolerance band, pointing to a return to the tolerance bands during 2024—which broadly corresponds to most central banks' monetary policy horizons—and to the inflation target by 2025 (Figure 11, panel 2). The effectiveness of monetary policy in taming inflation in LA5 economies over the past decade has been instrumental in influencing market and household expectations (Figure 12).

Figure 11. LA5: Inflation Expectations

1. Revisions to Inflation Expectations, 2022:Q1–22:Q3
(Percentage points)



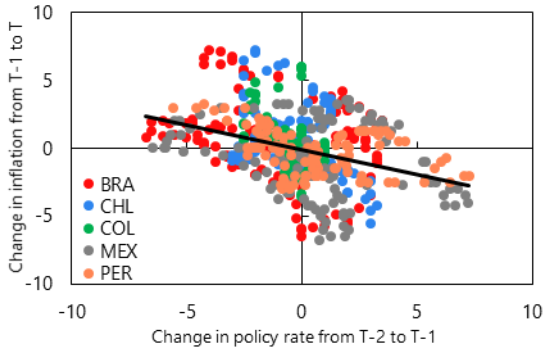
2. Inflation and Inflation Expectations[1]
(End of period; percent)



Sources: Bloomberg Finance L.P.; Consensus Economics; Haver Analytics; national authorities; and IMF staff calculations.
Note: LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).
[1]Two-year expectations are the average of the July 2022 *Consensus Economics Forecasts* for end-2023 and end-2024.

[7]Market-based inflation expectations refer to breakeven rates computed as the difference in yields between regular bonds and inflation-indexed bonds of the same maturity. These measures should be interpreted with caution, as they may be contaminated with risk, term, and liquidity premiums.

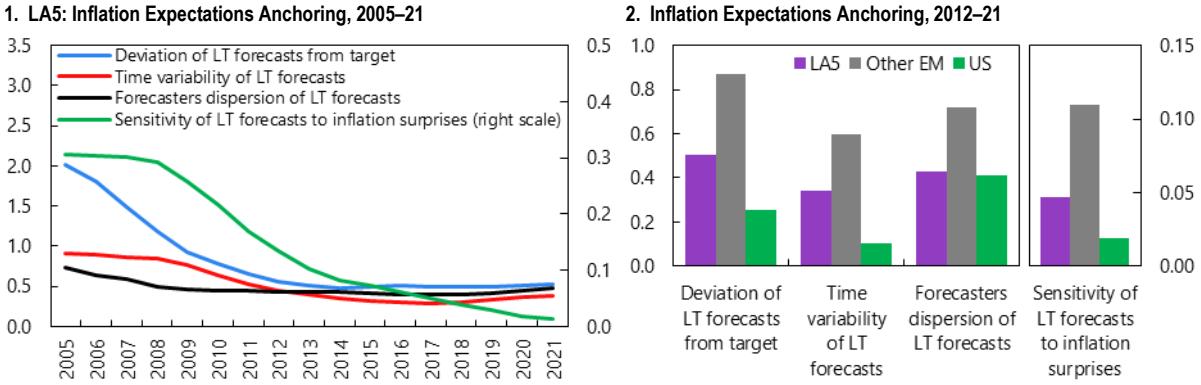
Figure 12. LA5: Inflation and Lagged Monetary Policy Rates
(Percentage points)



Sources: Haver Analytics; national authorities; and IMF staff calculations.
Note: *t* is a particular month, *t* – 1 is the same month of the previous year, and *t* – 2 is the same month two years before. Sample period is January 2012 to July 2022. Data labels use International Organization for Standardization (ISO) country codes. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).

The credibility built over the past two decades has supported LA5 central banks' monetary policy responses. Following the work of Bems and others (2021), we gauge how credible LA5 central banks are by focusing on four measures: (1) the average deviation of long-term forecasts from the central bank's target (to measure how credible the monetary authority is for forecasters); (2) the variability of long-term forecasts over time (following the assumption that well-anchored expectations should be stable); (3) the dispersion of forecasters' long-term expectations (to corroborate that cross-sectional variation of forecasts is small, consistent with well-anchored expectations); and (4) the sensitivity of long-term forecasts to short-term inflation surprises (which should be low with well-anchored inflation expectations) (see Annex 4). Evidence suggests that over the past two decades LA5 central banks have improved their credibility across the four measures as their inflation targeting regimes matured (Figure 13, panel 1). Moreover, according to these measures, long-term inflation expectations are better anchored in the average LA5 country in comparison to other emerging market economies, although not in comparison to major central banks such as the US Federal Reserve (Figure 13, panel 2).

Figure 13. Credibility of Central Banks
(Left scale: percentage points; Right scale: index, lower = better anchored)



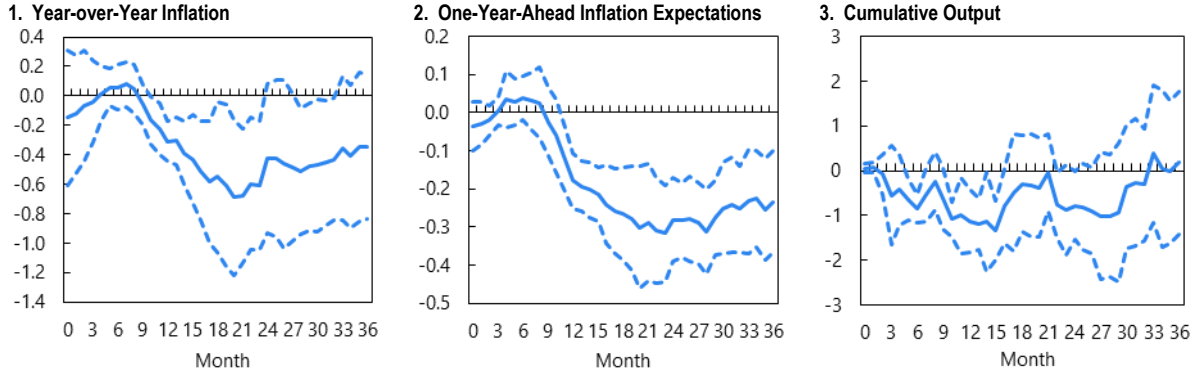
Source: IMF staff calculations.
Note: See Annex 4. EM = emerging markets; LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru); LT = long term; US = United States.

Should Central Banks be Concerned about the Inflation/Output Trade-Off?

Monetary authorities should focus on the long-term benefits of price stability, as opposed to the short-lived output costs of tighter monetary policy. With economic activity slowing, and inflation-output trade-offs turning more salient, monetary authorities in the region may face greater obstacles to sustaining a contractionary monetary stance (see Chapter 1). Would weaker economic activity justify a less contractionary monetary stance, even if inflationary pressures persist? To shed light on the potential trade-offs between inflation and output, we empirically estimate the impact of monetary policy on inflation, short-term inflation expectations, and economic activity, following the work of Brandao-Marques and others (2020). In a first stage, Taylor rules are estimated for each LA5 to build a measure of monetary policy shocks based on the deviations from the estimated rule (that is, error terms). In a second stage, the impact of these monetary policy shocks on variables of interest, conditional on a set of control variables, is explored in a panel setting

and using the local projections method (see Annex 5). The results confirm the anecdotal evidence of the transmission of monetary policy to inflation presented earlier—a 1 percentage point monetary policy shock lowers inflation by ½ percentage point in about a year (Figure 14, panels 1 and 2).[8] Moreover, estimates point to a short-lived inflation/output trade-off for monetary policy, on average. Specifically, the impact on inflation (over an 18- to 24-month horizon) and output (over a 12-month horizon) are considerable—consistent with our Phillips Curve estimates (see Annex 3)—although the latter is short-lived (Figure 14, panel 3).[9] Furthermore, while not explored here, the long-term benefits of price stability are well-known (Feldstein 1999; Bernanke 2006) and outweigh the potential short-term costs.

Figure 14. LA5: Response to Monetary Policy Shocks
(Percentage points; 90 percent confidence interval)



Source: IMF staff calculations.
Note: Line shows the estimated impact of a 1 percentage point shock to the policy rate estimated through a panel local projection method. See Annex 5 and Brandao-Marques and others (2020) for methodological details. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).

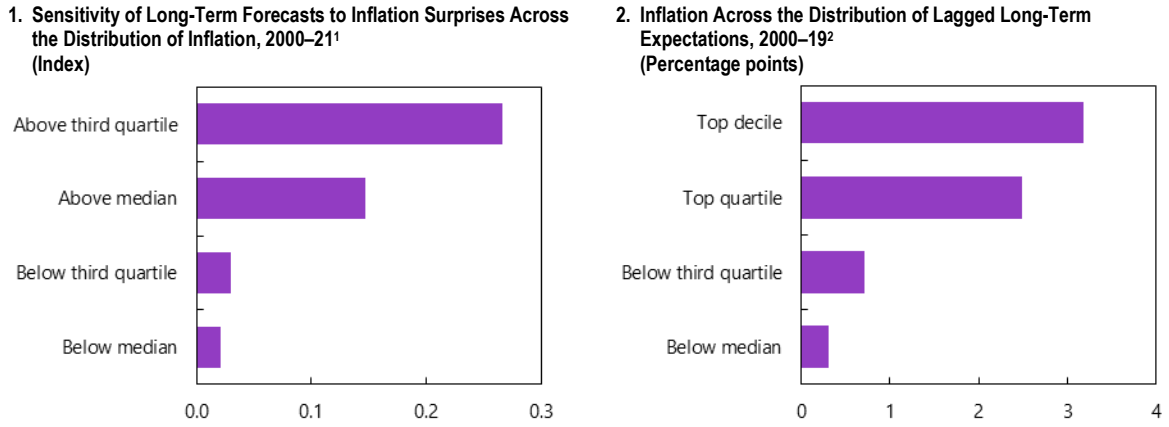
Moreover, current inflation levels point to high risks of a de-anchoring of inflation expectations, highlighting the need for monetary policy to remain agile. To explore possible nonlinearities related to the level of inflation, we re-estimate the sensitivity of long-term expectations to short-term inflation surprises, conditioning the sample on the level the short-term inflation expectations. The sensitivity of long-term forecasts to short-term inflation surprises is found to increase markedly for higher levels of short-term inflation expectations (Figure 15, panel 1). For example, while the "pass-through" from short-term surprises to long-term expectations is less than 0.05 when short-term expectations are below the median, it reaches 0.28 for the top quartile of the distribution. This result points to nonlinearities in the formation of expectations and a greater risk of de-anchoring of long-term expectations when levels of inflation are higher.

Furthermore, a de-anchoring of long-term expectations would likely increase the persistence of inflation and the risks of entrenchment. Historically, higher long-term inflation expectations have been associated with higher future (six-month) inflation, both measured as deviations from inflation targets (Figure 15, panel 2). Looking at the distribution of inflation expectations indicates that, for the first three quartiles, the associated inflation outcomes are within the central banks' tolerance bands. However, six-month-ahead inflation outcomes are considerably worse (falling outside the tolerance bands in most cases) for the top quartile (and more so the top decile) of the distribution of long-term inflation expectations. This

[8]As discussed in Brandao-Marques and others (2020), the literature typically finds low monetary policy transmission from interest rates to inflation and output in emerging market economies. In fact, the results found for LA5 countries stand in contrast to those for a larger set of emerging market economies, where inflation does not seem to respond to monetary policy shocks. This exercise, however, does not explicitly account for the behavior of the exchange rate, which Brandao-Marques and others (2020) find is critical to explain the seemingly lack of strength of monetary policy transmission in emerging market economies.
[9]As in Brandao-Marques and others (2020), the local projection exercise uses industrial production to proxy for output. One concern is that industrial production captures only a fraction of all sectors comprising GDP. In fact, for the LA5 there is a pass-through from industrial production to Economic Activity Index of 0.2, which suggests that Economic Activity Index, which is a better measure of GDP, is less volatile. Then the effect on broader activity is likely to be considerably lower.

suggests that a significant de-anchoring of long-term inflation expectations carry risks of increasing inflation's persistence.

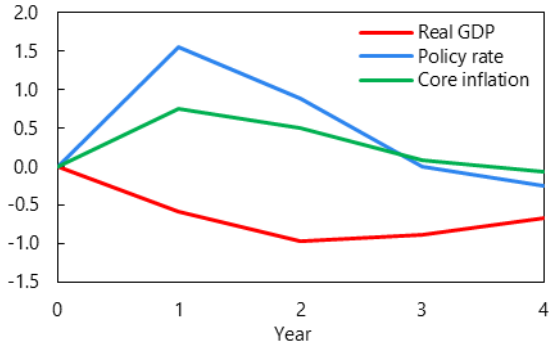
Figure 15. LA5: Inflation and Long-Term Inflation Expectations



Sources: Consensus Economics; and IMF staff calculations.
Note: See Annex 4 for a description of the data. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).
[1]Distribution of inflation based on short-term inflation expectations.
[2]The distribution of lagged long-term expectations is the empirical distribution of three-year-ahead inflation expectations' deviation from inflation targets for LA5 from 2000–19 with a six-month lag. Inflation in the horizontal axis is the average deviation of year-over-year inflation from inflation targets for LA5—conditional on the parts of the distribution of lagged long-term expectations depicted in each bar—and it is a purchasing-power-parity GDP-weighted average.

Maintaining anchored expectations is paramount to limit the inflation/output trade off. The IMF's Western Hemisphere Module general equilibrium model (Andrle and others 2015) shows that transient and modest shocks to inflation expectations would require considerable additional monetary tightening to bring inflation back to target, with commensurate short-term impact on the economy (Figure 16). Furthermore, a delayed reaction of central banks to rising inflation expectations would require a more aggressive monetary policy tightening at a later stage, accentuating inflation and output losses.

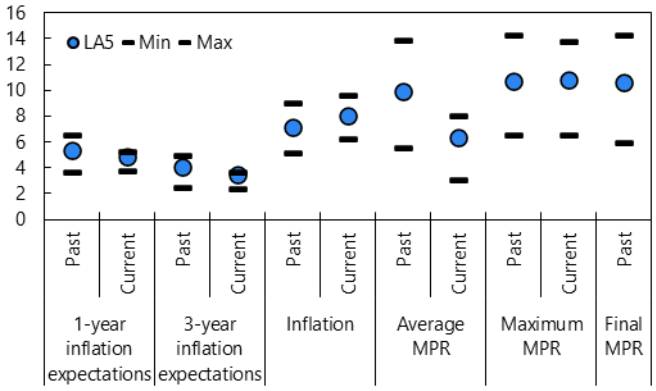
Figure 16. LA5: Inflation Expectations Shock
(Percentage points; deviation from baseline)



Sources: IMF staff calculations based on IMF's Western Hemisphere Module general equilibrium model.
Note: Inflation expectations shock of 75 and 50 basis points in year 1 and 2, respectively. Results shown as simple average of LA5 countries. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru).

Sustaining current policy rates for some time is likely to be needed to ensure the return of inflation to their targets over the horizon of monetary policy. In comparable past inflationary episodes, monetary policy rates reached levels close to those observed now, and they were maintained for a significant period of time, until inflation returned to the central banks' tolerance bands (Figure 17). Moreover, our estimates of transmission of monetary policy to inflation suggest that if current monetary policy rates remained unchanged for about six quarters, inflation would return to the central banks' tolerance bands over this period, although there is considerable uncertainty about the future path of inflation (amid commodity price and exchange rate volatility), which is further reason to avoid a premature withdrawal of the contractionary monetary stance. While calibrating monetary policy in the current context of high uncertainty—including on the estimates of neutral rates, output gap, inflation path, and inflation expectations formation process—might be challenging, the costs to restore price stability if inflation becomes entrenched may be very large. To manage these uncertainties and secure the return toward inflation targets, it will be key to continue communicating policy intentions clearly and to take further actions, if needed, following a data-dependent approach.

Figure 17. LA5: Average Inflation Expectations, Inflation, and Monetary Policy Rates during Inflationary Episodes
(Year-over-year percent change)



Sources: Consensus Economics; Haver Analytics; national authorities; and IMF staff calculations.
Note: Current includes observed data up to August 2022 in each of the episodes in green dots of Figure 8. Past includes data over the duration of the longest episode in blue dots in Figure 8 for each LA5 country in the last 15 years. LA5 is purchasing-power-parity GDP-weighted average. Min (max) are the minimum (maximum) values among these countries. Inflation expectations and inflation are averages. Final rate is the monetary policy rate three months before the end of the inflationary episode. LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru); MPR = monetary policy rate.

Conclusions

Inflation in Latin America's largest economies is the highest in almost two decades. Initial price pressures reflected mostly external shocks but became more broad-based and persistent over time. With the largest deviations from central banks' targets in years and rising nominal wages, risks of a protracted inflationary process are high. Moreover, while long-term inflation expectations have remained broadly anchored despite repeated inflation surprises, short-term expectations have been gradually rising, pointing to increasing risks of de-anchoring. With evidence of monetary policy being effective to contain inflation and entailing only transitory effects on output, central banks should be ready to tighten monetary policy further, if needed, in response to persistent inflation and to not loosen monetary policy prematurely. Amid high uncertainty about the path of inflation and structural parameters of the economies, effective communication on the main policy objectives and contingency planning will be key to maintain expectations well anchored and secure a smooth return of inflation to the central banks' targets.

Annex 1. Global and Domestic Factors of Inflation

To tease out a global factor of inflation we estimate the following dynamic factor model, akin Nir, Haberkorn, and Cascaldi-Garcia (2021):

$$\pi_{it} = \chi_{it} + \varepsilon_{it}$$
$$\chi_{it} = \lambda_i f_t$$
$$f_t = a f_{t-1} + u_t$$
$$\varepsilon_{it} = \rho_i \varepsilon_{t-1} + e_{it},$$

where, in this case, π_{it} is year-over-year monthly headline inflation for each country i, χ_{it} is the global component of inflation, f_t is the global factor of inflation, and λ_i is the factor loading, such that the process of the global factor and the idiosyncratic errors are AR(1) with normally distributed errors.[1] The sample covers the period January 2000 to July 2022 and includes Brazil, Bulgaria, Chile, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russia, Thailand, and the United States.

Figure 2, panel 1 plots the estimates of f_t along the year-over-year change of monthly global commodity price index from the IMF. The plotted series pairwise correlation is about 0.4 and statistically different to zero, and it almost doubles for the recent half of these time series as well as for six-month lags of the commodity price series.[2]

Figure 2, panel 2 reports the decomposition of average π_{it} since January 2021 into the average predicted values of χ_{it}, global inflation, and ε_{it}, idiosyncratic or domestic inflation, for the United States, and purchasing-power-parity-weighted aggregates of LA5 (Brazil, Chile, Colombia, Mexico, Peru), emerging Europe (Bulgaria, Hungary, Poland, Romania, Russia), and emerging Asia (India, Indonesia, Malaysia, Philippines, Thailand).

[1]Estimation method is maximum likelihood. Results are robust to alternative specifications.

[2]Estimates of the global factor for food and energy consumer price index inflation present the strongest correlation among alternative global commodity price indices from IMF with food commodity price and fuel commodity price indices, respectively. Estimates of the global factor for core consumer price index inflation lag headline consumer price index global factor in Figure 2, panel 1, suggesting that inflation is becoming increasingly broad-based globally on average.

Annex 2. Drivers of Inflation

To construct the inflation decomposition in Figure 3, panel 2 and Figure 6, panel 2, the following specification is estimated, using local projection method, for Latin America 5 (Brazil, Chile, Colombia, Mexico, Peru) economies:

$$y_{i,t+h} - y_{i,t-1} = \beta_{t+h} x_{i,t} + \nu_i + \varepsilon_{i,t+h},$$

where $y_{i,t+h}$ is the log of the headline consumer price index for Figure 3, panel 2, and the log of the producer price index for Figure 6, panel 2 at time $t+h$; $x_{i,t}$ includes log-differenced import prices index and log-differenced, local currency-US dollar exchange rate and their two lags; and smoothed output gap, in country i at time t.[1] Output gap is available only at an annual frequency. Therefore, a weighted average of previous and current year output gap is taken, with the weight depending on the month of the year. β_{t+h} is the regression coefficients for $x_{i,t}$ in the regression for period $t+h$. ν_i is country fixed effect. Driscoll and Kraay (1998) standard errors are used.

For Figure 3, panel 2, realized monthly data on import price index, local currency-US dollar exchange rates, and smoothed output gap are subsequently combined with the regression coefficients to generate prediction of the contribution to headline inflation of each of the drivers, using up to eight- or nine-months-ahead estimation. These monthly predicted contributions are averaged to quarterly frequency.

[1]Results from the same specification for Figure 3, panel 2 but replacing logged import prices index with logged producer price index supported the pattern that producer price dynamics typically precede consumer price index inflation in the main text of this chapter.

Annex 3. Estimations of Phillips Curves

To explore inflation persistence in Latin America 5 (LA5; Brazil, Chile, Colombia, Mexico, Peru), we estimate an open-economy hybrid Phillips Curve model of inflation, as in Kamber, Mohanty, and Morley (2020). The baseline specification is as follows:

$$\pi_{c,t} = \gamma_c + \beta\pi_{c,t-1} + \delta E\pi_{c,t+12|t} + \theta gap_{c,t} + \vartheta\Delta neer_{c,t-1} + \mu\Delta comm_{t-1} + \delta\pi_{US,t-1} + \varepsilon_{c,t}, \quad \text{(A3.1)}$$

where $\pi_{c,t}$ is year-over-year headline inflation in country *c*, in month *t*, γ_c is a country fixed effect, $E\pi_{c,t+12|t}$ is 12-month-ahead inflation expectations in country *c*,[1] in month *t*, $gap_{c,t}$ is the output gap calculated using the Hamilton filter (using industrial production as a proxy of output), $\Delta neer_{c,t-1}$ is the change in the (log) nominal effective exchange rate between month $t-2$ and $t-1$, $\Delta comm_{t-1}$ is the change from month $t-2$ and $t-1$ of the commodity price index from IMF, and $\pi_{US,t-1}$ is the lagged value of year-over-year inflation in the United States. The analysis used monthly data for the period between January 2000 and February 2022.

Annex Table 3.1 shows the results of the estimation of (A3.1). Column (1) shows results for the LA5 countries over the full sample period 2000–22. It shows that monthly inflation is quite persistent, some evidence of exchange rate pass-through, and a low, albeit statistically significant coefficient on the output gap. Splitting the sample between into two periods (2000–10 and 2011–22), shows an increase in persistence in the most recent period, a sharp decline in the coefficient on the output gap (the coefficient is lower and no longer significant, that is, the Phillips curve is virtually flat), and an increase in importance of international inflation (proxied by US inflation). Annex Table A3.1 also shows a similar panel estimation for a group of 10 countries with inflation targeting regimes in Asia and Europe as in Annex 1. The results point to lower persistence relative to LA5 in the 2011–22 period and a larger coefficient for inflation expectations and higher exchange rate pass-through.

Annex Table 3.1. Phillips Curve Estimations—LA5 and Selected Emerging Market Economies

Dependent variable Inflation (year-over-year)	LA5 2000–21	LA5 2000–10	LA5 2011–22	Other IT EMs 2000–10	Other IT EMs 2011–22
Lagged inflation (year-over-year)	0.916***	0.873***	0.945***	0.904***	0.807***
	(0.0275)	(0.0456)	(0.0219)	(0.0390)	(0.0555)
Inflation expectations	0.144	0.217	0.116*	0.0804*	0.303***
	(0.0765)	(0.113)	(0.0515)	(0.0382)	(0.0891)
Output gap (HP)	0.0105***	0.0311**	0.00366	0.0176**	-0.000696
	(0.00186)	(0.00945)	(0.00293)	(0.00701)	(0.00125)
Lagged NEER change	-0.0192**	-0.0177**	-0.0172*	-0.0431***	-0.0761***
	(0.00532)	(0.00527)	(0.00786)	(0.00807)	(0.0204)
Lagged US inflation	0.170	-0.00496	0.367**	0.293	0.391*
	(0.0967)	(0.122)	(0.0926)	(0.163)	(0.210)
Lagged commodity price index change	0.00198	0.00367	0.00145	0.0105	0.0111
	(0.00368)	(0.00477)	(0.00346)	(0.00802)	(0.00697)
Constant	-0.243	-0.381	-0.250*	0.0378	-0.595**
	(0.191)	(0.288)	(0.106)	(0.0655)	(0.194)
Observations	1,148	483	665	956	1,592
R-squared	0.969	0.975	0.962	0.980	0.968

Source: IMF staff calculations.
Note: Standard errors clustered at the country and year/month level. EMs = emerging markets; HP = Hodrick-Prescott; LA5 = Latin America 5 (Brazil, Chile, Colombia, Mexico, and Peru); NEER = nominal effective exchange rate; yoy = year-over-year; IT = Inflation targeting central bank. *** *p*<0.01, ** *p*<0.05, * *p*<0.1

[1]Data for inflation expectations are from Consensus Forecasts, which reports monthly forecasts of December-on-December inflation for both the year of the survey and for the year after the survey. The analysis approximates 12-months-ahead inflation expectations following Brito, Carriere-Swallow, and Gruss (2018), who use a weighted average of current and next calendar year inflation expectations, where the weight for current year inflation forecast is equal to the months remaining in the year at the time of the survey divided over twelve.

Annex 4. Central Banks' Credibility

To estimate how well-anchored long-term inflation expectations are in each Latin America 5 (LA5; Brazil, Chile, Colombia, Mexico, Peru) and comparators, which gauges how credible central banks are, we use four measures following the work of Bems and others (2021):

1. Deviation of long-term forecasts, $\pi_t^{e,h}$, where h denotes the years of forecast horizon, from inflation target, π_t^*, $A_{t'}^1 = \max_{h\in\{3,5,7\}} \sqrt{\frac{1}{T}\sum_{t=t'-T+1}^{t'}\left(\pi_t^{e,h} - \pi_t^*\right)^2}$ —the better-anchored inflation expectations are the smaller deviations from target should be.
2. Time series variability of long-term forecasts, $A_{t'}^2 = \max_{h\in\{3,5,7\}} \sqrt{\frac{1}{T-1}\sum_{t=t'-T+1}^{t'}\left(\pi_t^{e,h} - \overline{\pi_t^{e,h}}\right)^2}$—the better-anchored inflation expectations are the lower their variation over time should be.
3. Cross-sectional dispersion of long-term forecasts measured with the standard deviation of forecasters views, $A_{t'}^3 = \max_{h\in\{3,5,7\}} \frac{1}{T}\sum_{t=t'-T+1}^{t'} stddev\left(\pi_t^{e,h}\right)$—the better-anchored inflation expectations are the lower their variation across forecasters should be.
4. Sensitivity of long-term forecasts to inflation surprises, measured with revisions of short-term or current year inflation expectations $\Delta\pi_t^{e,1}$, $A_{t'}^4 = \max_{h\in\{3,5,7\}} \beta^h$: $\Delta\pi_t^{e,h} = \alpha + \beta^h\,\Delta\pi_t^{e,1} + \varepsilon_t \;\; with\; t \in [t'-T+1; t']$—the better-anchored inflation expectations are the less they should react to short-term surprises.

T is the size of the window for rolling window estimates of the time series of the four indices—6-year for 1–3 and 10-year for 4—for each quarter (half-year) t' in the data. Quarterly (biannual) time series of end-of-year inflation expectations for diverse horizons from 2014:Q1 (2000:H1) to 2021:Q4 (2013:H2) are from Consensus Economics Forecasts. Figure 13, panel 1 plots the purchasing-power-parity-weighted annual average of each of the four measures for LA5. Figure 13, panel 2 plots the average for the last decade in the sample for the United States, and purchasing-power-parity-weighted LA5 and other emerging market average—Bulgaria, Hungary, India, Indonesia, Malaysia, Philippines, Poland, Romania, Russia, and Thailand. Figure 15, panel 1 presents purchasing-power-parity-weighted LA5 averages of the fourth measure but for the whole sample from 2000 to 2021 conditioning it on the distribution of $\pi_t^{e,1}$.

Annex 5. Impact of Monetary Policy on Inflation and Output

To estimate the impact of monetary policy shocks, the chapter follows the two-step approach of Brandao-Marques and others (2020). First, a Taylor-rule model is used to estimate monetary policy shocks. For each country c, the following equation is estimated at the monthly frequency:

$$\Delta i_{c,t} = \alpha + \beta E\Delta y_{c,t+12|t} + \delta E\pi_{c,t+12|t} + \sum_{j=1}^{2}\left(\vartheta_j \Delta neer_{c,t-j} + \rho_j \Delta y_{c,t-j} + \mu_j \Delta\pi_{c,t-j} + \sigma_j i_{c,t-j}\right) + \varepsilon_{c,t},$$

where $\pi_{c,t}$ and $\Delta y_{c,t}$ are year-over-year headline inflation and growth rate in month *t*, respectively; $E\pi_{t+12|t}$ and $E\Delta y_{t+12|t}$ are 12-month-ahead inflation and growth expectations in month *t*, respectively; $\Delta neer_{t-1}$ is the month-over-month change in the (log) nominal effective exchange rate; and *i* is the monetary policy rate. The monetary policy shock is the estimated error term $\varepsilon_{c,t}$.

Having estimated the monetary policy shocks, the second stage estimates the responses of output, inflation, and inflation expectations to monetary policy shocks using local projections (Jordà 2005). The specification is as follows:

$$v_{c,t+h} - v_{c,t-1} = \alpha_c^h + \beta^h \hat{\varepsilon}_{c,t} + \varphi^h X_{c,t} + \omega_{c,t+h}$$

where v is the variable of interest (inflation, log output, or inflation expectations), $\hat{\varepsilon}_{c,t}$ is the monetary policy shock estimated in the first stage, and h denotes the time horizons considered. X_{ct} denotes a set of control variables, which includes lagged values of the dependent variables, of the policy rate, of changes in the nominal effective exchange rate, and a set of global variables (the Chicago Board Options Exchange Volatility Index, a commodity price index, the US policy rate, US inflation, and the US output gap). The specification also includes country (α_c^h) fixed effects that capture time-invariant country features, respectively.

The parameter of interest is β^h, which tracks the impact of a monetary policy shock at time *t* (equivalent to a 1 percentage point change in the policy rate) on the variables of inters at different horizons. Notice that the estimated impact is relative to the preshock month (*t* – 1).

References

Andrle, Michal, Patrick Blagrave, Pedro Espaillat, Keiko Honjo, Benjamin Hunt, Mika Kortelainen, René Lalonde, Douglas Laxton, Eleonora Mavroeidi, Dirk Muir, Susanna Mursula, and Stephen Snudden. 2015. "The Flexible System of Global Models – FSGM." IMF Working Paper 15/64, International Monetary Fund, Washington, DC.

Bems, Rudolfs, Francesca Caselli, Francesco Grigoli, and Bertrand Gruss. 2021. "Expectations' Anchoring and Inflation Persistence." *Journal of International Economics* 132 (September).

Bernanke, B. 2006. "The Benefits of Price Stability." Speech by Chairman Ben S. Bernanke at The Center for Economic Policy Studies and on the occasion of the Seventy-Fifth Anniversary of the Woodrow Wilson School of Public and International Affairs, Princeton University, Princeton, New Jersey.

Brandao-Marques, Luis, R. G. Gelos, Thomas Harjes, Ratna Sahay, and Yi Xue. 2020. "Monetary Policy Transmission in Emerging Markets and Developing Economies." IMF Working Paper 20/35, International Monetary Fund, Washington, DC.

Brito, Steven, Yan Carriere-Swallow, and Bertrand Gruss. 2018. "Disagreement about Future Inflation: Understanding the Benefits of Inflation Targeting and Transparency," IMF Working Paper 18/024, International Monetary Fund, Washington, DC.

Driscoll, John C., and Aart C. Kraay. 1998. "Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data." *Review of Economic and Statistics* 80: 549–60.

Feldstein, Martin. 1999. "Capital Income Taxes and the Benefit of Price Stability." In *The Costs and Benefits of Price Stability*, edited by Martin Feldstein, 9–46. Cambridge, MA: National Bureau of Economic Research, Inc.

Ha, Jongrim, M. Ayhan Kose, and Franziska Ohnsorge. 2019. *Inflation in Emerging and Developing Economies: Evolution, Drivers, and Policies*. Washington, DC: World Bank.

Jordà, Òscar. 2005. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review* 95: 161-182.

Kamber, Güneş, Madhusudan Mohanty, and James Morley. 2020. "Have the Driving Forces of Inflation Changed in Advanced and Emerging Markets?" BIS Working Paper 896, Bank for International Settlements, Basel.

Nir, Eli, Flora Haberkorn, and Danilo Cascaldi-Garcia. 2021. "International Measures of Common Inflation." FEDS Notes, Board of Governors of the Federal Reserve System, Washington, DC.

Partnership for Market Readiness. 2021. *Carbon Pricing Assessment and Decision-Making: A Guide to Adopting a Carbon Price*. Washington, DC: World Bank.