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Understanding Inflation Dynamics

The Role of Global Shocks in CEMAC

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Understanding Inflation Dynamics: The Role of Global Shocks in CEMAC
Prepared by Johanna Tiedemann, Olivier Bizimana, Lluis Dalmau and Martin Ambassa*

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ABSTRACT: As in the rest of the world, inflation in CEMAC surged more quickly and persistently than expected during the 2021–23 period. This paper examines the drivers of inflation dynamics and the contribution of global shocks to inflation persistence in CEMAC. We use a Phillips curve framework combined with the local projections method. Our results confirm the prominent role of global factors in driving inflation dynamics. Global commodity food and oil price fluctuations, and shipping costs are the main factors explaining the large variability in headline inflation. Further, we find that global price shocks have sizable and persistent effects on domestic headline inflation, with differences in the magnitude and speed of pass-through. The pass-through from commodity food price fluctuations to headline inflation is higher and more persistent than that of other global price shocks, reflecting the large share of food in the consumption baskets, which makes inflation more vulnerable to direct effects of international food shocks, but also larger second-round effects.

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WORKING PAPERS

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I. Introduction

As in the rest of the world, the CEMAC region has been hit by a series of overlapping inflationary shocks since the end of the pandemic.[2] Inflation surged more quickly and persistently than expected during 2021–23, converging closer to peer countries (see IMF, 2023).[3] Inflation reached its highest levels in decades at 6.7 percent at end-2022, more than twice as high as the regional convergence criterion of 3 percent. In 2023, inflation eased in CEMAC, albeit at a much slower pace than in the rest of the sub-Saharan African region, especially compared with the other African currency union—the West African Economic and Monetary Union (WAEMU).[4]

The initial surge in headline inflation was largely driven by the spike in global food and energy prices, on account of the disruptions in global demand and supply chains caused by the COVID-19 pandemic. This has been further compounded by the onset of Russia's invasion of Ukraine—particularly its implications for agricultural commodity market, like cereals, and fertilizer. While headline inflation has started to wane from its historically high levels, as international commodity prices have eased, underlying inflation has proven more persistent, suggesting that domestic price pressures have broadened. In this context, there are concerns that inflation pressures might become more entrenched than expected, which creates a challenging environment for monetary policy in the region.

This paper examines the drivers of inflation dynamics and explores how global shocks—e.g., commodity price fluctuations and supply chain disruptions—contribute to inflation persistence. Inflation persistence in our analysis is understood as the time it takes for inflationary shocks to dissipate (that is, extrinsic persistence).[5] Indeed, inflation in CEMAC has been pushed persistently away from its long-term trend (and convergence criterion) by a series of global price shocks over 2021–22. Even if each of these shocks can be seen as transitory in nature this can result in greater persistence in inflation if they operate in the same direction. In addition, persistently high inflation, even if stemming from a sequence of transitory inflation shocks, could lead to a shift in longer-run inflation expectations or second-round effects in the wage and price setting process that generate more long-lasting inflationary pressures.

From a policy perspective, it is essential for the central bank to understand the source and persistence of global shocks, in particular food and energy prices. In principle, if the commodity price shocks are transitory, with a quick reversal of the spikes, and are unlikely to affect the medium-term inflation outlook relevant for monetary policy, the relative price increases can be accommodated (Cecchetti and Moessner, 2008). If, however, commodity price increases are more persistent, monetary policy would want to respond to fend off any second-round effects on longer-run inflation expectations and wage and

[2] The Central African Economic and Monetary Community (CEMAC) comprises six countries: Cameroon, the Central African Republic, Chad, the Republic of Congo, Equatorial Guinea, and Gabon.

[3] Peer countries refer to the WAEMU region and other sub-Saharan low-income countries.

[4] See Fernandes (2023) for discussions on the drivers of the inflation surge in the WAEMU.

[5] The literature distinguishes three forms of persistence: (i) extrinsic persistence stems from persistent fluctuations of the underlying determinants of inflation, such as the output gap or supply shocks; (ii) intrinsic persistence arises from the dependence of inflation to its own past, for example reflecting some backward-looking price-setting mechanism; and (iii) expectations-based persistence is due to the formation of inflation expectations. For more discussion of definitions of inflation persistence, see the analysis of Altissimo et al. (2006) who present an overview of the exhaustive research on the topic by the Inflation Persistence Network at the European Central Bank.

price setting behavior, and thereby on inflation in the medium-term.[6] Still, in practice, inflationary effects of commodity price shocks create challenges for monetary policy. In particular, in real time it is difficult to identify whether the increases in commodity prices are transitory or whether they are of a more persistent nature and likely to generate second-round effects on headline inflation.[7] In the context of the inflation surge of 2021-2023, the central bank faced a challenging task because multiple global shocks occurred simultaneously. Their overlapping nature made it more difficult to respond to these shocks.

Against this background, this paper provides a framework to better understand the inflation process in the CEMAC region and conduct an analysis to assess the drivers of inflation persistence. We shed light on why inflation has proven more persistent than expected and how long the effects of global shocks on inflation last in CEMAC. We explore the following questions: (i) To what extent inflationary pressures have broadened? (ii) How important are global factors in explaining inflation dynamics? (iii) How persistent are global price shocks? (iv) What are the policy implications?

The paper's main findings are as follows:

- Various measures of underlying inflation and the diffusion of inflation indicate that price pressures were broad-based during the inflation surge period (2021-2022), which suggests persistence of inflation in CEMAC.

- Global price shocks play a prominent role in explaining inflation dynamics in CEMAC. In particular, global commodity food and oil price fluctuations, and supply chain disruptions (proxied by shipping costs) are the main factors explaining the large variability in headline inflation—deviation from its long-term average—before, during the time of the pandemic, and the subsequent recovery. This finding partly reflects the large volatility in commodity prices, but also their persistent effects. By contrast, the contributions of domestic economic slack and long-term inflation expectations (proxied by the five-year ahead forecast for CPI inflation) to inflation dynamics were relatively small.

- The persistent inflationary effects of commodity price shocks and supply chain disruptions are important drivers of inflation persistence in CEMAC. We found that the pass-through from international commodity food price fluctuations to headline inflation is larger and more persistent than that of shocks to oil prices and shipping costs. A one standard deviation increase in global commodity food prices has a peak impact on headline inflation of around 2 percentage points after six quarters. This likely reflects the large share of food in the consumption baskets of CEMAC economies, which makes inflation more vulnerable to direct effects of commodity food price shocks, as well as potentially larger second-round effects. A similar shock to oil prices is associated with 1 percentage point increase in headline inflation after half a year, while a shock to global shipping costs has a peak effect of around 1.3 percentage points after two years.

[6] See De Gregorio (2012) for further discussions on monetary policy response to commodity price shocks.

[7] The central bank also might consider the adverse output effects of commodity price shocks. Given that CEMAC countries are exporters of oil and other commodity products, the negative output effects of rising commodity prices would be mitigated by an improvement in the region's terms of trade. In addition, the adverse output effects of rising commodity prices could be lessened if the source of the shock is rising demand of global commodities.

- In terms of policy implications, our results suggest that the central bank should not "look through" global price shocks, especially commodity food prices. Their higher share in the consumption basket, strong volatility, and persistence make them more likely to feed into inflation expectations which could contribute to upward pressures on wage demands and cost pressures and stimulate large second-round effects. Therefore, the central bank should closely monitor commodity price shocks and react to prevent inflation expectations from rising, which would have an impact on inflation over the medium-term policy horizon.

The paper contributes to the literature studying the impact of global shocks on domestic inflation in emerging and developing economies (EMDEs), which mainly focuses on commodity price shocks, as these economies are characterized by a larger share of food and energy in the consumer baskets (Walsh, 2011). This literature suggests that commodity price shocks explain a substantial part of domestic inflation dynamics. Specifically, for the CEMAC region, Caceres et al. (2011) found that global food and energy prices are important drivers of noncore inflation, yet administered prices hamper the direct pass-through effects. Furceri et al. (2015) find that global food price shocks of the 2000s had a larger impact on EMDEs than in advanced economies, reflecting the larger share of food in the consumption baskets in these economies and the weaker anchoring of inflation expectations, which creates a challenging environment for monetary policy in these economies. In line with this, Ha et al. (2019) provide evidence that core inflation in low-income countries responds more sharply to shocks to food and energy prices, reflecting the indirect effects of relatively large weight of food, and the relatively large weights of imported food and energy components in headline CPI, and the weaker response of many central banks to the second-round effects of these shocks. More recently, Carrière-Swallow et al. (2022) argue that inflationary impacts of shocks to global shipping costs are comparable in magnitude with that of shocks to oil and food prices but tend to be persistent. They also find stronger pass-through of shipping cost shocks in emerging economies and low-income countries, and attribute this to weaker monetary frameworks. For Sub Saharan Africa (SSA), Adriantomanga et al. (2023) find that global supply chain pressures, as well as shocks to global oil and food prices, have a sizable and persistent impact on domestic inflation.

Our analysis is also related to empirical studies that have documented the role of global shocks in the dynamics of domestic inflation, especially using the Phillips curve framework. Most of the studies are focused on individual countries or groups of advanced economies and, to a lesser extent, major emerging markets. This literature emphasizes the importance of global economic slack in explaining domestic inflation dynamics (the so called "global centric" view), particularly in advanced economies, beyond the direct impact of traditional global supply shocks, such as commodity prices. This literature argues that globalization has dampened the response of inflation to domestic economic slack, as an increase in demand translates into stronger imports rather than higher price pressures or because increased integration of emerging market economies into the global economy has constrained wage and price increases in the tradable sector. The results of these studies are fairly mixed. While some studies find that global output gap affects domestic inflation in advanced economies (see, among others, Borio and Filardo, 2007; Auer et al., 2017; Forbes, 2019), others find little support for a significant role of global economic slack (see, among others, Mikilajun and Lodge, 2016; Calza, 2008). Some studies on emerging market economies have also included the global output gap, in addition to global prices in a Phillips curve framework, and generally find that it is statistically insignificant (see, among others, IMF, 2018, 2021 or 2022a). They conclude that the direct impacts of external price pressures are more important for major emerging markets. The role of global economic conditions in driving domestic inflation in low-income countries, beyond their direct effects on international prices, has received less attention.

The remainder of the paper proceeds as follows. Section II presents an overview of inflationary pressures and evaluates whether they have become widespread across the CPI basket. Section III explores empirically the relative importance of global shocks in explaining inflation dynamics using the Phillips curve framework. Section IV examines the inflation persistence using local projection methods (Jordà, 2005) to estimate the impulse responses to global price shocks. Section V concludes with a brief discussion of the main findings and policy implications.

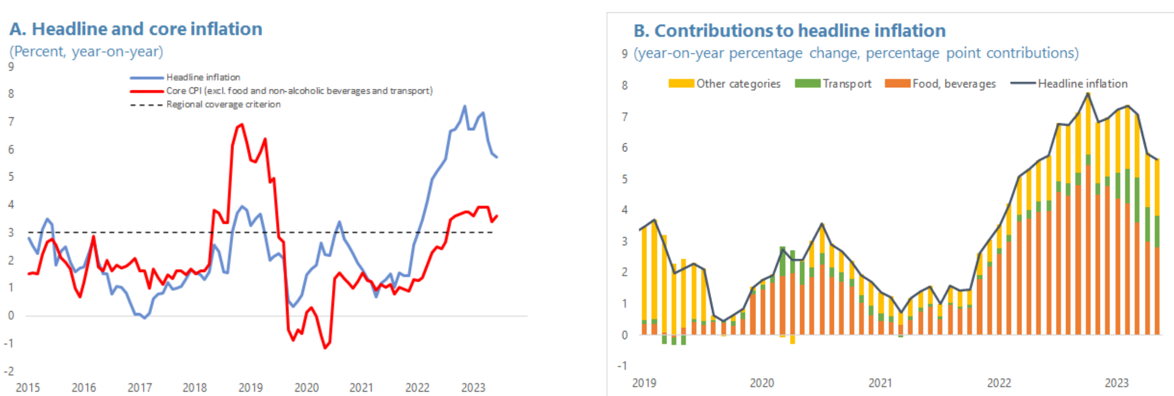
II. Recent Inflation Developments

A. Inflationary Pressures in CEMAC

Headline inflation in CEMAC started to accelerate at the end of 2021, doubling in 2022 and exceeding the regional convergence criterion of 3 percent in early 2022. It peaked in November 2022 at 7.6 percent year-on-year (y-o-y) and moderated in early 2023, at 6.0 percent y-o-y in the second quarter (see Figure 1 panel A). The surge was preceded by a long period of subdued inflation, with rates hovering below the convergence criterion and exceeding it only episodically since the early 2000s. In addition, inflation in CEMAC has been lower than in peer countries in recent years, although with the recent spike in 2022, CEMAC has converged somewhat closer to inflation rates among peer countries (see Figure A.4).

The sharp increase in headline inflation was driven by a small number of items with very high inflation rates. In particular, food and transport were the main drivers of higher headline inflation. They made up around three-quarters of headline inflation in the second quarter of 2023, accounting for more than two-thirds of the increase compared to two years before (see Figure 1 panel B). The component "housing, water and energy" also accelerated, but its contribution remained relatively modest over the same period (about 0.42 percentage points).

Figure 1. Inflation Dynamics



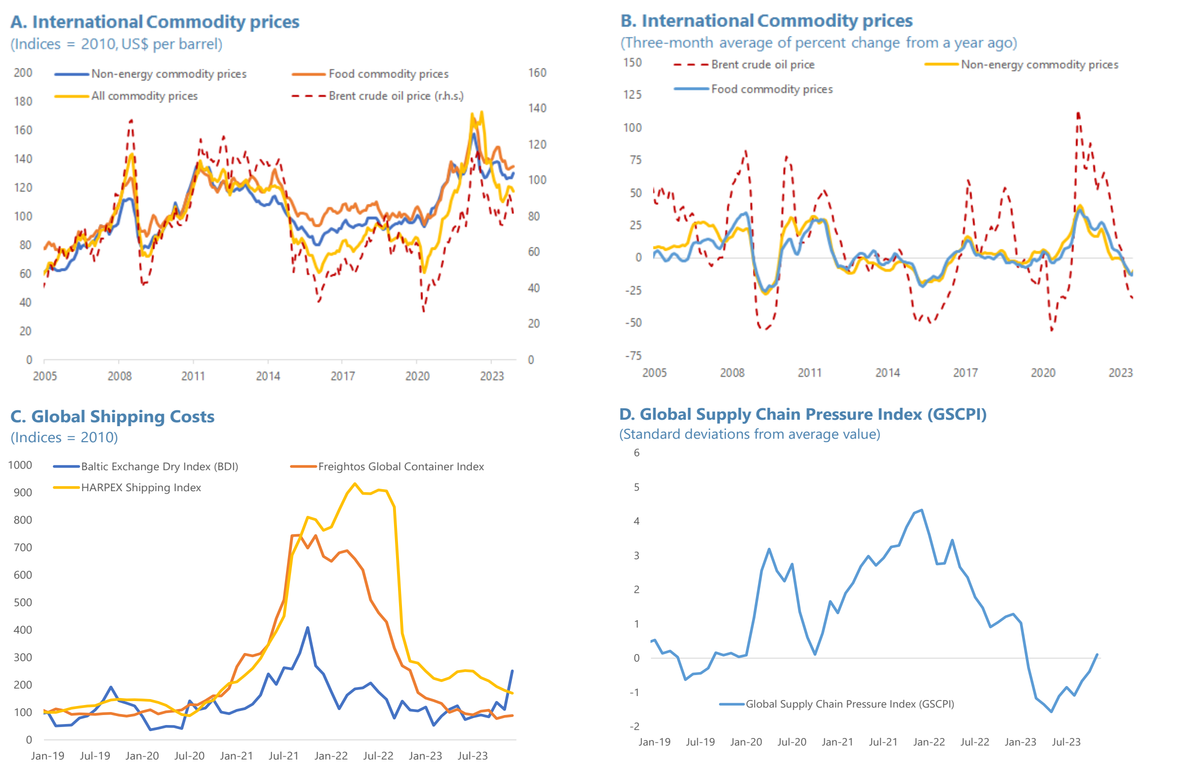
Sources: BEAC; and authors' calculations.

Notes: Core inflation measure excludes food and non-alcoholic beverages and transport.

The initial acceleration in headline inflation in CEMAC can be primarily attributed to a series of overlapping global shocks. First, the pandemic created adverse supply factors, with global supply chain disruptions, as well as demand factors, compounded by the subsequent rapid recovery in the global economy, which fueled global prices. As a result, the international prices of commodity and oil soared (Figure 2 panel A and B). Global shipping costs skyrocketed, with various indicators of freight rates, such as the Baltic Exchange Dry Index and the Freights Global Container Index, reaching multidecade highs (Figure 2 panel C). The Global Supply Chain Pressure Index, which aggregates several measures of supply chain pressures, rose to its record level in December 2021 (Figure 2 panel D).

In addition to the pandemic-related pressures, international markets of energy and food were disrupted by the onset of the war in Ukraine in February 2022, setting global prices for oil and some food products soaring (Figure 2 panel A). The global food commodity price index increased considerably in the second half of 2021, and accelerated further following Russia's invasion of Ukraine, peaking in June 2022 at its highest level since its inception in 1992 (Figure 2 panel A).

Figure 2. Global Inflation Pressures



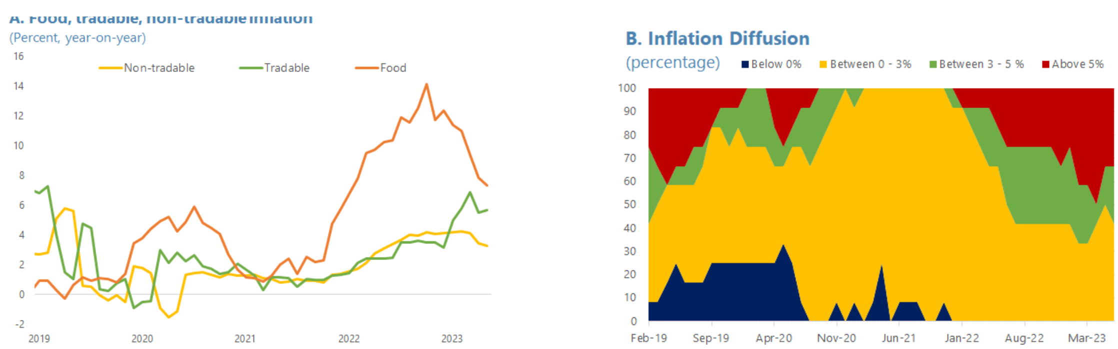
Sources: Haver Analytics; Datastream; and authors' calculations.
Notes: The Baltic Dry Index (BDI) is an index of average prices paid for the transport of dry bulk materials across more than twenty routes. The Freightos Baltic Global Container Freight Index is a composite indicator of container freight spot rates across twelve major global trade lanes. The Harpex is a composite indicator of weekly container shipping rate changes in the time charter market for eight different classes of container ships. The Global Supply Chain Pressure Index (GSCPI), developed by the New York Federal Reserve, summarizes information from commonly used indicators of global transportation costs (the Baltic Dry Index, the Harpex index and airfreight cost indices) and supply chain-related components from Purchasing Managers' Index (PMI) surveys in manufacturing in seven major economies (China, the euro area, Japan, South Korea, Taiwan, the United Kingdom, and the United States). The latest observations are for October 2023.

B. How Widespread is Inflation?

To better understand the diffusion of inflationary pressures across sectors, the regional Harmonized Index of Consumer Prices (HICP) is decomposed into tradable and non-tradable items. The tradable components (alcoholic beverages, clothing, household furnishing, transport, and other items) comprise items that are more influenced by global market conditions and the exchange rates, while non-tradable items (housing, health, communication, education, restaurants, and recreation) are mainly driven by domestic factors (Figure 3 panel A).[8] Consistent with the surge in international prices, tradable inflation has recorded a steep rise since the end of 2021, but less sharp than food inflation. Non-tradable inflation accelerated, more gradually, and with a lag, suggesting a delay in the pass-through of international price movements to domestic prices. The moderation in non-tradable inflation, which includes the components "utilities and energy", could be partly related to subsidies on energy products and other forms of price controls that have delayed the pass-through of some of the oil price shock.[9]

The distribution of price changes for items that are included in the CPI basket suggests that inflation has become more broad-based in 2022. While the increase in headline inflation was initially driven by a limited number of items, price pressures have spread across different CPI components over the period 2021-2023 (see Figure 3 panel B). The share of items with high inflation (i.e., above 5 percent) has increased substantially to about one third of the CPI basket in June 2023, compared to zero percent at end-2021, while the share of items with extremely low inflation rates (below zero) has disappeared between end- 2021 and June 2023 entirely. The share of items with inflation rates between 3 percent and 5 percent has tripled since the end of 2021 to about 25 percent in June 2023. As a result, the share of items with inflation rates above the regional convergence criterion (3 percent)–which can be interpreted as a sign of more broad-based inflation pressures–has increased to close to two-thirds from zero percent in the second half of 2021.

Figure 3. Diffusion of Inflation



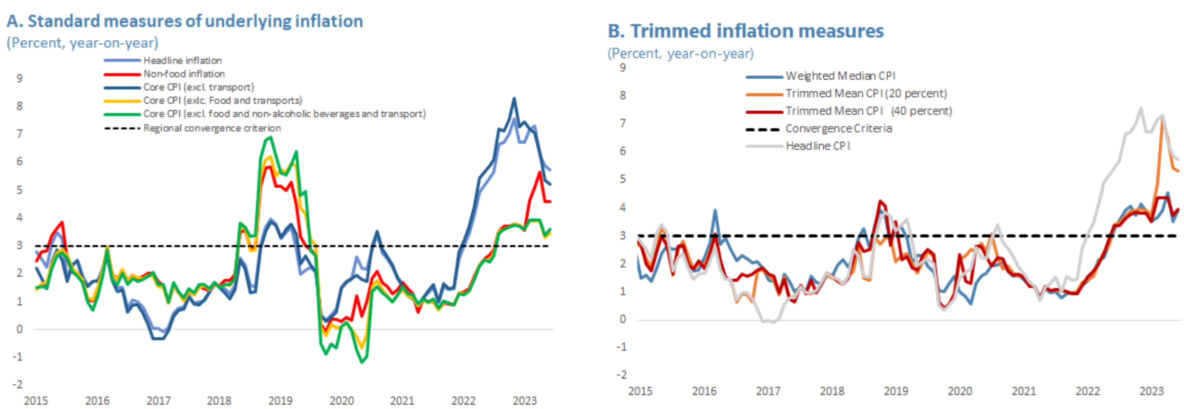
Sources: BEAC; and authors' calculations.
Notes: Tradable items include alcoholic beverages, clothing, household furnishing, transport, and other items. Non-tradable items include housing, health, communication, education, restaurants, and recreation. Figure B shows the share of items by inflation rate in the CEMAC region. The shares are computed as a unit count of the components of CPI inflation. The CPI basket includes 12 different components. The latest observations are for June 2023.

[8] Food items are not included in tradables, as they also comprise domestic products that are not directly affected by international prices (mainly unprocessed food, such as fresh products).

[9] The details of goods and services in the CPI that are subject to price controls are not available. Figure A.5 in Annex II shows that energy subsidies in CEMAC countries are very large, amounting to about 4 percent of GDP on average in 2022.

The surge in headline inflation has been accompanied by a sharp increase in all measures of underlying inflation. These indicators of core inflation seek to filter out the more volatile components that are affected by temporary idiosyncratic shocks. It should be noted that we do not solely rely on traditional measures of core inflation excluding energy and food to evaluate the underlying inflationary pressures. In part, this is because, like in many low-income countries, food, and to a lesser extent energy, are important components of the overall consumption basket in CEMAC economies: the share of food represents about 40 percent of the CPI on average, while energy is about 9 percent (see Annex II). In addition, food prices are characterized by high volatility, and their shocks are transmitted quickly and strongly to nonfood prices (Walsh, 2011). Therefore, relying only on core inflation measures that exclude food prices from a headline inflation could lead to an underestimate of their medium-term effects. Consequently, we look at a broader set of core inflation measures.

Figure 4. Underlying Inflation



Sources: BEAC; and authors' calculations.

Notes: The underlying inflation are computed based on the removal of volatile components from the CEMAC CPI basket. The latest observations are for June 2023.

Two types of underlying inflation measures send the same signal. The first one, which is the commonly used, permanently excludes certain fixed sub-components from the CPI that tend to be more volatile, such as food and energy. For the CEMAC region, based on available disaggregated price data, permanent exclusion-based measures of core inflation essentially remove food and transport (energy is a major input in the cost of production of transport services), or only food or transport. The core inflation indicator excluding food and transport has more than tripled since mid-2021, peaking at around 4 percent in March 2023 and hovering around that level in the second quarter of 2023 (Figure 4 Panel A).[10] The second type of indicators temporarily removes items that exhibit more volatile dynamics in certain months (typically on a month-by-month basis). It includes trimmed mean and weighted median CPI inflation

[10] It should be noted that permanent exclusion-based measures are still influenced by transitory effects, as they include the indirect effects of energy and food. For example, energy and food are major inputs for hotel and restaurant services. In addition, the component "housing and utilities", which is included in this core measure, is affected directly and indirectly by energy price swings.

measures, which point to broad-based inflation dynamics.[11] Figure 4 Panel B shows that the trimmed inflation rates have historically hovered around 3 percent, with an upward trend in 2022 onwards. The 20 percent trimmed mean CPI inflation increased by 4 percentage points, while the weighted mean rose by 2.7 percentage points between end-2021 and June 2023.[12] They stood at 5.3 and 3.9 percent in June 2023, respectively, their highest readings since 2018, confirming that inflation has become more broad-based since 2022.

III. The Phillips Curve Framework for CEMAC

To examine these developments in more detail, this section focuses on the most common framework for analyzing inflation dynamics–the Phillips curve. In particular, we use a hybrid version of the Phillips curve which incorporates not only domestic slack, the role of forward-looking inflation expectations from the New-Keynesian Phillips curve (see Galí and Gertler, 1999, for the theoretical foundations), a role for inertia, but also a comprehensive set of global variables. The baseline specification controls for the contributions of a set of global prices to inflation developments over the past years, and an extension allows to account for the direct impact of global cyclical conditions (or global output gap).

A. Framework and Data

For the baseline specification, we estimate a hybrid version of a standard New-Keynesian Phillips curve (see for example IMF, 2013; Gordon, 2013). The benchmark hybrid Phillips curve has the following form:

$$\pi_t = \rho\pi_t^e + \gamma\pi_{t-1} + \beta x_{t-1}^d + \theta Z_{t-l}^f + \varepsilon_t \quad (1)$$

Where π_t represents a quarterly measure of year-on-year inflation, and π_t^e is a measure of forward-looking inflation expectations; π_{t-1} is lagged inflation to capture persistence in the inflation process and other backward-looking expectations; x_{t-1}^d is a measure of domestic slack (cyclical component of output) with one lag, Z_{t-l}^f captures external price pressures in domestic currency, with longer lags *l* to account for a slower pass-through to domestic prices.

In this framework, the error term, ε_t, captures different factors, including potential mismeasurements of domestic slack (the output gap), but also potential impacts of global factors (beyond the direct effects of traditional global supply shocks).

Following a recent stream of literature, which explores the role of global factors in influencing the domestic inflation process, the standard hybrid Phillips curve framework is augmented with a measure of

[11] For recent discussions on the comparison of both types of alternative measures, see Dolmas and Koenig (2019) for the US or Kahn, Morel and Sabourin (2015) in the case of Canada, among others.

[12] The trimmed mean and weighted median are measures of core inflation that exclude CPI components whose rates of change in a given month are located in the tails of the distribution of price changes. The 20 (40) percent trimmed mean removes 10 (20) percent of the year-on-year rates of change from each tail of the distribution of 12 price changes in the CPI each month and aggregates the year-on-year rates of change using rescaled weights. The weighted median (or the 50 percent trimmed mean) is the price change at the 50th percentile (by weight) of the ordered distribution of price changes.

global economic slack to investigate the potential role of global activity (beyond what is captured by external prices) in inflation dynamics (see Borio and Filardo, 2007; Auer, Borio and Filardo, 2017; Forbes, 2019). According to the “global-centric view” of the inflation process, global factors have become more important relative to domestic factors, and hence measures of global economic slack should be relevant determinants of domestic inflation, and their role should have increased with global economic integration. To investigate the potential impact of global factors, we estimate the following specification:

$$\pi_t = \rho\pi_t^e + \gamma\pi_{t-1} + \beta x_{t-1}^d + \theta Z_{t-l}^f + \delta x_t^g + \varepsilon_t \qquad (2)$$

x_t^g is a measure of the slack in the global economy–or foreign output gap –with one lag, which captures global demand shocks, while foreign prices proxy the supply shocks.

The variables used for the estimation of each of these specifications are computed using standard conventions in the literature. We convert all variables to quarterly frequency. Annex III provides detailed definitions and sources of all data used in the empirical analyses.

Dependent variable: We use the new Harmonized Index of Consumer Prices (HICP) computed by the central bank (BEAC) for the six CEMAC countries for the entire region. Headline HICP inflation is the arithmetic average of national HICP and weighted by the country’s share of final household consumption in the total final consumption of resident households in the CEMAC. We convert monthly data to quarterly frequency by computing the average of the three months of the quarter. The relatively short time series for the CPI components–from 2012 to 2023–does not allow us to compare the results of the Phillips curve for headline inflation with measures of core inflation presented in the previous section over the entire sample. This means that our analysis will assess both the direct and indirect impacts of global prices on domestic inflation. The choice of using headline inflation for our analysis can be justified by the large expenditure share of food (and to a lesser extent, energy), which implies that excluding these items would likely understate underlying pressures (see Walsh, 2011).

Domestic slack: We use the output gap as a measure of domestic cyclical conditions. It is computed as the deviation of real GDP for the CEMAC region from its trend derived from the Hodrick-Prescott filter (HP filter). As real GDP data is available on annual basis, we interpolate the series using the quadratic match method.

Inflation expectations: We use the five-year-ahead CPI inflation forecasts from the IMF’s *World Economic Outlook* as a proxy for forward-looking inflation expectations. These forecasts are available for each individual country. As for headline HICP, the aggregate measure for CEMAC is computed as the arithmetic average of national forecasts and weighted by the country’s share of final household consumption in the total final consumption of resident households. These forecasts are highly stable, hovering around 2.5 to 3 percent–close to the regional convergence criterion of 3 percent. Thus, the measure of inflation expectations is close to a constant in our specification. As the inflation forecasts are only available annually, we use the quadratic match method to interpolate the annual series into quarterly series.

Global factors: The multitude of global shocks that have affected the CEMAC region over the past years may not be sufficiently captured in the inflation model that only controls for global factors through a single measure of import prices. Hence, external price pressures are captured by several global price indicators traditionally used in the literature. We include several global prices (converted to domestic currency using bilateral; exchange rate against the U.S. dollar) in the equation to capture global supply shocks: the year-on-year changes in oil prices, non-energy commodity and food price indices. We use the changes in the Baltic Dry Index (a measure of global shipping costs) as a proxy of the effects of global supply chain pressures. All the global prices are available on a daily basis and averaged over the quarter. Our baseline estimation uses the global output gap as a measure of slack in the global economy, which is computed as the difference between global real GDP and its trend obtained using the HP filter. Annual global GDP is interpolated using the quadratic match method to obtain quarterly series.

B. Baseline Results

We estimate several specifications of the hybrid Phillips curve for the CEMAC region as a whole, using quarterly data over the period 2001Q1–2022Q4.

Table 1 displays the estimates of alternative specifications. The estimated parameters are broadly consistent with the findings from the literature on hybrid Phillips curve augmented with global factors for developing and emerging market economies (see, among others, IMF, 2018, 2021 or 2022a). Column (1) reports estimates of the standard hybrid Phillips curve model (equation (1)). All the coefficients have the expected sign, and all are significant at the 5 percent level, which suggests that the Phillips curve framework can explain headline inflation dynamics in the CEMAC region. Typically, higher lagged inflation, a more positive domestic output gap and higher inflation expectations are all associated with higher inflation. The magnitude of the coefficients also provides an indication of which variables have a more important impact on inflation. A 1 percentage point increase in five-year-ahead inflation expectations leads to a 0.17 percentage point increase in current inflation. An improvement of 1 percentage point in the domestic output gap is associated with a 0.18 percentage point increase in inflation. Inflation also appears to be highly persistent, with lagged inflation terms highly significant with the largest coefficient.

Our results also confirm the prominent role of global supply shocks, which account for an important part of inflation dynamics. Higher oil prices, food commodity prices and shipping costs (which proxy global supply chain pressures) are all significantly correlated with higher headline inflation. The coefficient for food commodity prices is larger than the coefficients for oil prices and shipping costs. It implies that an increase of 1 percentage point in global food price inflation over the last two quarters corresponds to a 0.02 to 0.03 percentage point increase in headline inflation, while a 1-percentage point increase in oil prices or shipping costs leads to less than 0.01 percentage point increase in inflation.[13] However, the coefficients for inflation expectations and the domestic output gap become insignificant when shipping costs are added to the standard hybrid Phillips curve (column (2)). The coefficient on inflation expectations is insignificant when oil and food commodity prices (column (3)) and shipping costs are all added to the hybrid Phillips curve (column (4)).

[13] While these effects seem small, given the average size of commodity food and oil price shocks, the impact can be quite large, with a standard deviation of 35 and 13 percentage points, respectively.

There is no evidence that global cyclical conditions have an impact on domestic inflation in CEMAC. The coefficient for global output gap is insignificant in all estimated hybrid Phillips curve specifications (Table 2) and negatively signed when controlling for food commodity and oil prices. This likely reflects the fact that the region's economies are not sufficiently integrated in the global economy, and the global value chains (GVCs), reflecting a lack of diversification. In other words, for the CEMAC region, global demand conditions only matter to the extent they affect commodity prices and supply chain conditions.

Table 1. Hybrid Phillips Curve Estimation

VARIABLES	(1) CPI Inflation	(2) CPI Inflation	(3) CPI Inflation	(4) CPI Inflation	(5) CPI Inflation	(6) CPI Inflation	(7) CPI Inflation	(8) CPI Inflation
Lag 1 of CPI inflation	0.845***	0.918***	0.821***	0.868***	0.854***	0.919***	0.816***	0.864***
	(0.0665)	(0.0609)	(0.0588)	(0.0568)	(0.0651)	(0.0610)	(0.0581)	(0.0566)
Lag 1 of output gap	0.186**	0.118	0.201***	0.158**	0.168**	0.114	0.212***	0.170**
	(0.0802)	(0.0806)	(0.0710)	(0.0717)	(0.0840)	(0.0832)	(0.0732)	(0.0745)
5-year ahead inflation expectations	0.168**	0.0400	0.108	0.0436	0.160**	0.0406	0.107	0.0397
	(0.0785)	(0.0771)	(0.0751)	(0.0728)	(0.0764)	(0.0778)	(0.0770)	(0.0753)
Lag 1 of change in oil prices			0.00840**	0.00659*			0.00949**	0.00796*
			(0.00357)	(0.00346)			(0.00418)	(0.00402)
Lag 2 of change in food prices			0.0299***	0.0250***			0.0301***	0.0250***
			(0.00987)	(0.00907)			(0.0101)	(0.00930)
Lag 2 of change in shipping costs		0.00646***		0.00386***		0.00632***		0.00403***
		(0.00128)		(0.00125)		(0.00130)		(0.00128)
World output gap					0.117	0.0316	-0.0698	-0.0933
					(0.117)	(0.109)	(0.118)	(0.113)
Observations	87	87	87	87	87	87	87	87
R-squared	0.895	0.913	0.923	0.928	0.897	0.913	0.923	0.929

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

C. Contributions to Inflation Dynamics

The analysis also examines the role of explanatory variables of the baseline Phillips curve in explaining inflation dynamics in the post-covid period (2021-2022). We use specification (4) in Table 1, which includes past inflation, domestic output gap, five-year-ahead inflation expectations, prices of oil and food as explanatory variables. The global output gap variable was not included in the specification as it was not significant. The contributions from each explanatory variable are derived as in Yellen (2015), using the corresponding estimated coefficients. In particular, the initial value of each explanatory variable of the model is set to zero and we perform dynamic simulations so that the lagged inflation term is set to its simulated value rather than its actual value. Hence, the decompositions include the effects of past inflation that are fully attributable to past movements in the explanatory variables. Specifically, the contributions from each explanatory variable to inflation dynamics is computed as follows:

$$C_t^x = \hat{\gamma}\, C_{t-1}^x + \widehat{\beta_t^x}\, x_t$$

Where C_t^x is the contribution to inflation dynamics of each explanatory variable, x, and $\widehat{\beta_t^x}$ is the corresponding estimated coefficient, while $\hat{\gamma}$ is the estimated coefficient on lagged inflation which captures the persistence of the inflation process.

The decomposition is constructed in terms of deviation of headline inflation from its long-term average over recent three sub-periods: the pre-pandemic period (from the first quarter of 2015 to the fourth quarter of 2019) where headline inflation dropped below its long-term average; the pandemic crisis episode (from the first quarter of 2020 to the second quarter of 2021), with headline inflation dropping below its historical mean, and the post-pandemic recovery period (from the third quarter of 2021 to the fourth quarter of 2022), during which inflation soared above its long-term mean. It should be noted that the historical mean is close to the average value of the five-year-ahead inflation expectations. Thus, the deviation of headline inflation can be interpreted as deviations from long-term inflation expectations.

Figures 5 (panel A and B) show the quarterly and average contributions of each factor to the deviation of headline inflation from its long-term average over the recent years.[14] The decompositions show that global price shocks are the most important drivers of the large variability in inflation–i.e., deviation from its mean–over the recent years, with overall positive contributions during inflation spikes and negative contributions during disinflationary periods.

Global prices of oil and food as well as shipping costs have been the major contributors to the spike in headline inflation in the post-pandemic recovery period (2021–22). Domestic cyclical conditions had a modest and deflationary impact, with a negative contribution of domestic output gap.

During the pandemic crisis (2020-mid-2021), global prices—oil and food prices and, to a lesser extent shipping costs— were the main contributor to the deviation of headline inflation from its historical mean. In addition, domestic slack exerted deflationary pressures on headline inflation.

Global prices were the main drivers of the decline in inflation below its long-term average during the pre-covid years (2015–19), while domestic cyclical conditions exerted upward pressures.

The contributions from long-term inflation expectations during the three sub-periods were negligeable, suggesting that inflation expectations remained broadly stable–and were well-anchored. This finding is in line with previous studies on emerging markets which showed that changes in long-term inflation expectations played a limited role in explaining deviations of headline inflation from inflation targets during the pre-pandemic period (see for example IMF, 2016). [15] Specifically for the CEMAC region, the relative stability of long-term inflation expectations could reflect the fact that inflation has been historically low and supply shocks have been mitigated by government intervention. For example, fuel prices at the pump are subsidized in all CEMAC countries.

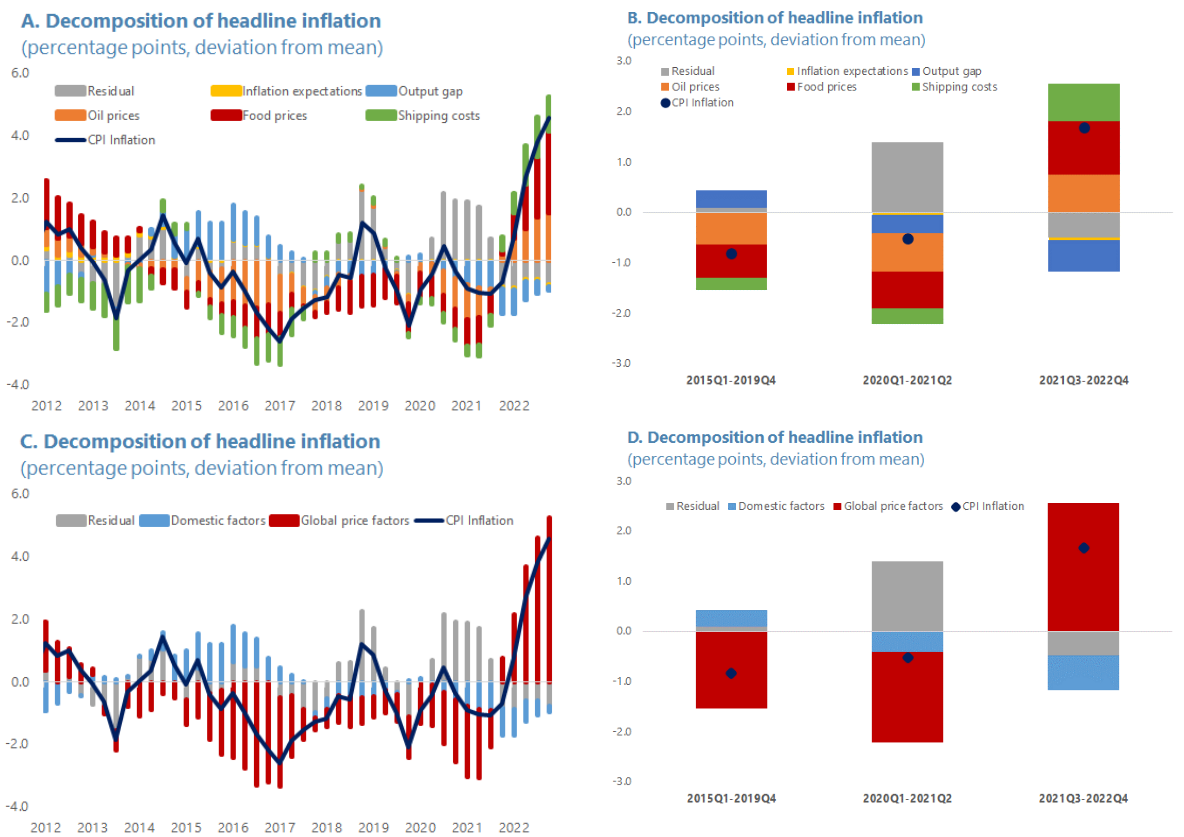
The decomposition shows a substantial contribution from unexplained factors–the model residuals–to inflation developments during the pandemic crisis and, to a lesser extent, the post-pandemic recovery. This could reflect a number of different factors, including measurement errors, particularly in the unobservable variables, such as the output gap and inflation expectations. In particular, the output gap could underestimate the extent of domestic slack. Measures of inflation expectations, such as long-term

[14] Figure A.6. presents the decomposition of headline inflation level into domestic and global factors.

[15] However, using core inflation for emerging markets, IMF (2018) found that long-term inflation expectations (3-year-ahead) were the main contributor to the deviations of inflation from target over the period 2004–18. In addition, this result for core inflation is robust to the change of the horizon for inflation expectations, but less robust for headline inflation.

inflation projections used in the analysis, may not capture the expectations of firms that set prices of goods and services. Changes in administered prices could also account for some of the unexplained residuals.

Figure 5. Contributions to Inflation Dynamics



Source: Authors' calculations.

Note: All series are expressed in terms of deviations from their sample mean. The figures depict the quarterly (A and C) and average contributions of each factor to the deviation of headline inflation from its long-term average by sub-periods (B and D) based on the dynamic simulations. Global price factors include oil and food prices as well as shipping costs, while inflation expectations and domestic output gap are categorized as domestic factors.

In Figure 5 (panel C and D), we reinterpret the contributions of global price factors to deviations of headline inflation from its historical average. Specifically, oil and food prices as well as shipping costs are considered as global price factors, while inflation expectations and domestic output gap are categorized as domestic factors. According to this classification, the deviations of headline inflation from its long-term average over the recent years were mostly driven by fluctuations in global price shocks, while the contribution of domestic factors was relatively small. This can be explained by the fact that, even if the coefficients of global price shocks are smaller than that of the output gap and inflation expectations, these prices are much more volatile and have experienced larger swings over the sample. In addition, their contributions account for their past developments, and thus their persistent inflationary effects.

D. Robustness Analysis

We perform various robustness checks to verify the validity of our baseline results. We consider several specifications with alternative variables (Annex I).

Global price shocks. We consider alternative specifications that include a broader set of global factors. We test several variables capturing external price pressures: (i) the year-on-year percent changes in producer price index (PPI) for total OECD countries, which proxies global external price pressure (Table A.1). (ii) the year-on-year percent changes in the OECD producer price index relative to the percent changes in the GDP deflator, as a measure of the relative price of imports (Table A.1). (iii) the year-on-year percent changes in China's PPI, which account for external price pressure from China (Table A.2). These variables also capture some of the effects of global supply chain pressures, as they reflect price inflation related to global manufacturing. The results indicate that these alternative measures of external price pressure are significant only in specifications where the prices of oil and food are not included, indicating that these measures capture the effects of global oil and food prices. This also suggests that fluctuations in import prices for the region are largely driven by food and energy price shocks.

Global slack. We also test two alternative measures of global slack: (i) the world output gap proxied by the deviation of real GDP for total OECD countries from the HP-filtered trend (Table A.3); and (ii) the cyclical component of the HP-filtered world industrial production index (Table A.3). Overall, our main findings remain robust across all specifications: the measures of global slack are insignificant, and the other key results are unchanged.

Inflation expectations. To address the uncertainty surrounding the specification of inflation expectations in the Phillips curve equation, three-year-ahead inflation forecast instead of five-year-ahead is included as an alternative proxy (Table A.3).[16] The key findings are robust to the change in the horizon for inflation expectations in all the Phillips curve specifications. Three-year-ahead inflation expectations are statistically significant in the benchmark hybrid Phillips curve and become insignificant with the inclusion of global shipping costs. In addition, the coefficients of domestic factors and global price variables are broadly similar in terms of magnitude to those of the baseline estimations.

Domestic slack. We test the cyclical unemployment (the deviation from the HP-filtered unemployment rate), instead of the output gap, as an alternative measure of domestic economic slack (Table A.5)[17]. The results confirm that the coefficients of global price variables remain significant when the unemployment gap is included in the equation as an alternative measure of economic slack. However, the coefficient on cyclical unemployment is insignificant in all the specifications. This supports the view

[16] Measures of medium to long-term inflation expectations (three-year-ahead and five-year-ahead inflation forecast) are less correlated with current inflation and consistent with long-run historical mean of headline inflation. However, measures of short-term inflation expectations (one-year-ahead) reflect the impact of transitory shocks, and hence depend on current inflation dynamics. Therefore, the use of one-year-ahead inflation expectations in the Phillips curve equation poses reverse causality issues.

[17] We also conduct a further robustness check with the output gap computed with alternative filters: the Baxter-King and the Christiano-Fitzgerald filters. The conclusions from the baseline estimation are robust to these alternative choices. The results (not shown here) are available upon request from the authors.

that the unemployment gap is a poor measure of labor market slack, reflecting the fact that traditional measures of unemployment do not consider that many workers move to the informal sector in response to negative shocks instead of registering as unemployed–especially in developing economies where informal employment is widespread.[18]

IV. On the Persistence of Global Price Shocks

In this section we further explore the dynamic impact of global shocks to inflation. In particular, we estimate a dynamic version of the baseline hybrid Phillips curve using local projection methods to evaluate the persistence of individual global price shocks to inflation. In other words, we evaluate how long a one-time contemporaneous global price shock to inflation is expected to continue affecting inflation in future periods.

A. Dynamic Responses of Inflation to Global Price Shocks

To explore the persistent effects of global price shocks on inflation, we apply the local projection method (Jordà, 2005) to estimate the impulse responses of inflation to changes in global factors, including oil prices, commodity prices and global shipping costs. For each horizon *h*, the following local projection specification is estimated:

$$\pi_{t+h} = \sum_{j=1}^{l} \gamma_j^h \pi_{t-j} + \sum_{j=0}^{l} \beta_j^h X_{t-j} + \sum_{j=0}^{l} \theta_j^h Y_{t-j} + \varepsilon_{t+h}^h, \tag{3}$$

Where π_{t+h} represents the year-on-year headline CPI inflation *h*-period ahead. X is the year-on-year change in each global factors, including oil prices, commodity food prices, shipping costs and non-energy commodity prices, denominated in US dollar. β_0^h captures the impact of each global price variable on inflation over the following *h* periods. Y_t is a vector of control variables, including domestic output gap, the bilateral nominal exchange rate against the US dollar (CFA per US dollar). We also include the lagged inflation in the equation to control for inflation persistence (captured by γ_j^h). ε_{t+h}^h is the error term.

In the baseline specification the number of lags has been set to one. Equation (3) is estimated for each horizon *h* = {0,…,8} using the ordinary least squares estimator. We estimate robust standard errors using the Newey-West procedure. The impulse response functions are computed using the estimated coefficients β_0^h. The impulse response functions' confidence bands are constructed using the standard errors of the β_h coefficients estimated for each horizon h.

B. Baseline Results

Figure 6 plots the estimated impulse responses of headline inflation to global oil prices, food and non-energy commodity prices as well as supply chain pressure shocks. Typically, each of the global price variables is shocked individually, while controlling for the effects of the others. We show impulse-

[18] This result could also be due to potential mismeasurement of the ILO modelled estimates of the unemployment rate.

responses that have been rescaled for a one standard deviation shock to global price shocks.[19]
The evidence shows that commodity price shocks and supply chain disruptions are important drivers of inflation persistence in CEMAC. The pass-through from international commodity food price shocks is larger than other global supply shocks, which is consistent with the evidence from the literature on developing economies (see, among others, De Gregorio, 2012; Andriantomanga et al., 2023).

Table 2 presents the coefficients on oil prices, global food commodity prices, shipping costs and non-energy commodity prices.[20] The results show positive and statistically significant responses of headline inflation to global price pressures, with differences in the magnitude and speed of pass-through.
On balance, global price shocks have relatively long-lasting effects on domestic inflation in CEMAC.

In Panel A, we report the impact of oil prices, which materializes very quickly–statistically significant the first three quarters–but appears to be short-lived, as it effectively disappears after one and a half years. Typically, a one standard deviation shock in oil prices increases headline inflation by about 1 percentage point two quarters after the shock, reverts in the subsequent quarters, and disappears in one year.
The relatively low pass-through from oil prices to inflation can partly reflect the fact that some of the shock has been mitigated by subsidies.

Panel B reports the responses of headline inflation to a global commodity food price shock. The impact of the shock is more gradual, stronger and tends to be more persistent than an oil price shock. A one standard deviation rise in global commodity food prices is associated with an increase in headline inflation of about 1.9 percentage points after four quarters, peaking at an impact of 2.1 percentage points after six quarters. The response of headline inflation remains statistically significant two years after the shock.
The sizable and more persistent impact of global commodity food shocks partly reflects the relatively large share of food in the consumption baskets across the region (see figure A.4. in Annex II), which makes its second-round effects through pressures on other costs and wages larger.

Panel C illustrates the impact of global supply chain pressures, proxied by shipping costs. Shocks to global shipping costs have a milder effect and build up more gradually than oil and food price shocks.
The shock starts to exert upward pressure on headline inflation after six quarters and is persistent, peaking after eight quarters. A one standard deviation shock to global shipping costs increases headline inflation by about 1.2 percentage points after six quarters, and the effects peaks at around 1.3 percentage points after two years. The shock is still statistically significant after two years. This finding is consistent with evidence from recent literature, which shows that shocks to global shipping costs have a relatively large and persistent impact on domestic inflation in a group of advanced and emerging economies
(see for example, Carrière-Swallow et.al., 2022), although the magnitude is smaller.[21] The slow pass-

[19] In Figure A.3 (Annex I), we present the local projection results for the shocks on exchange rate shock and domestic demand. The results show that the effects of shocks on the exchange rate and the output gap are less persistent than global price shocks, reversing after around three quarters. We also tested the impact government spending shocks. The results are available upon request from the authors.

[20] The results for the impact of a shock on global output gap on domestic inflation are not presented, as the impulse responses were not statistically significant, consistent with the Phillips curve analysis.

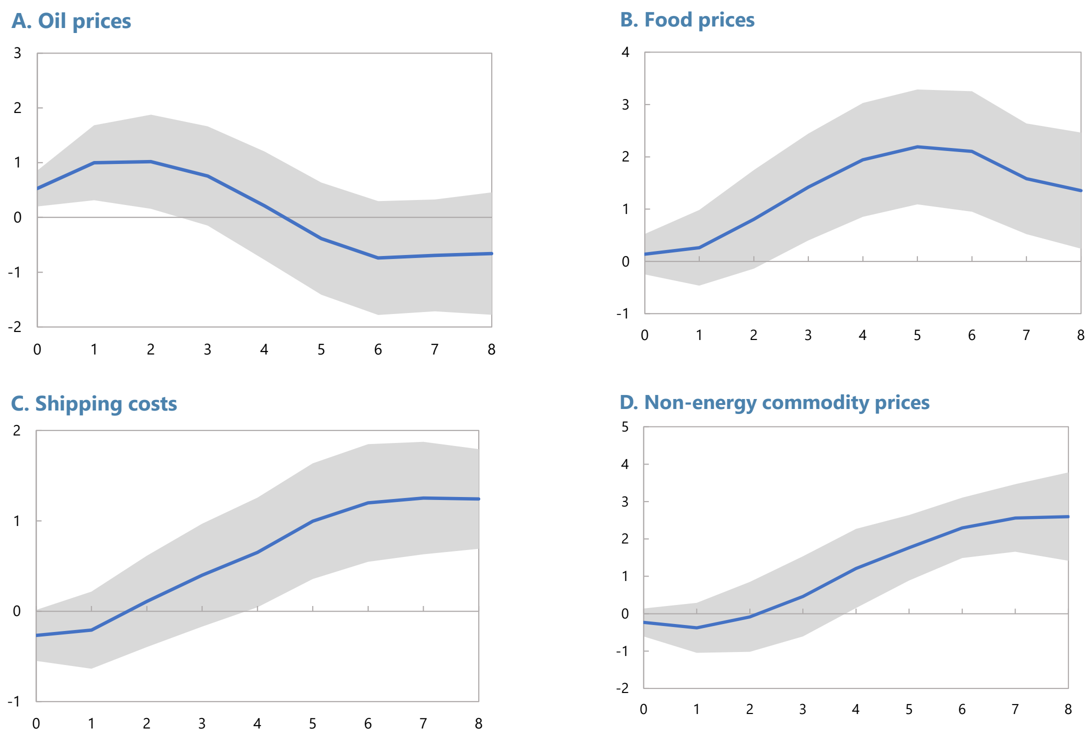
[21] Carrière-Swallow et al. (2022) document that a one standard deviation shock in shipping costs increases domestic headline inflation by about 0.15 percentage point over twelve months, with the effects increasing gradually and reverting after six months.

through of higher shipping costs to headline inflation reflects the fact that shipping services ordered today affect goods that will be delivered several months later, and that firms likely take time to pass on global higher costs to consumers (Herriford et al., 2016).

Panel D shows the impulse responses of inflation to a non-energy commodity price shock. The impact on headline inflation following a shock on non-energy commodity prices is very gradual, but persistent and significant, materializing after six quarters and peaking after more than two years. Typically, a one standard deviation increase in non-energy commodity prices increases inflation by about 2.3 percentage points after six quarters and about 2.6 percentage points after eight quarters.

Figure 6. Impulse Responses of Headline Inflation to a one Standard Deviation Shock on Global Prices

(Percentage points)



Source: Authors' calculations.

Notes: The figures present the impact of a one standard deviation increase in each global price shock on headline inflation. The solid line is the impulse response function (IRF) in percentage points, and the shaded areas represent the 90 percent confidence bands. t = 0 denotes the quarter of the shock. The impulse responses are reported in percentage points.

C. Robustness Checks

We perform a set of robustness tests to verify the validity of our baseline findings. First, given the magnitude of global price shocks during the pandemic crisis and the aftermath, we estimate the model over the pre-pandemic sample period (ending in 2019Q4). This will allow us to assess whether the baseline findings might be driven by the extraordinary pandemic conditions. Second, we estimate the baseline specification with different lag lengths.

The results from these exercises indicate that the conclusions from the baseline estimations with the full sample period are robust to the change in the sample, with broadly similar results for the pre-pandemic estimations (see figure A.1). The baseline results are also robust to the inclusion of different lag lengths (4 lags included in the alternative specification) (see figure A.2).

V. Conclusion

Inflation in CEMAC has surged faster and proved more persistent during the 2021-2023 period. While inflation seems to have waned since early 2023, helped by declining global commodity and oil prices and easing supply chain bottlenecks, it remains elevated, and well above the regional convergence criterion. Therefore, persistent inflationary pressures remain a concern for policy making.

In this paper, we use various extensions of the Phillips curve framework to assess the role of global shocks in explaining inflation dynamics and explore their contributions to the persistence of the inflation process (that is, extrinsic inflation persistence).

Our results indicate that global price shocks play a significant role in the dynamics of headline inflation. However, we do not find evidence of the direct influence of global economic slack on domestic inflation. The results also show high persistence of headline inflation. Analysis of the decomposition of inflation dynamics indicates that global commodity food and oil price fluctuations, and supply chain disruptions (proxied by shipping costs) are the most important factors explaining the large variability in headline inflation–deviation from its long-term average–before and during the pandemic, and the subsequent recovery. This result partly reflects the high volatility in global prices and supply disruptions, especially over the concerned periods, but also their persistence effects. In contrast, the contributions of domestic factors–output gap and long-term inflation expectations–to inflation dynamics were relatively small.

The evidence confirms that persistent inflationary effects of commodity price shocks and supply chain disruptions are important drivers of inflation persistence in CEMAC. In particular, the pass-through from international commodity food price fluctuations to headline inflation is larger than that of shocks to oil prices and shipping costs. Typically, a one-standard-deviation increase in global commodity food prices has a peak impact on headline inflation of around 2 percentage points after six quarters. This higher transmission can be explained by the large share of food in the consumption baskets of CEMAC economies, which makes inflation more vulnerable to direct effects of commodity food price shocks, as well as higher second-round effects. A shock of the same magnitude on oil prices is short-lived, increasing headline inflation by about 1 percentage point two quarters after the shock and reversing in the following quarters. A similar shock to global shipping costs increases headline inflation by about 1.2 percentage points after six quarters, with a peak effect of around 1.3 percentage points after two years.

Our finding also suggests that the central bank should not ignore global price shocks, especially commodity food prices and supply chain bottlenecks. In particular, commodity food price shocks are larger, more volatile and persistent, which makes them more likely to feed into inflation expectations. Therefore, the central bank should closely monitor them and react to prevent inflation expectations from rising in response to what could still be a transitory but nevertheless persistent shock that could propagate through wages and prices, and thus affect inflation over the policy horizon.[22] In the context of the inflation surge in 2021–22, early policy actions were even more warranted, as the economy was hit by a series of overlapping global shocks, making the diagnostic of their nature more complicated in real time. In addition, while energy subsidies have likely had a muting effect on inflation in the region during that period, reforms to phase out energy subsidies across the region will likely lead to increased domestic energy costs, and further upward pressures on inflation.[23] Further research on second round effects of global shocks in the CEMAC region would help to better understand their persistent inflationary effects over the medium term, particularly how fast food prices impact cost and wage pressures.

[22] For recent discussions on lessons from the pandemic for monetary policy strategies and whether central banks should "look through" supply shocks, see Gopinath (2022).

[23] Most of the CEMAC countries plan gradual removals of explicit energy subsidies in the medium term (IMF, 2023).

Table 2. Local Projection Baseline Estimates

	h = 0	h = 1	h = 2	h = 3	h = 4	h = 5	h = 6	h = 7
Oil	0.0126*	0.0241*	0.0244	0.0178	0.00429	-0.0101	-0.0180	-0.0163
	(0.00487)	(0.0101)	(0.0125)	(0.0131)	(0.0144)	(0.0152)	(0.0156)	(0.0153)

	h = 0	h = 1	h = 2	h = 3	h = 4	h = 5	h = 6	h = 7
Food	0.0101	0.0180	0.0510	0.0881*	0.119**	0.133**	0.128**	0.0956*
	(0.0146)	(0.0269)	(0.0351)	(0.0380)	(0.0407)	(0.0406)	(0.0425)	(0.0395)

	h = 0	h = 1	h = 2	h = 3	h = 4	h = 5	h = 6	h = 7
Shipping costs	-0.00286	-0.00178	0.00283	0.00679	0.0104*	0.0144**	0.0161**	0.0161***
	(0.00227)	(0.00348)	(0.00407)	(0.00431)	(0.00455)	(0.00477)	(0.00485)	(0.00465)

	h = 0	h = 1	h = 2	h = 3	h = 4	h = 5	h = 6	h = 7
Non-fuel commodity	-0.0155	-0.0244	-0.00955	0.0199	0.0600	0.0919**	0.124***	0.140***
	(0.0125)	(0.0225)	(0.0312)	(0.0354)	(0.0342)	(0.0279)	(0.0257)	(0.0306)

Sources: Authors' calculations.

Note: Robust standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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Annex I. Robustness Tests

This annex provides the empirical results from estimating the hybrid Phillips curve using alternatives measures of global factors, domestic economic conditions and inflation expectations. Table A.1 and A.2 present the findings using alternative measures of external price pressures (converted to local currency using bilateral exchange rate against the US dollar), including the changes in producer price index for total OECD countries, the changes in OECD producer price index relative to the changes in the GDP deflator, and the changes in China PPI. Table A.3 presents the results where global slack is measured as the deviation of real GDP for total OECD from its HP-filtered trend, and the cyclical component of the world industrial production index. Table A.5 measures domestic economic slack with the unemployment gap instead of the output gap. Table A.4 shows the results with the inflation expectations term measured with three-year-ahead inflation expectations instead of the five-year-ahead used in the baseline estimation.

A. Robustness Tests: Phillips Curve Estimation

Table A.1. Robustness Check: Alternative External Price Pressure (OECD PPI; Relative Price of Imports)

VARIABLES	(1) CPI Inflation	(2) CPI Inflation	(3) CPI Inflation	(4) CPI Inflation	(5) CPI Inflation	(6) CPI Inflation	(7) CPI Inflation	(8) CPI Inflation
Lag 1 of CPI inflation	0.791***	0.822***	0.800***	0.818***	0.785***	0.824***	0.794***	0.820***
	(0.0664)	(0.0614)	(0.0663)	(0.0612)	(0.0668)	(0.0622)	(0.0668)	(0.0621)
Lag 1 of output gap	0.120	0.204***	0.111	0.216***	0.123	0.206***	0.114	0.218***
	(0.0845)	(0.0768)	(0.0860)	(0.0776)	(0.0842)	(0.0764)	(0.0860)	(0.0776)
5-year ahead inflation expectations	0.188**	0.107	0.182**	0.105	0.196**	0.105	0.189**	0.104
	(0.0753)	(0.0759)	(0.0730)	(0.0779)	(0.0752)	(0.0766)	(0.0730)	(0.0787)
Lag 1 of change in oil prices		0.00844**		0.00955**		0.00848**		0.00960**
		(0.00362)		(0.00419)		(0.00362)		(0.00421)
Lag 2 of change in food prices		0.0306**		0.0309**		0.0310***		0.0314***
		(0.0117)		(0.0118)		(0.0116)		(0.0117)
Lag 1 of OECD PPI inflation	0.0303***	-0.00120	0.0289***	-0.00163				
	(0.00960)	(0.0113)	(0.0102)	(0.0112)				
World output gap			0.0801	-0.0704			0.0805	-0.0708
			(0.118)	(0.118)			(0.119)	(0.118)
Lag 1 of External price pressure					0.0298***	-0.00212	0.0283***	-0.00258
					(0.00932)	(0.0110)	(0.00986)	(0.0110)
Observations	87	87	87	87	87	87	87	87
R-squared	0.904	0.923	0.905	0.923	0.904	0.923	0.905	0.923

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

Table A.2. Robustness Check: China PPI

VARIABLES	(1) CPI Inflation	(2) CPI Inflation	(3) CPI Inflation	(4) CPI Inflation
Lag 1 of CPI inflation	0.829***	0.820***	0.836***	0.816***
	(0.0625)	(0.0590)	(0.0610)	(0.0584)
Lag 1 of output gap	0.161**	0.199***	0.151*	0.210***
	(0.0795)	(0.0711)	(0.0832)	(0.0728)
5-year ahead inflation expectations	0.165**	0.109	0.160**	0.108
	(0.0763)	(0.0746)	(0.0739)	(0.0767)
Lag 1 of change in oil prices		0.00825**		0.00937**
		(0.00368)		(0.00422)
Lag 2 of change in food prices		0.0290***		0.0295***
		(0.0102)		(0.0102)
Lag 1 of China PPI inflation	0.0322***	0.00227	0.0308***	0.00161
	(0.00807)	(0.00907)	(0.00866)	(0.00873)
World output gap			0.0768	-0.0689
			(0.118)	(0.118)
Observations	87	87	87	87
R-squared	0.905	0.923	0.906	0.923

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

Table A.3. Robustness Check: OECD Cyclical Conditions; World Cyclical Industrial Production

VARIABLES	(1) CPI Inflation	(2) CPI Inflation	(3) CPI Inflation	(4) CPI Inflation	(5) CPI Inflation	(6) CPI Inflation	(7) CPI Inflation	(8) CPI Inflation
Lag 1 of CPI inflation	0.853***	0.921***	0.819***	0.866***	0.877***	0.935***	0.824***	0.870***
	(0.0656)	(0.0608)	(0.0582)	(0.0568)	(0.0680)	(0.0631)	(0.0587)	(0.0581)
Lag 1 of output gap	0.170**	0.112	0.205***	0.163**	0.168**	0.110	0.199***	0.157**
	(0.0826)	(0.0827)	(0.0732)	(0.0746)	(0.0835)	(0.0822)	(0.0729)	(0.0740)
5-year ahead inflation expectations	0.161**	0.0399	0.108	0.0430	0.138*	0.0284	0.106	0.0428
	(0.0770)	(0.0770)	(0.0758)	(0.0741)	(0.0773)	(0.0765)	(0.0722)	(0.0714)
Lag 1 of change in oil prices			0.00871**	0.00701*			0.00809**	0.00645
			(0.00387)	(0.00377)			(0.00405)	(0.00395)
Lag 2 of change in food prices			0.0300***	0.0250***			0.0300***	0.0250***
			(0.00997)	(0.00920)			(0.00991)	(0.00912)
OECD output gap	0.0796	0.0375	-0.0184	-0.0265				
	(0.0924)	(0.0732)	(0.0699)	(0.0636)				
Lag 2 of change in shipping costs		0.00630***		0.00390***		0.00610***		0.00385***
		(0.00127)		(0.00125)		(0.00124)		(0.00124)
World cyclical IP					0.0799	0.0502	0.0101	0.00455
					(0.0600)	(0.0520)	(0.0567)	(0.0528)
Observations	87	87	87	87	87	87	87	87
R-squared	0.897	0.913	0.923	0.928	0.899	0.914	0.923	0.928

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

Table A.4. Robustness Check: Three-year-ahead Inflation Expectations

VARIABLES	(1) CPI Inflation	(2) CPI Inflation	(3) CPI Inflation	(4) CPI Inflation	(5) CPI Inflation	(6) CPI Inflation	(7) CPI Inflation	(8) CPI Inflation
Lag 1 of CPI inflation	0.825***	0.900***	0.807***	0.854***	0.831***	0.899***	0.806***	0.855***
	(0.0660)	(0.0617)	(0.0571)	(0.0564)	(0.0652)	(0.0618)	(0.0573)	(0.0564)
Lag 1 of output gap	0.184**	0.121	0.201***	0.161**	0.166*	0.118	0.208***	0.170**
	(0.0800)	(0.0816)	(0.0714)	(0.0730)	(0.0835)	(0.0841)	(0.0738)	(0.0757)
3-year ahead inflation expectations	0.195**	0.0688	0.127*	0.0649	0.194***	0.0723	0.122*	0.0533
	(0.0744)	(0.0751)	(0.0687)	(0.0681)	(0.0730)	(0.0757)	(0.0733)	(0.0719)
Lag 1 of change in oil prices			0.00792**	0.00630*			0.00880**	0.00762*
			(0.00355)	(0.00346)			(0.00419)	(0.00405)
Lag 2 of change in food prices			0.0305***	0.0255***			0.0306***	0.0254***
			(0.00987)	(0.00907)			(0.0100)	(0.00927)
Lag 2 of change in shipping costs		0.00624***		0.00373***		0.00605***		0.00394***
		(0.00134)		(0.00134)		(0.00133)		(0.00132)
World output gap					0.131	0.0391	-0.0525	-0.0851
					(0.116)	(0.108)	(0.121)	(0.114)
Observations	87	87	87	87	87	87	87	87
R-squared	0.897	0.913	0.923	0.928	0.899	0.913	0.924	0.929

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

Table A.5. Robustness Check: Unemployment Gap

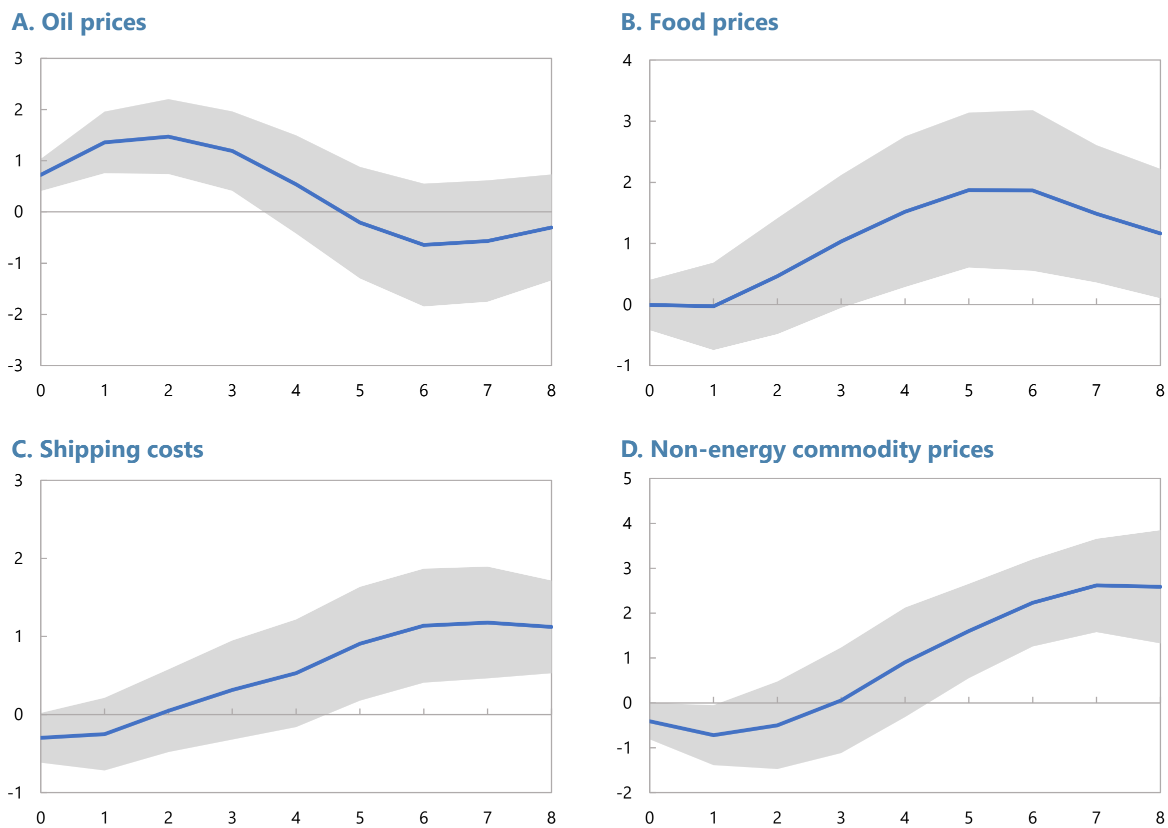
VARIABLES	(1) CPI Inflation	(2) CPI Inflation	(3) CPI Inflation	(4) CPI Inflation	(5) CPI Inflation	(6) CPI Inflation	(7) CPI Inflation	(8) CPI Inflation
Lag 1 of CPI inflation	0.857***	0.930***	0.836***	0.887***	0.875***	0.932***	0.824***	0.873***
	(0.0685)	(0.0608)	(0.0623)	(0.0588)	(0.0696)	(0.0621)	(0.0609)	(0.0576)
Lag 1 of unemployment gap	0.522	0.320	0.423	0.327	-0.272	0.175	0.942	1.044
	(0.713)	(0.685)	(0.718)	(0.695)	(0.904)	(0.785)	(0.684)	(0.632)
5-year ahead inflation expectations	0.159*	0.0278	0.0968	0.0258	0.141*	0.0268	0.102	0.0284
	(0.0822)	(0.0798)	(0.0805)	(0.0779)	(0.0828)	(0.0803)	(0.0793)	(0.0773)
Lag 1 of change in oil prices			0.00836**	0.00628*			0.00960**	0.00788*
			(0.00386)	(0.00365)			(0.00436)	(0.00410)
Lag 2 of change in food prices			0.0292***	0.0237**			0.0305***	0.0252***
			(0.0107)	(0.00947)			(0.0106)	(0.00936)
Lag 2 of change in shipping costs		0.00678***		0.00442***		0.00666***		0.00469***
		(0.00131)		(0.00130)		(0.00134)		(0.00130)
World output gap					0.159	0.0298	-0.110	-0.153
					(0.141)	(0.126)	(0.128)	(0.120)
Observations	87	87	87	87	87	87	87	87
R-squared	0.891	0.911	0.918	0.925	0.893	0.911	0.919	0.927

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

B. Robustness Tests: Local Projection Estimation

Figure A.1. Impulse Responses of Headline Inflation to a One Standard Deviation Shock on Global Prices — Robustness Test: Pre-pandemic Sample

(Percentage points)

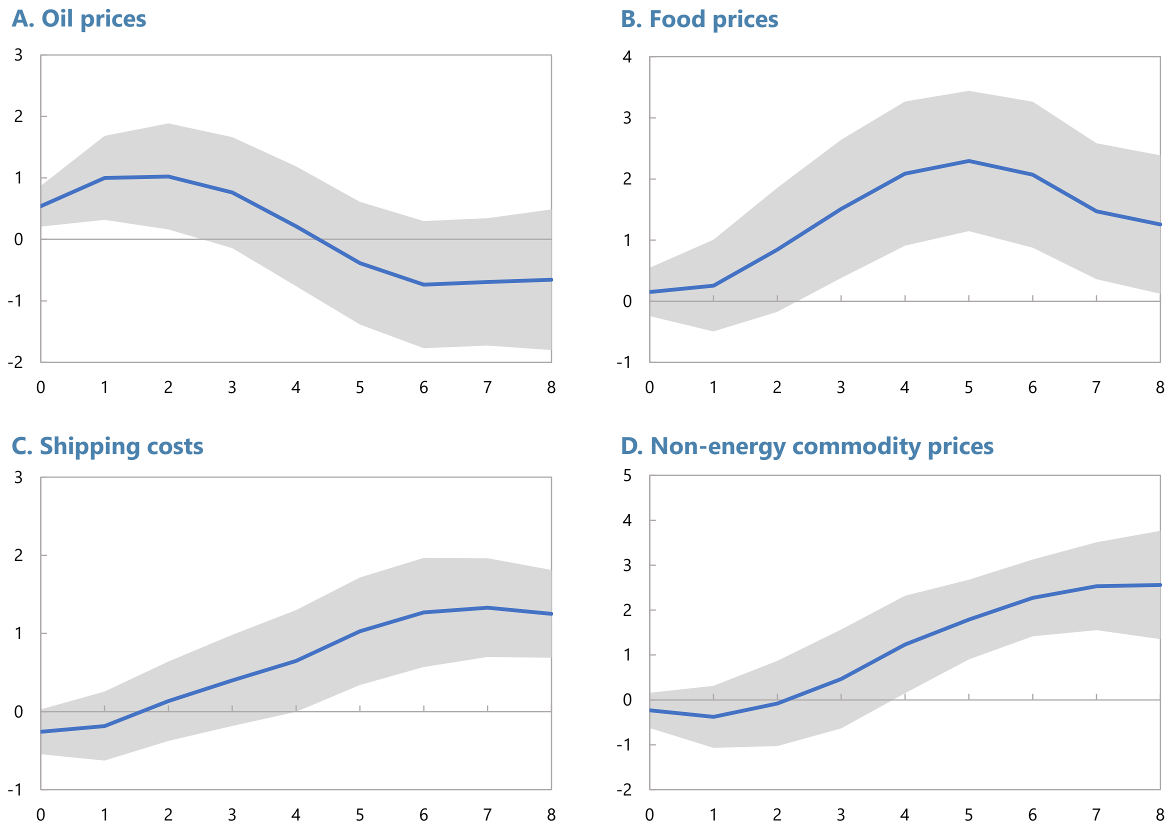


Source: Authors' calculations.

Notes: The figures present the impact of a one standard deviation increase in each global price shock on headline inflation. The solid line is the impulse response function (IRF) in percentage points, and the shaded areas represent the 90 percent confidence bands. t = 0 denotes the quarter of the shock. The impulse responses are reported in percentage points.

Figure A.2. Impulse Responses of Headline Inflation to a One Standard Deviation Shock on Global Prices — Robustness Test: Different Lag Lengths

(Percentage points)

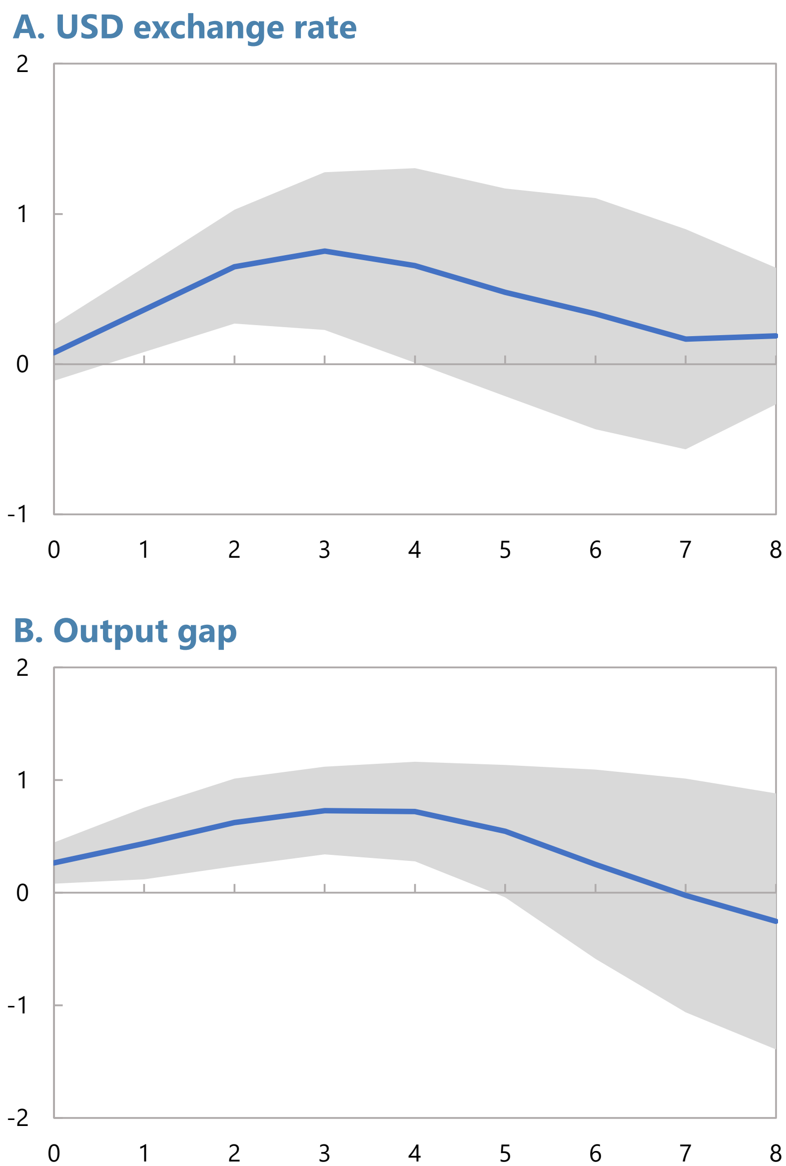


Source: Authors' calculations.

Notes: The figures present the impact of a one standard deviation increase in each global price shock on headline inflation. The solid line is the impulse response function (IRF) in percentage points, and the shaded areas represent the 90 percent confidence bands. t = 0 denotes the quarter of the shock. The impulse responses are reported in percentage points.

Figure A.3. Impulse Responses of Headline Inflation to a One Standard Deviation Shock on Domestic Output Gap and Exchange Rate

(Percentage points)

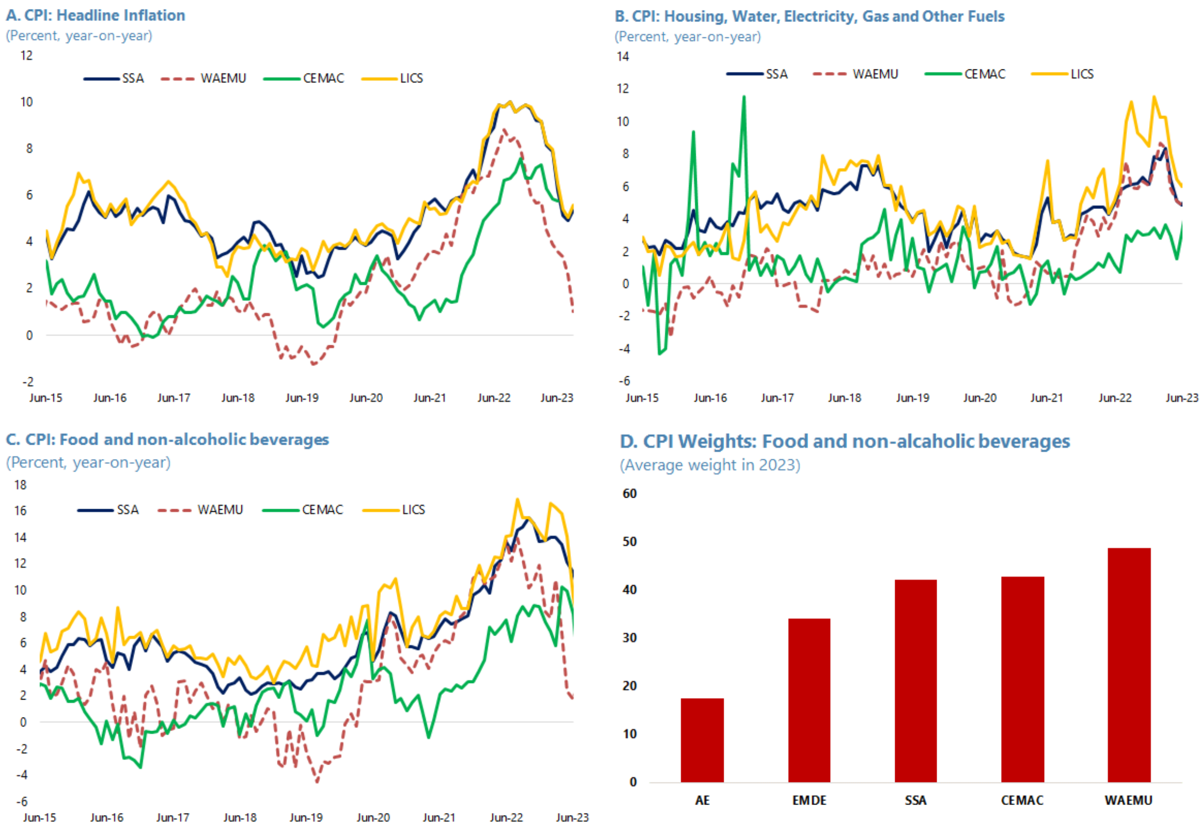


Source: Authors' calculations.

Notes: The figures present the impact of a one standard deviation increase in the exchange rate (local currency per U.S. dollar—i.e. a depreciation) and the output gap on headline inflation. The solid line is the impulse response function (IRF) in percentage points, and the shaded areas represent the 90 percent confidence bands. t = 0 denotes the quarter of the shock. The impulse responses are reported in percentage points.

Annex II. Food and Energy Inflation across Regions

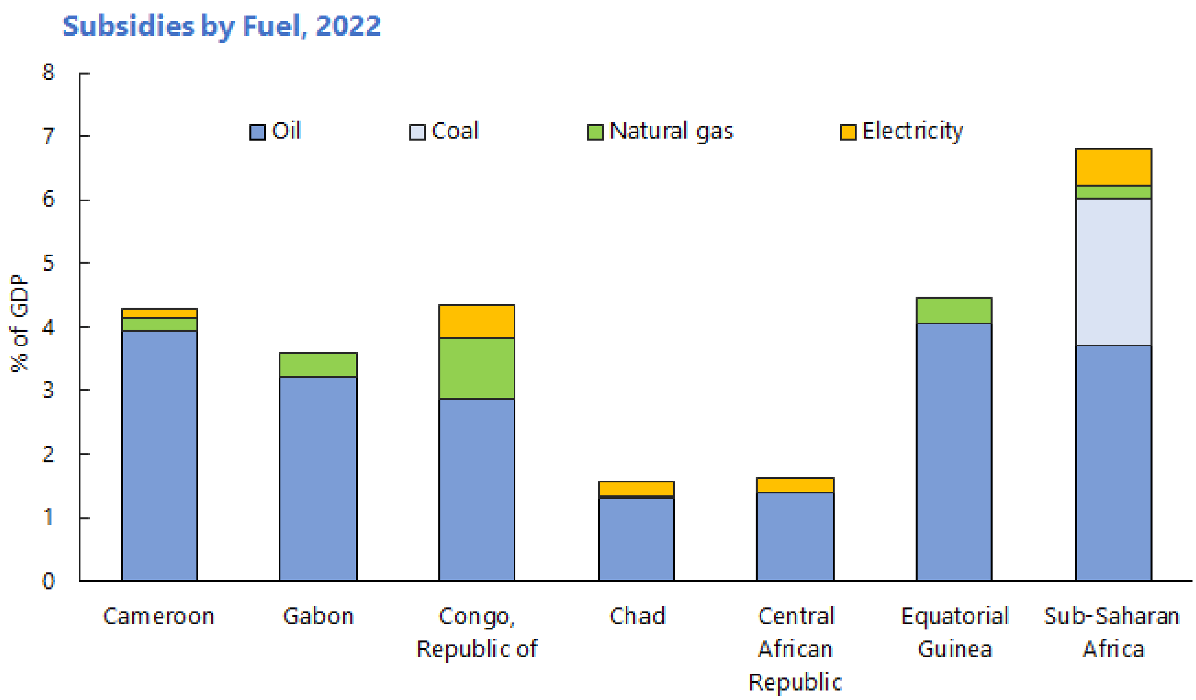
Figure A.4. Food and Energy Inflation across Regions



Sources: IMF; and authors' calculations.

Notes: LIC stands for low-income countries, SSA stands for Sub-Saharan Africa countries. SSA and LICs (SSA) are calculated using the median of the country groups, CEMAC and WAMEU are calculated using a weighted average.

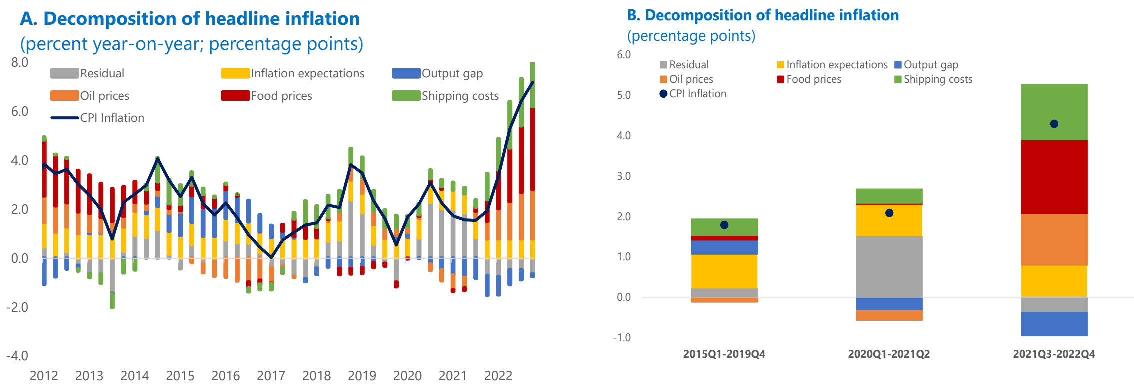
Figure A.5. Energy Subsidies



Sources: IMF Fossil Fuel Subsidies Data: 2023 Update; and authors' calculations.

Annex III. Decomposition of Inflation

Figure A.6. Decomposition of Inflation



Sources: Authors' calculations.

Note: The figures depict the quarterly (A) and average contributions of each factor to the level of headline inflation by sub-periods (B) based on the dynamic simulations.

Annex IV. Data Definitions and Sources

Variable	Description	Frequency	Source
CEMAC headline HICP	Harmonized Index of Consumer Prices (HICP) (2018=100). The CEMAC HICP is the arithmetic average of national HICPs, rebased in 2018, and weighted by the country's share of final household consumption in the total final consumption of resident households in the CEMAC.	Monthly; quarterly average	BEAC
CEMAC real GDP	Real GDP-weighted. Data was interpolated to quarterly frequency using the quadratic match method.	Annual	IMF World Economic Outlook; and IMF staff calculations
Domestic Output gap	Output gap measured by the Hodrick-Prescott (HP)-filtered cyclical component of quarterly real GDP. For the HP filter we use the typical for quarterly data smoothing parameter λ=1600. Data was interpolated to quarterly frequency using the quadratic match method.	Annual	IMF staff calculations
Unemployment rate	Regional average unemployment rate. Data was interpolated to quarterly frequency using the quadratic match method.	Annual	ILO, Modelled Estimates
Unemployment gap	Unemployment gap measured by the HP-filtered cyclical component of quarterly unemployment rate. Data was interpolated to quarterly frequency using the quadratic match method.	Annual	IMF staff calculations
Commodity prices, all index	World commodity price index (2016=100), USD, includes both fuel and non-fuel price indices.	Monthly; quarterly average	Datastream, IMF
Commodity prices, exc. fuel	World commodity price index, excluding fuel (2016=100), USD, includes precious metal, food and beverages and industrial inputs price indices.	Monthly; quarterly average	Datastream, IMF
Oil prices	Brent crude oil price in USD	Daily; quarterly average	Datastream
Commodity food prices	World food index, (2016=100), USD, includes cereal, vegetable oils, meat, seafood, sugar, and other food (apple (non-citrus fruit), bananas, chana (legumes), Fishmeal groundnuts, milk (dairy), tomato (veg)) price indices.	Monthly; quarterly average	Datastream, IMF

Variable	Description	Frequency	Source
Inflation Expectations	5-year-ahead and 3-year-ahead forecasts for CPI inflation. Data was interpolated to quarterly frequency using the quadratic match method.	Annual	IMF, from historical WEO forecasts
Baltic Dry Index		Daily; quarterly average	Datastream
OECD PPI	Domestic Producer Price Index Manufacturing, Proxy	Quarterly	OECD
GDP deflator	Data was interpolated to quarterly frequency using the quadratic match method.	Annual	IMF
China PPI		Quarterly	National Bureau of Statistics of China
XAF/USD exchange rate	National Currency Per USD, XAF	Monthly; quarterly average	IMF, IFS
World Output Gap	Output gap measured by the HP-filtered cyclical component of quarterly real GDP. Data was interpolated to quarterly frequency using the quadratic match method.	Annual	IMF World Economic Outlook; and IMF staff calculations
OECD Output gap	Output gap measured by the HP-filtered cyclical component of real GDP data for the OECD.	Quarterly	OECD; and IMF staff calculations
World industrial production gap	Output gap measured by the HP-filtered cyclical component of the world industrial production index.	Monthly; quarterly average	Netherlands Bureau for Economic Policy Analysis (CPB); and IMF staff calculations

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