

Introduction

The upsurge in inflation that began in 2021—the sharpest in more than three decades—has affected fiscal accounts, worsened poverty, and altered the distribution of households' well-being, calling on policymakers to respond. This chapter analyzes these developments and explores how fiscal policy can do its part to curb inflation while supporting the vulnerable.¹

Most people strongly dislike high and variable inflation,² which causes many distortions in the economy (Agarwal and Kimball 2022), including greater uncertainty. Relative prices of goods and services may become blurred—no longer reflecting relative demand and supply conditions and making everyday decisions about consumption, investment, and production decisions harder for households, financiers, and firms. Inflation is more likely to become persistent if, akin to a tug-of-war, each group in the economy—employers and workers, producers and consumers, and retailers and their suppliers—tries to hold on to its share of prosperity at the expense of others. If such social tensions lead to inconsistent macroeconomic policies (for example, monetary policy that is too loose), high inflation will persist longer, ultimately prolonging a costly phenomenon for everyone.

Inflation often leads to a rise in poverty from loss of purchasing power (Cardoso 1992), and, as with any adversity, poor families tend to suffer

disproportionately more because they consume more as share of their income and they lack buffers in the form of accumulated savings. But the distributive effects of inflation stemming from its uneven impacts on the budgets of different households are far more complex. In turn, these depend on various factors, including the source of price increases (for example, food or energy prices) and their form (demand, or wage push); households' consumption baskets, sources of income, and the size and composition of their balance sheets (for example, their position as net borrowers or lenders); and policy design and responses (such as indexation of wages, pensions, and social safety nets). Government policies need to be informed by an understanding of how inflation affects various groups in society. Greater availability of household data makes it possible to analyze how big those effects are, which channels affect them, and how they vary across households.³

The impact of inflation on the fiscal accounts also depends on redistribution—in this case, between the public sector and the private sector. An unexpected bout of inflation erodes the real (inflation-adjusted) value of public debt, at least in the near term, with bondholders bearing the loss. Likewise, deficit-to-GDP ratios decline because the nominal (current monetary) values of the economy's output and of tax bases will generally rise, generating more revenues, while spending—often set in nominal terms in the budget—initially fails to keep up. Without indexation, real incomes decline for civil servants, pensioners, and recipients of welfare transfers. The quality of public services may also suffer as nominal spending ceilings clash with higher costs of goods and services. The early decline in deficits as a share of GDP may not last over the medium term; yet, as inflation becomes expected, spending catches up, and the cost of borrowing rises as investors require an inflation risk premium

This chapter was prepared by staff from the Fiscal Affairs Department. The authors of this chapter are Marcos Poplawski-Ribeiro (team lead), Carlos Eduardo Gonçalves (team co-lead), Chadi Abdallah, Vybhavi Balasundharam, Yongquan Cao, Daniel Garcia-Macia, Andres Ghini, Ting Lan, Anh Dinh Minh Nguyen, Julieth Pico Mejía, and Alberto Tumino, with research support from Kardelen Cicek, Arika Kayastha, Zhonghao Wei, and Andrew Womer, and under the guidance of Paolo Mauro and Paulo Medas.

¹Although the spike in prices during 2021–22 was initially concentrated in food and energy, this chapter discusses inflation more generally as a sustained rise in the prices of many goods and services, which may originate from different sources. The analysis measures inflation using the Consumer Price Index (CPI), complementing it with the GDP deflator in specific exercises. For recent developments on the relationship between inflation and public finances, see also Chapter 1.

²See survey results in Shiller (1997), Scheve (2001), and Prati (2022).

³Empirical analyses of historical episodes have been constrained by limited availability of comparable data. A study based on surveys of overall incomes of households in *Israel* with at least one employee, for the period 1950–91 (including the hyperinflation of the mid-1980s), reports evidence of a statistically significant correlation between inflation and inequality in incomes (Dahan 1996).

and central bank policy rates are hiked. Initial fiscal gains may even be reversed in some cases, notably if growth falters.

High and volatile inflation thus makes fiscal management more challenging, potentially undermining the credibility of economic institutions and of the fiscal framework. Fiscal planning and budget preparation become more complex not only because of uncertainty regarding prices, wages, and interest rates but also because the overall fiscal stance affects inflation through aggregate demand and through inflation expectations (Coibion, Gorodnichenko, and Weber 2021).

Governments can influence how the costs of inflation are allocated, via indexation or discretionary policy decisions. They could choose, for example, to let inflation quietly increase taxation while eroding public pensions, wages, and transfers or instead seek to keep the real values of these variables unchanged. They could also make the tax or transfer more or less progressive by adjusting some items but not others. Further complicating policymakers' task, widespread indexation of public wages and other expenditure items would entrench inflation expectations and make inflation more persistent. Such anticipation of inflation makes price stability harder to achieve. Similarly, if untargeted support outlasts spikes in energy prices or other prices that originally motivated it, fiscal costs and contributions to aggregate demand would be unnecessarily prolonged (October 2022 *Fiscal Monitor*, Chapter 1). High inflation can lead to policy mistakes that may ultimately hamper investment and economic growth, whereas price stability helps all individuals in the economy.

Against this backdrop, it is timely to review what we know about these variegated interactions between inflation and fiscal variables and draw lessons for the conduct of fiscal policy. The chapter analyzes the following questions:

- *How does inflation affect fiscal accounts? And how do the effects depend on institutional features of the tax and benefit system, such as indexation?* The section “Impact of Inflation on Public Finances” reviews the mechanisms through which inflation affects public finance; surveys indexation practices across the world; and estimates the impact of inflation on public debts, deficits, expenditures, and revenues in the near and medium term.

- *How large are the distributive effects of inflation across households in countries at different levels of economic and financial development, and what is the role of fiscal policy?* The section “Distributive Effects of Inflation and Fiscal Policy Support” analyzes the impact of inflation on poverty and the distribution of consumption, income, and net wealth, using household surveys for six countries at different levels of economic and financial development.
- *What is the role of fiscal policy in the efforts to promote price stability?* The section “Disinflation and Distributing” estimates the impact of fiscal policy on inflation through aggregate demand. Using model simulations that allow for distributive effects, it explores how fiscal policy can support monetary policy to curb inflation while protecting vulnerable households.

The conclusion summarizes the chapter's policy implications.

Impact of Inflation on Public Finances

Inflation can affect fiscal aggregates through multiple channels, with varying effects over time (Dydan 2022; US CBO 2022a).

Direct Channels of Impact

The main direct channels through which inflation affects public finances, abstracting from subsequent fiscal and monetary policy reactions, are listed below and sketched out in the Executive Summary.

- *Inflated nominal values for GDP and the tax base.* Higher nominal output lowers debt and deficits as a share of GDP. The nominal tax base also grows with inflation. For example, more revenues from value-added taxes are collected as the prices of underlying goods and services go up. For some taxes, such as income taxes, revenues may increase even more than one-for-one with inflation, including because some taxpayers may jump over nominal thresholds to higher tax brackets (*bracket creep*).⁴ These effects also depend on the degree of

⁴Beer, Griffiths, and Klemm (2023) analyze further channels through which inflation affects the real value of collected tax revenues, including the erosion of such revenues if inflation is high and they are collected with a lag (Tanzi 1977).

indexation (in this case, of thresholds), discussed later in the chapter.

- *Inertia in nominal spending.* The net response of the fiscal balances to inflation depends on whether expenditure keeps pace with revenues. During the budget year, this is seldom the case because spending caps are usually set in nominal terms, although indexation of some important items such as public wages and transfers may lead in some cases to automatic adjustments to inflation in the same year. Ad hoc adjustments or new measures such as introduction or enhancement of subsidies (for example, in response to higher food or energy prices) can also speed up the rise in nominal spending.
- *Sovereign debt size and structure, and investors' response.* The larger the debt, the greater the potential erosion from inflation. This effect is attenuated, however, if a portion of the debt is inflation-linked (as inflation automatically leads to higher borrowing costs), is denominated in foreign currency (as inflation leads to depreciation, potentially resulting in higher repayments when expressed in domestic currency), has a floating rate (as inflation prompts higher policy, and hence higher short-term benchmark rates), or has a greater share of short-term bonds that are maturing and need to be rolled over (as investors will ask for higher rates on newly issued bonds). When governments issue new debt, investors may require higher returns to compensate not only for expected inflation but also for higher inflation volatility (an inflation risk premium)—and, for countries where economic prospects are uncertain and the debt ratio remains high or keeps rising, a default premium.

International Practices with Inflation Indexation

Countries' practices vary regarding how much tax or budget items are indexed to inflation or adjusted to inflation by policy measures. This has consequences for how their public finances evolve in the face of inflation surprises. Indexation of politically salient expenditure items such as pensions or wages is often a prominent topic in public discourse. The effects on the revenue side, while less discussed, are no less relevant. If income tax thresholds are not adjusted to

inflation, for example, taxpayers may be pushed into higher tax brackets (*bracket creep*), or the value of their tax allowances and deductions may be eroded.

The degree of indexation involves trade-offs. On one hand, indexing public wages, pensions, or welfare transfers reduces uncertainty and preserves purchasing power for civil servants, retirees, and low-income households. It may also prevent distortionary gaps between public and private wages or a possible brain drain from the public sector. On the other hand, indexation sustains real expenditures, contributing to aggregate demand and potentially making inflation more persistent. If public wages are a benchmark for private wages (as in many countries), indexation of public wages could prolong wage and inflationary pressures (Box 2.1). Widespread indexation can limit the scope for discretionary cuts.

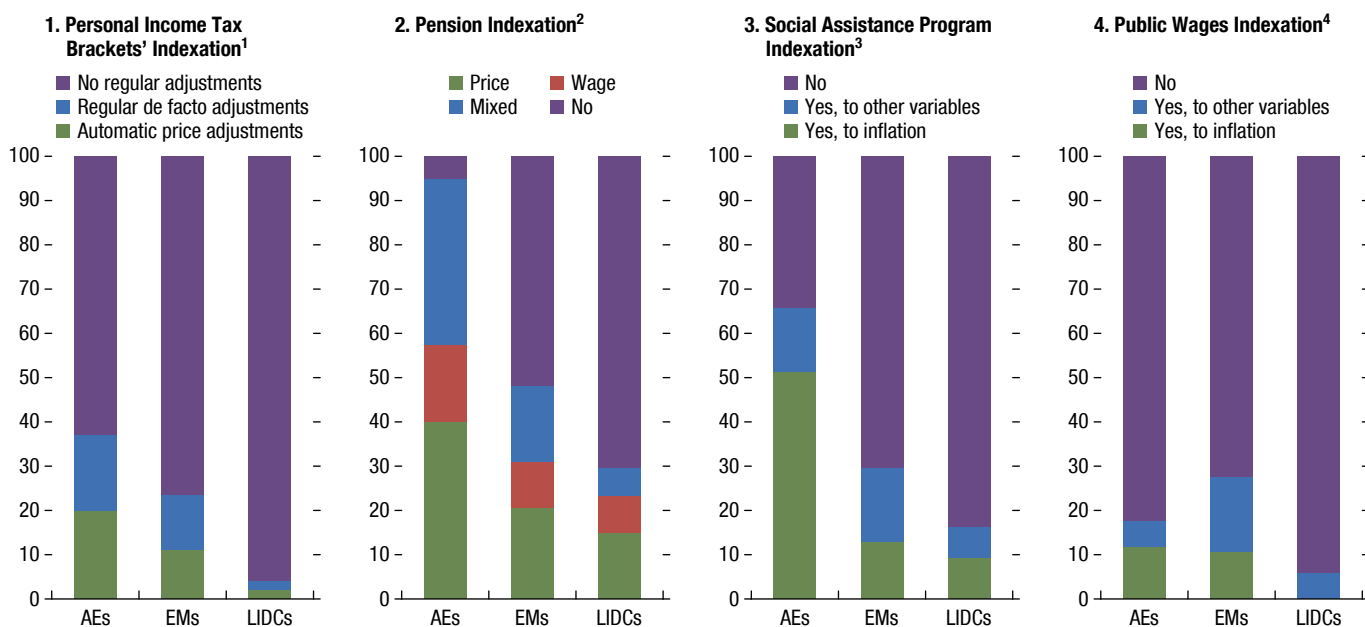
Countries have taken different approaches to indexation policies (Figure 2.1). A minority of countries index or regularly adjust their income tax rate brackets to minimize *bracket creep*.

Indexation is more common for some important expenditure items, especially pensions. Nearly all advanced economies, about 50 percent of emerging market economies, and 30 percent of low-income developing countries have some form of indexation. Pension indexation has become more prevalent recently, but many countries have made it less generous to reduce the burden on the budget and safeguard the sustainability of pension systems (OECD 2022a). Countries have moved from wage indexation toward price indexation as nominal wage increases have tended to exceed price inflation in the past, reflecting productivity gains.⁵ Many countries further index their social assistance programs, with around half of advanced economies linking several of their benefits to inflation (OECD 2022c). By contrast, most countries do not index public wages to inflation—a practice that has become less prevalent in recent decades, perhaps because inflation had been low. But the pressure to index wages may return if high inflation persists (Suthaharan and Bleakley 2022).⁶

⁵In 2022, such a strategy may have been costlier than predicted given that inflation rose faster than nominal wages (OECD 2022d).

⁶For public wages, their increases in most countries tend to be related to the political cycle rather than to indexation (Gaspar, Gupta, and Mulas-Granados 2017).

Figure 2.1. Indexation Policies Vary across the World and across Budget Items
(Percentage of countries in each income group)



Sources: IMF staff analysis based on an IMF survey and using additional data from Beer, Griffiths, and Klemm (2023); IMF Pay Systems database (2016); International Social Security Association database; OECD (2022c); and US Social Security Administration databases.

Note: Panels include data for 2016–23. Observations vary from 116 to 176 countries in each panel (see Online Annex 2.1 for details). Price indexation includes different measures of inflation, for example, “core,” or measures that include only urban workers or exclude fuel, tobacco, alcohol, and others. Even with automatic indexation, discretionary approval stages may be part of the framework that result in ad hoc adjustments. AEs = advanced economies; EMs = emerging market economies; LIDCs = low-income developing countries.

¹“Regular de facto adjustments” means that personal income tax thresholds are regularly revised but not automatically.

²“Mixed” indexation refers to an adjustment that includes a mix of price, wages, and other variables.

³Social assistance programs include major fixed cash transfer programs. “Yes” means that majority of benefits are indexed in the country.

⁴“No” means that inflation does not play an automatic or mandatory role in the setting of public wages. Indexation includes both partial and full indexation.

Effects of Inflation on Public Finances over the Medium Term

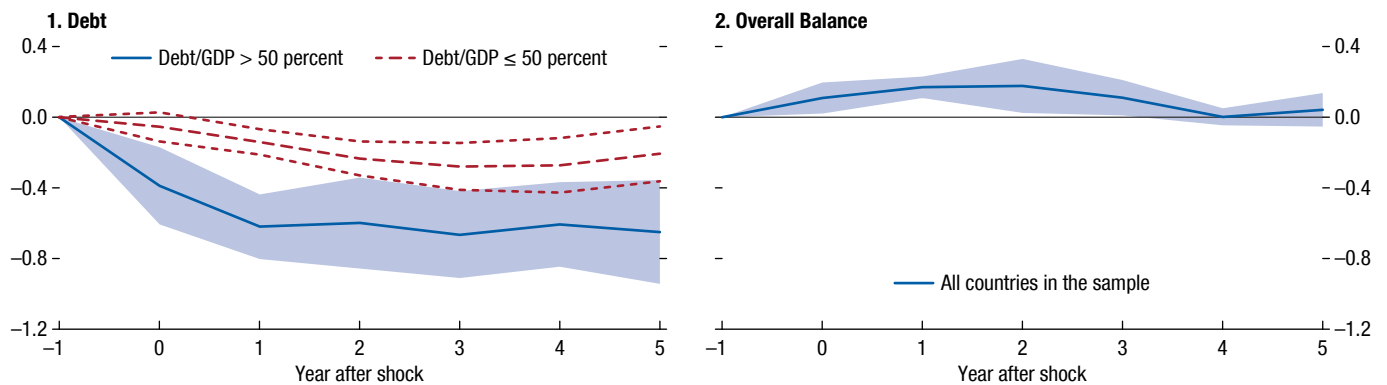
Inflation surprises often improve debt and budget balances in the near term, but are these gains maintained over the medium term? To answer this question, the chapter employs both quarterly and annual data.⁷ The effects of inflation on public finance could ebb over time for three main reasons. First,

⁷Recent attempts to answer this question have used different methods, including event studies (Blanco, Ottonello, and Ranosova 2022), model-based simulations (Bénassy-Quéré 2022), and surprises in *World Economic Outlook* forecasts (October 2022 *Fiscal Monitor*, Chapter 1). The US Congressional Budget Office’s 2002 workbook allows users to simulate alternative economic scenarios by specifying different values for inflation (and three other economic variables) for the *United States*, comparing them to its baseline projections (US CBO 2022b). The estimates in this section use the local projection method (Jordà 2005). The annual historical data include many more (emerging market) economies, allowing the research of samples where inflation is higher, more volatile, and less surprising (more persistent). Quarterly data provide more accurate estimates of the immediate effects of CPI inflation on fiscal variables. See Online Annex 2.2.

public spending could catch up with revenues through indexation. Second, public policies and decisions, including for wages or pensions, could lead to higher spending over time, reducing any initial gains for public finance indicators. Third, most central banks have the statutory objective of maintaining price stability, using adjustments in their policy rates to do so, which may lead to a tightening of financial conditions for agents in the economy, including the government. Even so, the adjustment of interest expense may be gradual if the structure of public debt is mostly in its own currency and in long maturities and if the country’s monetary authority has a reputation for maintaining price stability. In such cases, exchange rate risks may be muted and market expectations well anchored. A debt structure with longer maturities will facilitate less pass-through of interest rates to increases in public interest payments in the medium term.

Analysis using historical annual data (1962–2019) for 85 economies shows that, on average, spikes in

Figure 2.2. Reaction to a 1 Percentage Point Growth Spike in the GDP Deflator
(Percent of GDP)



Source: IMF staff estimates using data from the IMF Public Finances in Modern History and World Economic Outlook databases.

Note: The data cover the period 1962–2019. Fixed effects ordinary least squares regressions use the GDP deflator as the inflation indicator and include 85 countries. Countries with populations of less than 1 million in 2019 are excluded as well as observations with annual GDP deflator inflation higher than 30 percent in absolute terms or for which the original data source changes. The panels plot the average impulse response and the 90 percent confidence bands, with standard errors clustered at the country level. Average debt to GDP in the sample is approximately 50 percent. See Online Annex 2.2.

the growth of the GDP deflator tend to reduce the debt-to-GDP ratio persistently (Figure 2.2).⁸ The drop in the debt-to-GDP ratio is larger in economies with higher initial debt, as expected, with an initial spike of 1 percentage point in the growth of the GDP deflator⁹ associated with a persistent cumulative decline in the debt ratio of 0.6 percentage point of GDP (see also Chapter 1 for recent developments on the relationship between inflation and debt). The reduction in the debt ratio is caused by a hike in the GDP denominator and an initial rise in fiscal balances. The debt and fiscal balance reactions to a spike in the growth of the GDP deflator are similar between advanced and emerging market economies. Yet the drop in debt is significantly smaller in countries with flexible exchange rates, as in those countries, inflation tends to be associated with exchange rate depreciation, increasing the value of foreign-currency-denominated debt relative to domestic GDP (see Online Annex 2.2).

⁸The result is qualitatively robust to the use of CPI inflation. To capture inflation from all sources, the estimates employ ordinary least squares regressions (panels with fixed effects). The analysis excludes countries with 2019 population of less than 1 million.

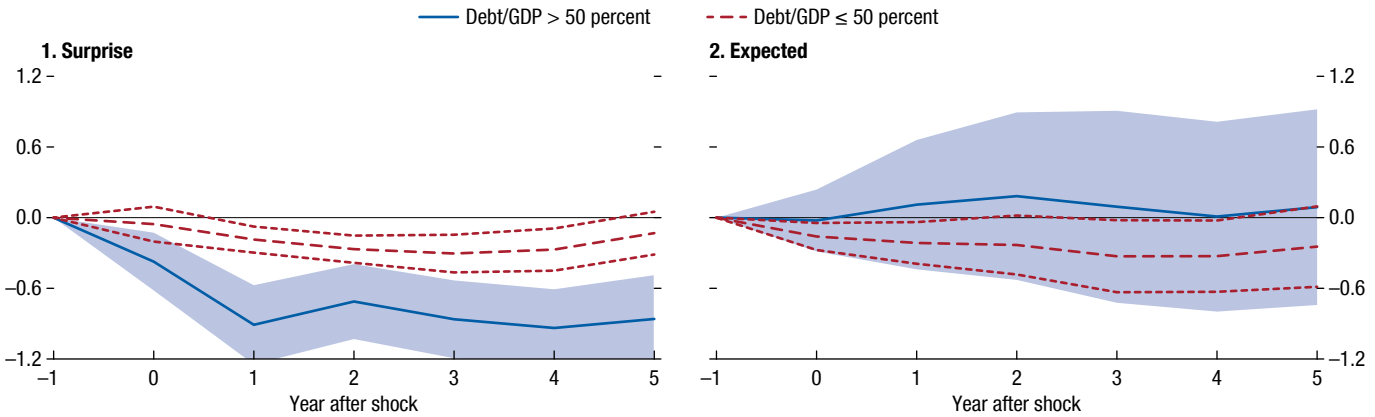
⁹Throughout the chapter, a “spike” in inflation refers to a sudden rise in inflation followed by a gradual decline. Specifically, when using annual data, a spike is a 1 percentage point increase in the GDP deflator growth rate, followed by gradual decline in subsequent years (see Online Annex Figure 2.2.1). When using quarterly data, the spike in CPI inflation stems from a 1 percentage point increase in commodity import inflation (weighted by GDP), with CPI inflation petering out after three quarters (see Figure 2.4, panel 1).

Whereas unexpected spikes in inflation reduce the debt ratio, increases in inflation *expectations* do not. The latter are associated with a faster rise in both primary spending and interest expense, and a smaller increase in the nominal GDP denominator. The difference in the effects of surprise versus expected inflation is larger for countries with high initial debt levels (Figure 2.3). Both results underscore that attempting to inflate public debt away is neither a desirable nor a sustainable strategy. If inflation surprises frequently, agents will adjust their inflation expectations accordingly and demand protection against it, leading to higher spreads owing to the inflation risk.

Estimates using quarterly data from the first quarter of 1999 to the fourth quarter of 2019 for 28 advanced economies confirm that CPI inflation spikes tended to improve the overall and primary fiscal balances in the short term (Figure 2.4).¹⁰ High-frequency data capture the immediate effects of inflation on public

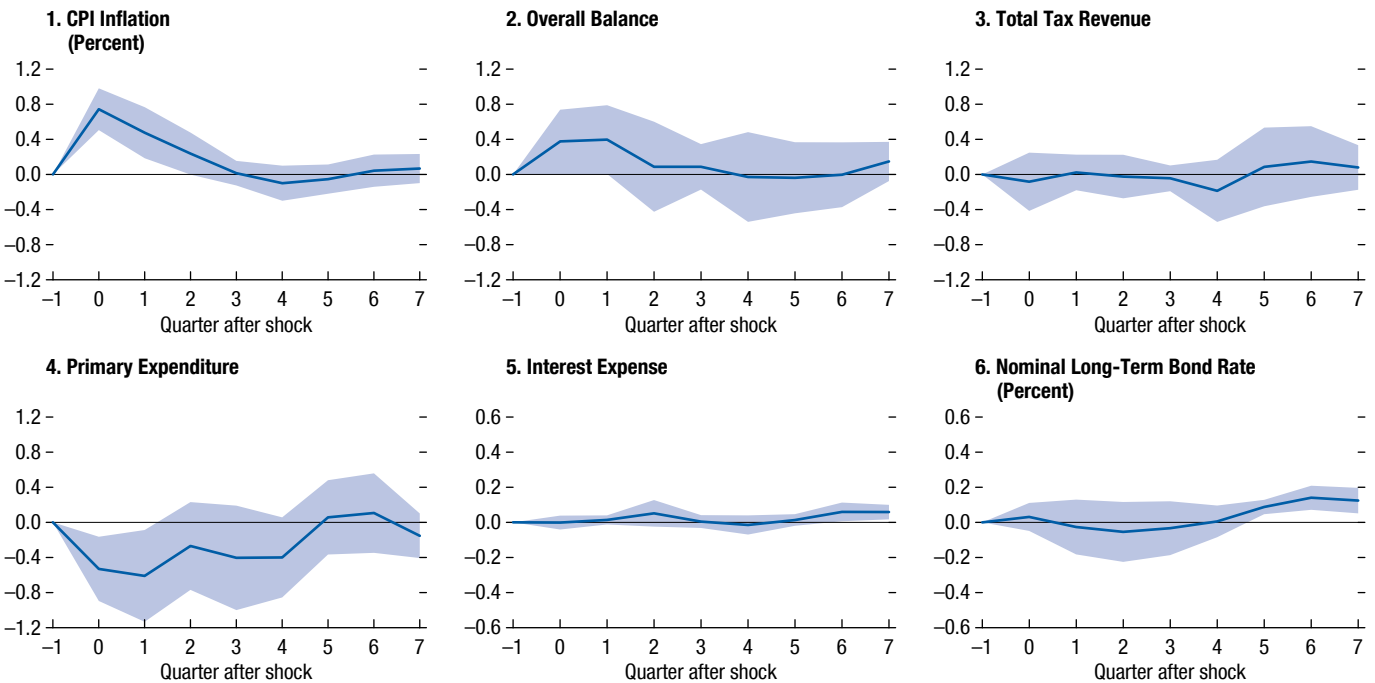
¹⁰Regressions with quarterly data are estimated using instrumental variables. CPI inflation spikes are instrumented by the change in the price growth of the commodity import basket, also interacted with an exchange rate peg dummy (lagged). Commodity price spikes tend to be more surprising and tend to pass through to prices of various goods and services (see Choi and others 2018). The correlation is clear for countries with more flexible exchange rate regimes. For these countries, commodity import price rises tend to lead to exchange rate depreciations and so to more inflation. This approach implies that results capture mainly the impact of imported inflation shocks, which may differ from domestically driven shocks affecting the GDP deflator more directly. See Online Annex 2.2 for details.

Figure 2.3. Debt Reaction to Surprise versus Expected Growth Spikes in the GDP Deflator
(Percent of GDP)



Source: IMF staff estimates using data from the IMF Public Finances in Modern History and World Economic Outlook databases.
Note: Fixed effects ordinary least squares regressions include 85 countries during the period with available data 1992–2019. Countries with population of less than 1 million in 2019 are excluded as well as observations with annual surprise or expected inflation higher than 30 percent in absolute terms or for which the original data source changes. Expected inflation is defined as the one-year-ahead forecast; surprise inflation is realized minus expected inflation. The panels plot the average impulse response and the 90 percent confidence bands (blue shaded areas and red short-dashed lines), with standard errors clustered at the country level. See Online Annex 2.2 for details.

Figure 2.4. Estimated Initial Gains to Fiscal Balances from CPI Inflation Spikes
(Percent of GDP, unless stated otherwise)



Sources: IMF staff estimates using data from Gruss and Kebhaj (2019); Ilzetzi, Reinhart, and Rogoff (2019); and IMF International Financial Statistics and World Economic Outlook databases.
Note: Regressions are estimated between the first quarter of 1999 and the fourth quarter of 2019 using instrumental variables and control for quarter indicator variables and country and year fixed effects (fixed effects two-stage least squares). The panels plot the average impulse response and the 90 percent confidence bands (blue shaded area) with standard errors clustered at the country level. See Online Annex 2.2 for details. CPI = Consumer Price Index.

finance before policies have time to react. The findings suggest that for each 1 percentage point initial increase in inflation, budget balances go up by 0.5 percent of GDP. Revenue broadly rises in line with nominal GDP, whereas primary expenditures tend to be stable in nominal terms in initial quarters. Interest expense climbs gradually over time given that debt in the sample features mainly fixed rates and long maturities, slowing the pickup in effective nominal rates of public bonds.

The quarterly data further enable empirical exercises for budget subcomponents, revealing different patterns among them (see Online Annex 2.2). While total tax revenue in nominal terms grows by about the same magnitude as inflation, some items (profit and income taxes) rise proportionally more. On the expenditure side, some expenditure categories are sticky, especially compensation of employees and social benefits. Over time, automatic or de facto indexation brings those expenditures back to their initial levels in real terms.

Distributive Effects of Inflation and Fiscal Policy Support

Beyond the overall impact of inflation on the fiscal accounts, analyzing the effects of inflation on the distribution of households' well-being is key to understanding how policies, including social protection, can be designed to take such effects into consideration. Such an analysis can also be useful for exploring the political feasibility of other policies or reforms by identifying potential pressure points (relative winners and losers among those who stand to gain or lose from inflation). As the discussion that follows shows, for example, the impact of inflation in countries with sizable mortgage markets is more adverse—as a share of household income—for those older than age 65 (usually net holders of nominal assets) than for people in their 30s to 40s (who often have mortgage debt outstanding). When considering the design, timing, and preparatory work for reforms to pensions or health care, it would be helpful to consider that inflation is already placing a burden on the households and groups that would be more affected. This section uses household-level data for distinct countries and economic groups to examine such distributive effects.

Channels for Distributive Effects of Inflation across Households

Inflation affects the distribution of households' well-being through three main channels:¹¹

- *Differences in price increases across goods combined with differing consumption patterns (consumption basket channel).* If the prices of some goods rise more than those of others, households with a higher share of higher-priced goods in their consumption baskets will suffer more. For example, spikes in food prices may hurt the consumption of the poor more than other households because food constitutes a larger share of consumption (and income) for the poor (Baez Ramirez, Inan, and Nebiler 2021). If inflation becomes equally widespread across goods and services, this differential effect abates.
- *Impact on households' real incomes (income channel).* Real incomes may be significantly eroded if wages, pensions, or other transfers do not keep pace with inflation. The extent and distribution of such erosion depends not only on features of the labor market and pension or transfer systems but also on the source of price changes. During the price surge of 2021, which was driven by commodity prices, for example, real wages fell in most commodity-importing countries but rose in some commodity-exporting countries. In some historical episodes during which inflation originated from a worker-led push for compensation, real wages may have risen.¹² Moreover, if price and wage changes stem from the sudden emergence of imbalances in demand and supply for certain sectors or skills, some workers may benefit (or be harmed) disproportionately. Likewise, wage and pension indexation may serve some workers or retirees to the detriment of others (Süssmuth and Wieschemeyer 2022).
- *Impact on the real value of households' initial stock of assets and liabilities (wealth channel).* Inflation is expected to lead to a change in relative asset prices and a reduction in real terms of households'

¹¹See also Online Annex 2.3 and Cardoso and others (2022). The term "well-being" is a shorthand for the sum of these three effects. The analysis does not estimate welfare using utility functions, nor does it consider households' behavioral responses.

¹²According to Hirschman (1985, 60), the experience in *Argentina* in 1946–55 could be interpreted as an attempt at redistribution toward lower-income groups through higher wages, social security, and transfers, which were also associated with higher inflation.

initial liabilities. A surprise hike in inflation in principle helps net borrowers and hurts net lenders (Doepke and Schneider 2006). In countries featuring developed financial and credit markets, wealth effects are potentially relevant. The change in relative asset prices means that portfolio composition also matters. Families holding cash as their main asset tend to be hit the most (Albanesi 2007). Likewise, holders of bank deposits and fixed-rate government bonds usually incur real losses from inflation. Instead, historically, home or land ownership has served as good protection against inflation, and mortgage borrowers have often benefited from it (Box 2.2).

Estimation

The effects through these three channels are estimated for six economies, using a new rich set of statistics and household survey data. The sample encompasses low-income and developing countries (*Kenya* and *Senegal*), emerging market economies (*Colombia* and *Mexico*), and advanced economies (*Finland* and *France*). These countries also vary with respect to past inflation histories, status as commodity exporters or importers, and availability and use of mortgage and other household credit markets. The wealth channel is estimated only for *Colombia*, *Finland*, and *France*, given data constraints.

To illustrate, the analysis focuses on observed price developments during the initial upsurge in global prices in the aftermath of the COVID-19 pandemic; that is, the second quarter of 2021 to the second quarter of 2022. This rise was concentrated in food and energy prices and was associated with a cost-of-living crisis for millions of people across the world. All countries in the sample faced significant headline inflation, ranging from 6.1 percent in *France* to 9.2 percent in *Colombia* during the period considered. Prices of food spiked the least in *Finland* and *France*, whereas energy prices in those countries rose the most (Online Annex 2.3).¹³

The consumption basket channel is illustrated by reporting averages, by quintile, of household-specific inflation and the contributions of various components of household consumption baskets (food and nonalcoholic beverages; housing, water,

electricity, gas, and other fuels; transportation; other) for the second quarter of 2021 to the second quarter of 2022 (Figure 2.5). A household's specific inflation is the weighted average of the percentage price hikes (in each country) for each given consumption category, with the weights derived from the individual household's consumption basket as reported in the survey.

Household-specific inflation levels are higher for households in lower income quintiles in *Colombia*, *Kenya*, *Mexico*, and *Senegal*, reflecting a larger contribution from food price increases for the lower quintiles (Figure 2.5). In turn, this stemmed from a combination of (1) more rapid increases in food prices than in other goods and (2) the well-known universal pattern whereby the share of food in total consumption declines with income per person.¹⁴ For *Finland* and *France*, household-specific inflation rates are nearly the same across income quintiles. In these two countries, the contribution from food prices was limited because the rise in food prices was less pronounced, and food accounts for a share of consumption that is lower and roughly the same across quintiles. Energy prices rose faster and account for a sizable portion of the overall increase, although the effect was felt through utilities at the lower quintiles and transportation (which includes fuel) at the higher quintiles.¹⁵ More recently, energy prices have adjusted down to levels seen before *Russia's* invasion of *Ukraine* (see Chapter 1), and these consumption basket channels may abate or even reverse. However, as found in new evidence reported in Box 2.3, changes in relative prices can on occasion persist or widen for several years, with meaningful implications for the budgets of different groups.

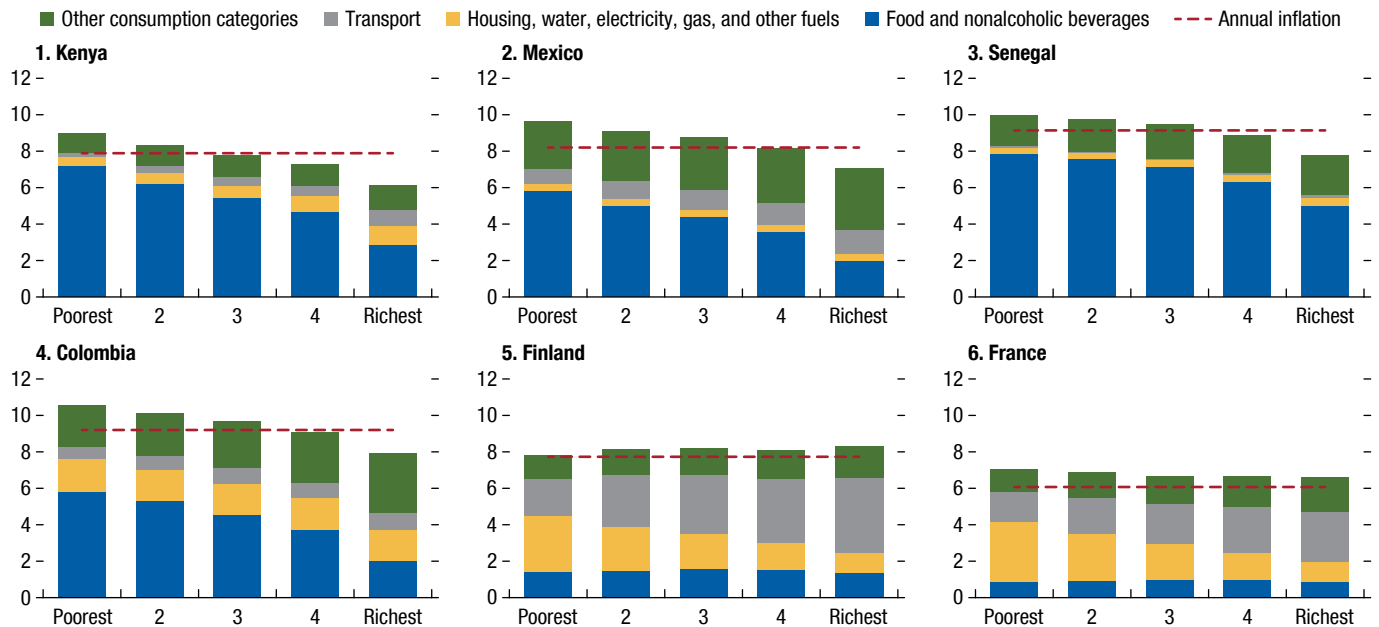
Although the effects occurring through the consumption basket channel were sizable during the period analyzed, they may become negligible (or reverse) when other sample periods are considered that

¹⁴In developing or emerging market economies such as *Colombia*, *Kenya*, *Mexico*, and *Senegal*, the poorest households spend 40–50 percent of their budget on food, compared with 15–30 percent for their richest quintiles. In advanced economies such as *Finland* and *France*, the budget share spent on food is roughly constant across quintiles at 10–15 percent. In the *United States* too, transportation represents a large expenditure share for the middle/upper class (*The Economist* 2023).

¹⁵Whereas energy used for utilities in these countries is a larger share of consumption for lower-income households, the share of transportation in total consumption rises with household income (see Hellebrandt and Mauro 2015 for international evidence).

¹³See Online Annex 2.3 for the details, including the assumptions for the income and wealth estimates. Online Annex 2.3 further analyzes total net wealth, including real assets, such as dwellings.

Figure 2.5. Household-Specific Levels of Inflation per Quintile, 2021–22
(Percent)



Source: IMF staff calculations.

Note: The figure covers the period from the second quarter of 2021 to the second quarter of 2022. In *Colombia* and *Mexico*, and in *Finland* and *France*, quintiles are built using per capita income. For *Kenya* and *Senegal*, the quintiles use per capita consumption (as a proxy for their income). See Online Annex 2.3 for details.

encompass, for example, food price increases similar to (or lower than) the general price index.¹⁶

Whereas the consumption basket channel appropriately received much attention in several recent analyses,¹⁷ the other two channels often have had even greater impacts. The income channel was generally the most prominent, but its sign differed across countries (Figure 2.6, blue bars).¹⁸ In *Finland*, *France*, *Kenya*, and *Senegal*, nominal changes in remuneration of families through wages, pensions,

¹⁶In all countries except *Finland*, the consumption channel is negative at the bottom of the income distribution and positive at the top. The finding confirms the evidence shown above on the cost of living in *Colombia*, *Kenya*, *Mexico*, and *Senegal* increasing more for poor households than for rich households.

¹⁷See, for example, OECD (2022b) for Organisation for Economic Co-operation and Development economies; Charalampakis and others (2022), Claeys and Guetta-Jeanrenaud (2022), and Mohrle and Wollmershauser (2021) for *European countries*; and Autor, Dube, and McGrew (forthcoming), Jaravel (2022), and US CBO (2022c) for the *United States*.

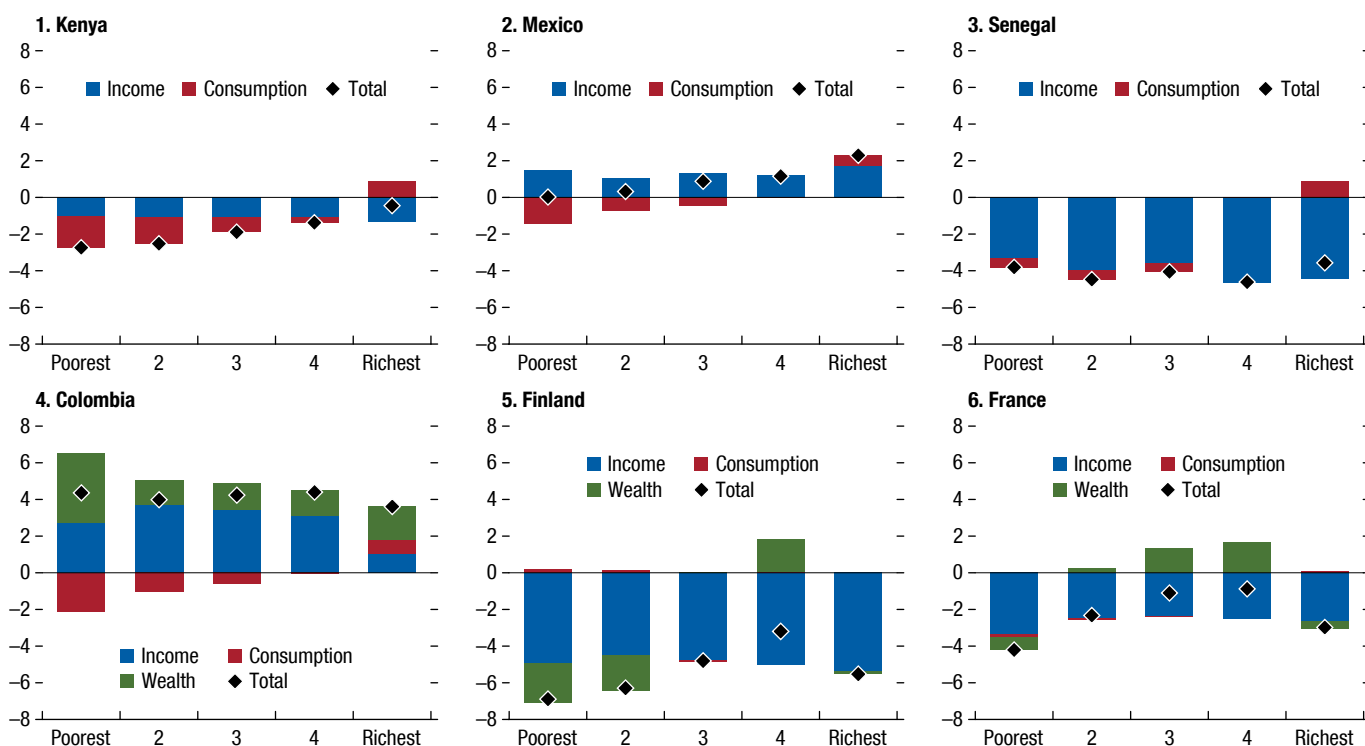
¹⁸Figure 2.6 assumes changes in nominal values of incomes, assets, and liabilities in line with the data discussed in Online Annex 2.3. The annex includes another simulation in which those financial resources are assumed to remain constant in nominal terms, allowing for a study of the immediate effects of an unexpected inflationary shock. In that scenario, the total immediate effects of inflation on households' incomes are negative in all countries, with the fall in real income being equal to the level of inflation.

and other income failed to keep pace with price hikes. In *Colombia* and *Mexico*, real incomes rose. The fact that these two countries are oil exporters may explain why nominal income increased there more recently. Institutional factors may be at play too—for example, wage and pension indexation is widespread in *Colombia* and *Mexico*. In most countries, the impact of inflation via this channel did not vary much across quintiles and, to the extent it did, there was no clear pattern, with several characteristics playing important roles (including the gender of the head of household; Mao 2022).

Effects occurring through the wealth channel are also significant in the countries for which data are available (Figure 2.6, green bars) and present the most complex interactions with household income, age of the head of the household, and country-specific mortgage and household credit markets.¹⁹ In *Finland* and *France*, real losses from the erosion of net nominal assets (or gains from erosion of net nominal liabilities)

¹⁹Emerging market and advanced economies generally have more developed financial markets and higher household debt levels (Bahadir and Gumus 2016; Jordà, Schularick, and Taylor 2016). Credit for large real assets, such as dwellings, is less widespread in low-income countries. For an analysis of the penetration of mortgage loans in those economies, see Badev and others (2014).

Figure 2.6. Income, Consumption, and Wealth Channels, 2021–22
(Percent of household income)



Source: IMF staff calculations, as described in Online Annex 2.3.

Note: The figure covers the period from the second quarter of 2021 to the second quarter of 2022. For *Colombia*, results are based on the financial inclusion module of the Great Integrated Household Survey (GEIH) to include the wealth effect. Results for income and consumption basket channels using a representative survey are similar.

differ significantly across household income groups. Families in the fourth quintile in *Finland* and the third and fourth quintiles in *France* are, on average, net borrowers (at least in terms of liquid assets and liabilities) and thus experience net wealth gains from inflation.²⁰ Conversely, families in the two lowest quintiles in *Finland* and, to a lesser extent, those in the lowest and highest quintiles in *France* are net lenders (or holders of net nominal assets) and experience losses. In *Colombia*, households for all income groups report, on average, that they have net liquid liability positions.²¹ The positive size of the wealth effect is significant, in comparison with the other effects, and does not present a straightforward association with income—the largest gains are for the lowest and highest income quintiles.

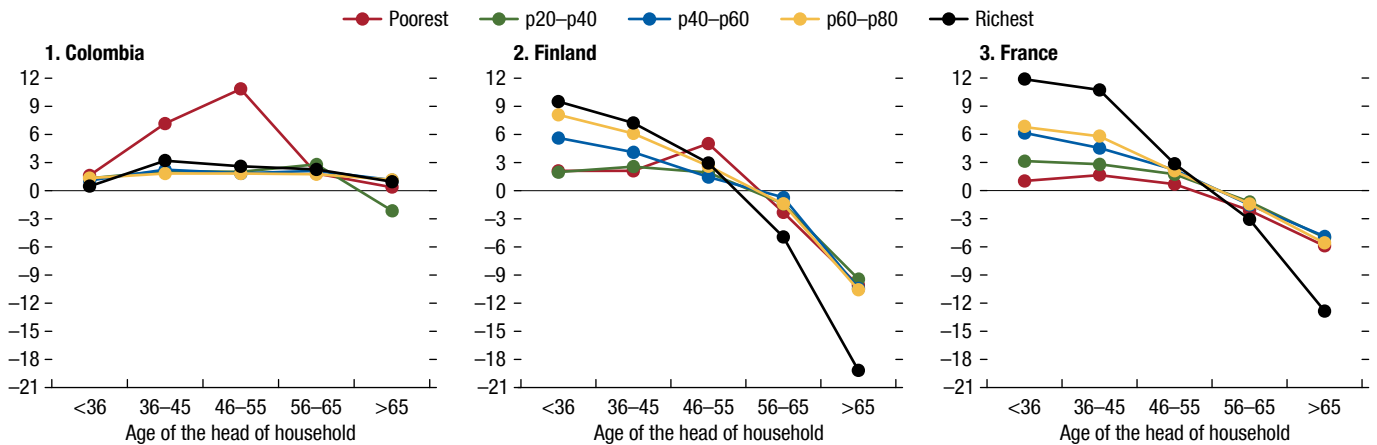
²⁰The conclusions may depend on whether real assets, including dwellings, are considered (see Online Annex 2.3).

²¹Although this would merit further analysis, the asset counterpart to these positions could be with financial institutions (including informal ones). The survey does not include information about ownership of these assets.

Considering the overall impact of inflation and the relative importance of the three channels (consumption basket, income, and wealth) in different countries and for different income groups, it becomes apparent that the impact of inflation on well-being is variegated and depends on several factors. In *Kenya*, during the period considered, the impact of inflation was worse the lower the income group, largely owing to the stronger impact of food prices on the poor. The pattern is similar, though less pronounced, in *Mexico*, whereas in *Senegal*, the income channel drove most of the action, with little variation across quintiles. In *Colombia*, the overall impact of inflation was similar across income quintiles, as the income and wealth channels masked the pattern stemming from the consumption basket channel. In *Finland* and *France*, the middle quintiles were less affected than the highest and lowest. While the income channel was the most sizable, variation across quintiles reflected the wealth channel.²²

²²For inequality trends by income percentile in the *United States* caused by inflation see Autor, Dube, and McGrew (forthcoming).

Figure 2.7. Wealth Effect by Age and Income Brackets, 2021–22
(Percent of household income)



Source: IMF staff calculations, as described in Online Annex 2.3.

Note: The figure covers the period from the second quarter of 2021 to the second quarter of 2022. Each line in the panels corresponds to the income brackets. The wealth effect differs, on average, across generations: Young people are net borrowers, whereas elderly people tend to be net lenders. Therefore, the wealth effect is usually positive for young people and negative for older households. p = percentile.

Table 2.1. Total Effect of Inflation on Saving Capacity by Age-Income Groups
(Percent of household income)

Age	Spain				Colombia					Finland					France				
	Income Quartile				Income Quintile					Income Quintile					Income Quintile				
	Poorest	Second	Third	Richest	Poorest	Second	Third	Fourth	Richest	Poorest	Second	Third	Fourth	Richest	Poorest	Second	Third	Fourth	Richest
<36	-2.6	-2.9	-2.4	-2.9	9.0	-8.4	-8.1	-7.4	-7.7	-6.2	-6.1	-2.8	0.1	1.6	-5.1	-3.1	0.2	0.9	6.0
36-45	-0.9	-0.3	-1.0	-2.0	-3.4	-8.0	-7.2	-7.1	-5.0	-5.8	-5.5	-3.7	-1.7	-0.7	-4.3	-3.0	-1.2	0.1	5.0
46-55	-3.5	-3.5	-3.9	-4.4	-0.7	-8.5	-8.2	-7.5	-5.7	-3.3	-6.0	-6.6	-5.3	-4.9	-5.2	-4.1	-3.7	-3.8	-2.9
56-65	-8.3	-6.2	-6.9	-6.8	-10.1	-7.6	-8.1	-7.6	-6.2	-10.4	-9.3	-8.7	-9.3	-12.9	-7.8	-6.9	-7.3	-7.1	-8.9
>65	-12.7	-9.6	-9.8	-9.7	-11.3	-13.0	-9.1	-8.4	-7.8	-17.3	-16.9	-18.2	-18.2	-27.0	-11.2	-10.4	-10.4	-11.2	-18.5

Sources: Cardoso and others (2022) for *Spain* and IMF staff calculations for *Colombia*, *Finland*, and *France*.

Note: Age brackets are based on the age of the head of household. See Online Annex 2.3 for details.

Redistributive wealth effects of inflation are also strongly influenced by the age of the head of household, especially in countries with sizable markets for mortgages. Figure 2.7 shows that for *Finland* and *France*, young families, which tend to be net borrowers (for example, via mortgages), experience gains through the wealth channel. For most families, a mortgage is the largest loan they ever undertake to gain ownership of their largest asset—their home. In contrast, older age groups, which typically do not have mortgages and are net holders of nominal assets, experience wealth erosion. This pattern holds within each income quintile and in these countries is most pronounced within the highest income quintile, which has the easiest access to credit and asset markets. No clear

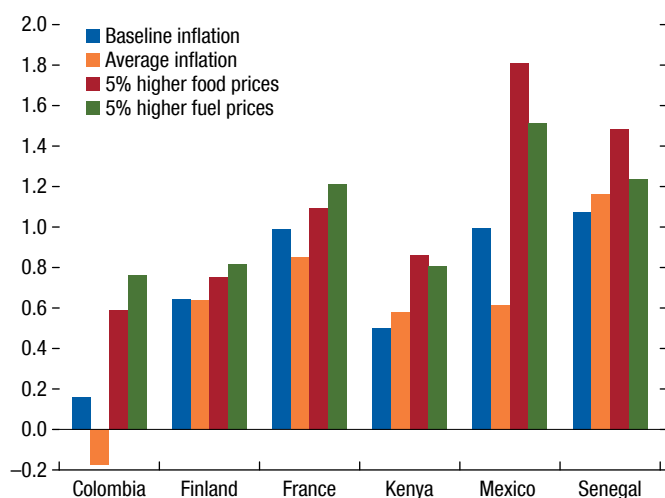
pattern is identified in *Colombia*, however. To sum up, in advanced economies, a group highly exposed to losses from inflation would consist of retirees who live in a rental apartment and hold their savings in nominal assets and whose pension is not indexed.

The importance of age is further corroborated by results for *Spain* by Cardoso and others (2022). Table 2.1 compares their results with those in this chapter.

Poverty

The analysis further suggests a likely increase in poverty in all economies analyzed. Figure 2.8 displays the change in absolute poverty headcount following four

Figure 2.8. Changes in Poverty from Different Types of Price Increase Shocks (Excluding New Policy Measures Responding to Inflation)
(Percentage points)



Source: IMF staff calculations.

Note: Baseline inflation refers to household inflation calculated based on observed inflation from the first quarter of 2021 to the second quarter of 2022. Results can be considered as a ceiling because the estimation does not take into account new measures taken by the government or households to respond to the effects of inflation.

scenarios of price hikes:²³ (1) baseline or actual inflation (and distribution across goods and services) in each country from the second quarter of 2021 to the second quarter of 2022, (2) an average or widespread price hike in all goods and services, whose increase remains equal to the country's inflation level, (3) a 5 percent hike in the price of food and nonalcoholic beverages on top of observed price rises, and (4) a 5 percent spike in energy prices on top of observed price rises.

The estimated impact of inflation (observed baseline) on the poverty rate, prior to new compensatory measures, is as high as about 1 percentage point in *France*, *Mexico*, and *Senegal*. Such increases in poverty already consider the growth of nominal income, which helped contain the adverse effects of inflation on poverty. In the countries studied, the mitigating effect of the growth in nominal income on poverty varies, with some countries experiencing little to no effect, while others, like *Colombia*, experienced a significant reduction in the poverty headcount (0.4 percentage point). Rises in food prices had a disproportionate impact on vulnerable populations during the period

²³Poverty headcount is the share of the population whose income falls below international poverty lines set by the World Bank.

considered. The effect of a rise in food prices is larger in *Kenya*, *Senegal*, and *Mexico*, whereas energy price hikes are more important for *Colombia*, *Finland*, and *France*. If the pace of increases in food and energy prices declines below average consumer price inflation, a significant source of increases in poverty may subside.

Disinflation and Distributing

The previous sections show how inflation affects public finances and households. Now the analysis turns to whether and how fiscal policy affects inflation. Understanding the specific channels through which public policies affect inflation and how those policies can contribute to the mix of instruments meant to restore price stability are two complex and interconnected issues. Monetary and fiscal policies have their own distributional effects. In addition, their overall impacts on the macroeconomy vary according to the structure of wealth and income inequality. Recent studies (often using a so-called Heterogeneous Agent New Keynesian [HANK] approach) have indicated that the role played by fiscal policy in aggregate demand and inflation management may be larger than typically assumed. These studies have also considered monetary policy's possible effect on distribution.

This section discusses how fiscal policy may lead to, or may help deal with, moderately high inflation. It does not speak to cases of instability, such as episodes of debt distress, which currently apply to a small set of emerging markets. Situations in which the government does not adjust the primary balance to stabilize public debt and central banks are less independent—both usually associated with the economic concept of *fiscal dominance*—are outside the scope of this chapter.²⁴ Instead, the standard assumption that central banks pursue their objective of price stability, unhindered by concerns about public debt, holds. Public finances matter for inflation via their impact on aggregate demand.²⁵ They also contribute to the price stability goal if they are aligned with monetary policy, bringing credibility to the overall macroeconomic framework. Hence, by taming spending, governments can help monetary policy curb inflation at lower costs for the

²⁴See Leeper (1991), Sims (1994), and Cochrane (1998), who initially developed the Fiscal Theory of the Price Level.

²⁵Over time, such effects of fiscal policy can be offset by monetary policy through the rise in interest rates.

overall economy (see, for example, Adrian and Gaspar 2022; and Erceg and Lindé 2012).

Fiscal policy support for monetary policy in disinflating is important for two additional reasons. First, monetary tightening²⁶ can have unwelcome distributive effects—for example, via more expensive credit for small firms (Alfaro, Faia, and Minoiu 2022; Haltom 2012) and because the poor do not hold interest-bearing assets.²⁷ Second, a disinflation strategy that relies solely on monetary policy is accompanied by real interest rates that are too high, and this can pose a challenge for debt dynamics. Government policies, in turn, can be more agile and contemplate other objectives if the right fiscal tool is employed.²⁸ Different fiscal policies can be calibrated and used to support the disinflation effort while mitigating the increase in poverty and income inequality at the same time. Monetary policy does not have the mandate to address income inequality, nor can it be targeted in the way that fiscal policy can.

In effect, the discussion in this chapter is geared toward policies that can help reduce overall inflationary pressures while providing temporary support (preferably targeted cash transfers) to the most vulnerable. It does not advocate the use of specific fiscal instruments to cap specific prices. As during the recent episode, some countries have adopted price controls or subsidies, put the squeeze on profits of state-owned enterprises, or cut taxes to try limit price increases and inflation (see Chapter 1 and the October 2022 *Fiscal Monitor*). However, such actions can be costly to the budget, lead to shortages and rationing, and prove ultimately ineffective and potentially make inflation more persistent.

²⁶In the analysis, monetary tightening is captured by central banks' hikes in interest rates. However, in the current inflationary episode, many central banks—which have used *quantitative easing* to support firms and households during the recent years of very low interest rates and the pandemic—may also restrict their policies through *quantitative tightening*. For example, some monetary authorities may stop purchasing corporate bonds, which was guaranteeing a supply of liquidity for some firms. Other central banks may even consider selling a portion of the corporate bonds they hold on their balance sheets. While those policies may have implications for (dis)inflation, they are not considered explicitly in this chapter's exercises.

²⁷Yet low interest rates are also shown to inflate stock prices, benefiting the rich (Auclert 2019), so a monetary tightening may have the opposite effect, depending on country characteristics.

²⁸Public investment projects, for instance, have long lags of execution that are usually higher than those of monetary policy.

Historical Evidence of the Impact of Fiscal Policy on Inflation

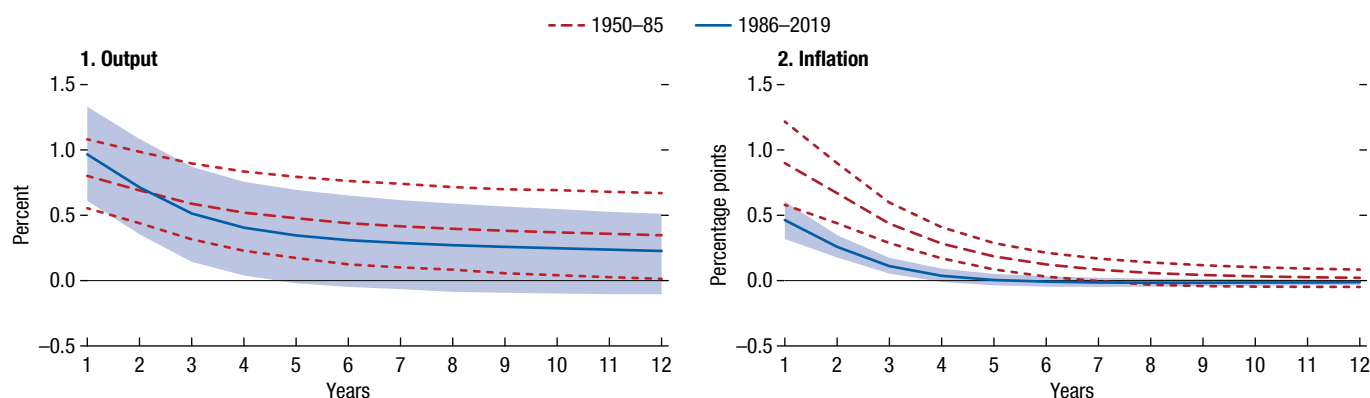
To assess the effect of public spending on inflation, as motivated by the recent spending surge, for a broad sample of economies, an empirical analysis is pursued using historical data from 1950 for 17 advanced economies, for two periods: 1950–85 and 1986–2019. The split in 1985 is aimed at dividing the sample into an earlier period of relatively passive monetary policy in advanced economies and a later period of more active monetary policy that anchors inflation expectations (see Banerjee and others 2022). The analysis focuses on public spending given that the recent debate relates to the large spending surge during COVID-19 (Gopinath 2022), as during the two world wars (Box 2.4).

The analysis shows that the effect of public spending on inflation varied over time (Figure 2.9). A 1 percent-of-GDP rise in government spending in the pre-1985 period leads to an average hike in inflation of almost 1 percentage point in the same year, phasing out slowly. For the post-1985 period, the same shock leads to an average increase in inflation of roughly half that size and, differently from the first case, it flattens out after three to four years. Monetary policy responses to forces pushing inflation up in both periods varied markedly. In the earlier part of the sample, central banks were more likely to accommodate fiscal expansions, thus allowing for a higher pass-through from those expansions to inflation. After 1985, central banks more often tightened monetary policy in response to fiscal expansions to slake their inflationary effects.

Ascertaining a causal impact of public spending on inflation (rather than vice versa, or the impact of a third factor on both variables) involves the same thorny methodological challenges faced by studies that have sought to estimate the fiscal multiplier for output (Ramey 2019; April 2012 *Fiscal Monitor*, Chapter 1). Following Ramey and Zubairy (2018), this chapter analyzes increases in government purchases that follow news about extra military spending in the *United States*. The methodological advantage is that such news is not caused by the economic cycle, and the only impact on the US economy occurs through additional spending.²⁹ As shown in Figure 2.10, there is a clear positive effect

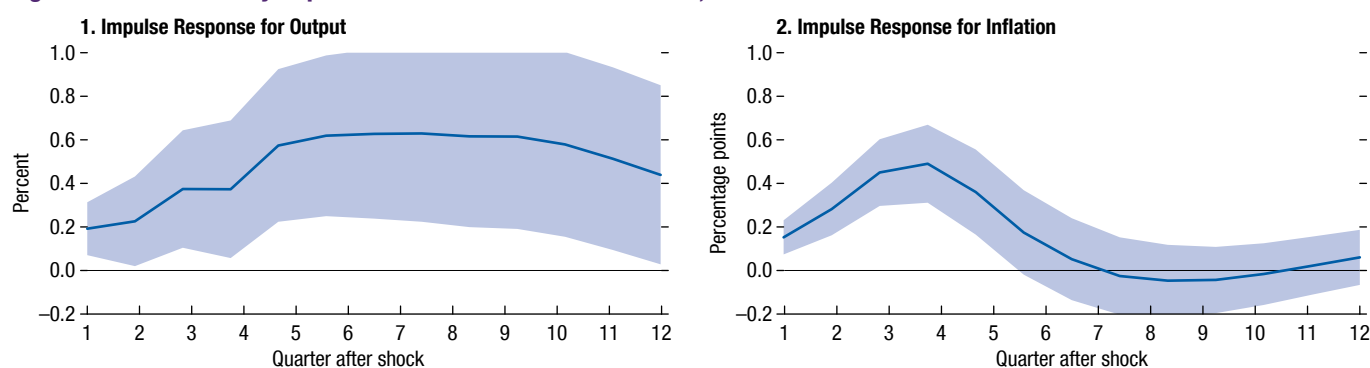
²⁹Specifically, a structural vector autoregression model is estimated, with public spending identified by quarterly news of additional military spending in the *United States* from the first quarter of 1939 to the fourth quarter of 2015 (Ramey and Zubairy 2018). See Online Annex 2.4.

Figure 2.9. Panel Evidence of the Fiscal Policy Impact on Inflation, 1950–2019



Sources: IMF staff analysis using the IMF Public Finances in Modern History database; and Jordà, Schularick, and Taylor (2017).
 Note: The panels plot average impulse responses and the 90 percent confidence bands (shaded blue area and short-dashed lines). See Online Annex 2.4 for further details.

Figure 2.10. Fiscal Policy Impact on Inflation in the United States, 1939–2015



Sources: IMF staff estimates using the Ramey and Zubairy (2018) database; and IMF World Economic Outlook database.
 Note: The figure covers the period from the first quarter of 1939 to the fourth quarter of 2015. The panels plot the average impulse responses (solid blue line) and the 90 percent confidence bands (blue shaded areas). See Online Annex 2.4.

on inflation. As the blue line in panel 1 indicates, following the news of additional military spending, output increases in subsequent quarters, confirming the presence of a positive fiscal multiplier (see Online Annex 2.4). The novel result is the response of annual inflation: It rises and reaches the highest level in less than one year after the spending news, with inflation going up by an additional 0.5 percentage point than otherwise.

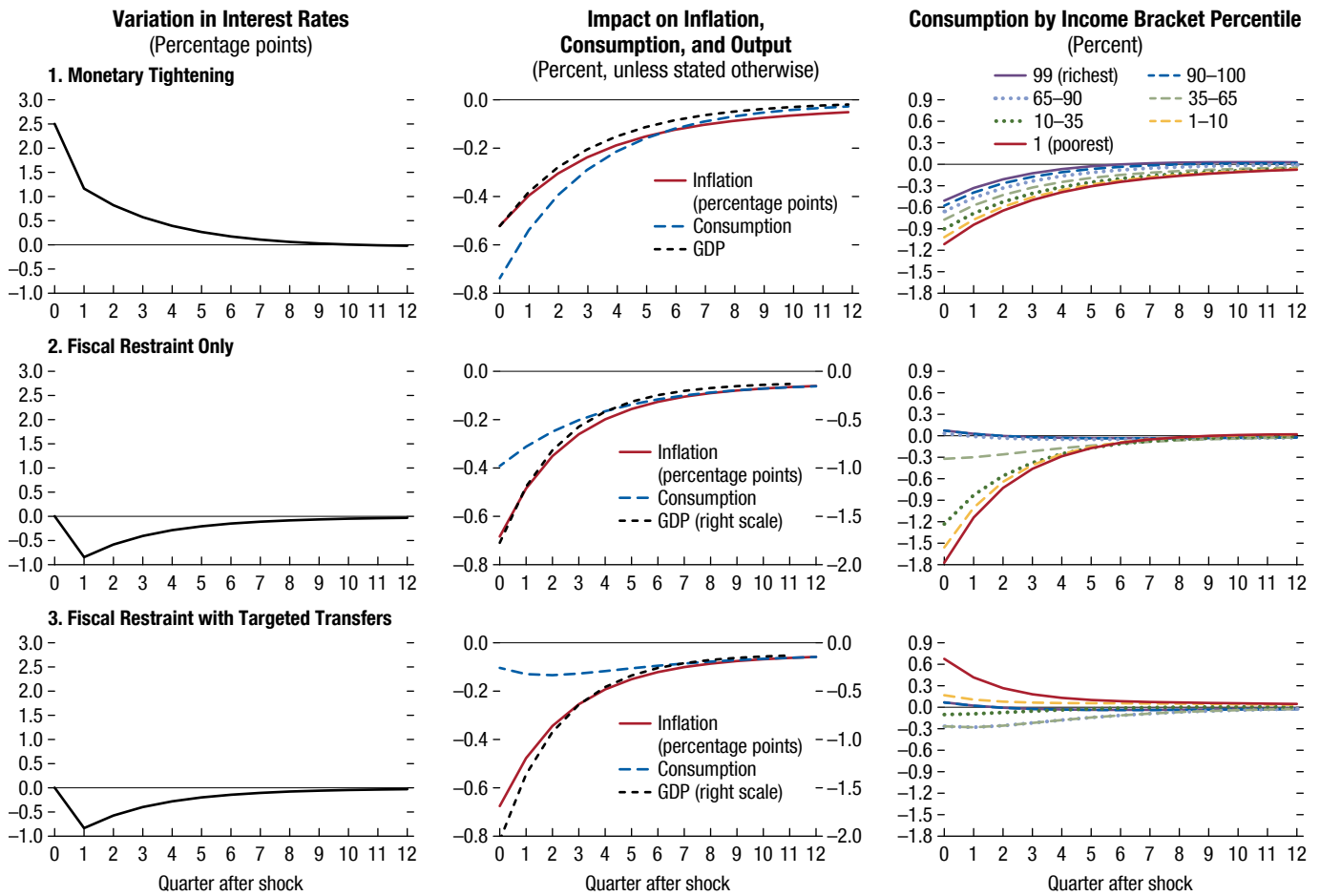
Fiscal Policy and Disinflation: Lessons from an Economic Model with Income Distribution

To illustrate and understand some of the main consequences of varied monetary-fiscal mixes, the analysis turns to a (simple) version of a state-of-art class of models that include a richer description of

the households’ income and wealth distribution—the HANK model (McKay and Reis 2016; Kaplan, Moll, and Violante 2018; Bayer, Born, and Luetcticke 2023). Such a model allows for the impact of different types of public policies—fiscal and monetary—on the households’ income distribution. Specifically, the analysis here focuses on how different forms of fiscal restraint by the government can help monetary policy achieve price stabilization. At the same time, their distributive effects across households are analyzed and considered for policy design.

The model has five crucial ingredients: (1) The government issues short-term debt that is held mostly by the higher-income groups; (2) when debt rises above 90 percent of GDP, taxes are gradually increased to guarantee that debt returns to that value; (3) transfers for lower-income people boost overall private

Figure 2.11. Disinflating via Different Policy Tightening Options in the HANK Model
(Deviation from long-term value)



Source: IMF staff calculations based on the model calibration in Auclert and others (2021).
Note: See Online Annex 2.4 for details. HANK = Heterogeneous Agent New Keynesian.

consumption because these groups consume a high share of any extra dollar of income they receive; (4) the central bank increases real interest rates when inflation goes above target (specifically, the central bank follows a so-called Taylor rule); and (5) taxes on labor income are progressive, meaning that higher-income families pay a higher share of their income in taxes, compared with lower-income families.³⁰

Calibrating the model for the *United States* (Auclert and others 2021), the analysis examines three combinations of policies to reduce inflation: (1) an increase in the nominal interest rate above what the Taylor rule would suggest, with fiscal policy taking no further action than required for a gradual return

to its debt target (90 percent); (2) untargeted fiscal tightening—that is, a reduction in overall spending across all budget items; and (3) targeted fiscal tightening composed of an overall cut in spending items while increasing transfers to families in the lowest 10 percent of the income distribution.

In the first scenario, nominal interest rates are raised by 250 basis points to bring inflation down by about 2 percent in roughly two years (Figure 2.11). Output and consumption fall throughout this period. The poorest families cut their consumption the most because they have no assets to draw from.

The second scenario simulates a cut in overall public spending amounting to 1 percent of GDP while monetary policy is also actively following a Taylor rule. This leads again to a contraction in aggregate demand and output, with inflation falling by a total of

³⁰In this version of model, the production function includes labor and a productivity term but not capital.

2 percentage points in eight quarters (as a response the central bank cuts interest rates, which in the real world should be interpreted as being able to raise them by less). The drop in aggregate demand affects everyone, but the impact is proportionately more cushioned for higher-income families by the decline in taxation.

In the third scenario, a fiscal tightening of the same overall size (1 percent of GDP) but with a different composition is simulated. While the fiscal effort in other spending items is greater than before (by 1.5 percent of GDP), targeted transfers to the poorest 10 percent of families are in turn increased by 0.5 percent of GDP. The results show that in such a scenario, both GDP and inflation go down. But because the poor households receiving transfers consume a high share of their extra income, aggregate consumption decreases by less than in the other simulations. The consumption of those targeted households goes up with the transfers. To summarize, a generalized fiscal contraction helps contain inflation, with a smaller drop in private consumption than in the monetary policy scenario, but its impact favors higher-income groups at the expense of the lower-income groups. These adverse distributional effects can be remedied if the fiscal contraction is accompanied by a targeted transfer program.

Conclusions

The evidence presented in this chapter highlights the pattern that inflationary surprises are historically associated with an initial rise in fiscal balances in the short term and a fall in public debt that often persists into the medium term. However, expected inflation is not associated with a fall in debt ratios, stressing that inflating debt away is neither a desirable nor a sustainable strategy. Unexpected inflation may offer some breathing room for debt ratios, but attempts to keep surprising bondholders have historically proved futile or harmful. The impact on debt is more significant for countries with large amounts of debt, especially when it is denominated in local currency, long term, and unindexed. For countries with debt exceeding 50 percent of GDP, each 1 percentage point surprise increase in inflation is estimated to reduce public debt by 0.6 percentage point of GDP, with the effect lasting for several years.

Current practices on indexation vary considerably across countries. Among budget items, pensions are the most commonly indexed, followed by transfers to lower-income groups and public sector wages. When reviewing automatic or discretionary indexation going forward, policymakers need to decide which groups and programs to protect from income erosion while avoiding policies that make inflation more persistent. Policymakers should carefully assess the impact of public wage setting during periods of high inflation, including through indexation, on the setting of private wages. Policymakers also need to consider potential effects of inflation on the structure of the tax system.

The redistributive effects of inflation on households are more complex than usually thought. Analysis of the recent surge in inflation highlights the importance of changes in families' incomes and net assets for the distributive effect, especially in countries with more developed financial and credit markets. Policy reforms should consider the redistribution that inflation drives from net lenders to net borrowers, usually associated with old and young families, respectively. During the period considered, the poverty rate rose by 1 percentage point or more in three countries of the sample (*France, Mexico, Senegal*).

While monetary policy is in the driver's seat in the battle against inflation, fiscal policy can help. Well-targeted fiscal restraint can be designed to support monetary policy in attaining price stability while protecting the vulnerable from the cost-of-living crisis. The chapter documents the empirical association between fiscal policies and developments in inflation. Estimates suggest that 1 percentage point of GDP in additional public spending resulted in higher inflation by 0.8 percentage point in a sample covering the 1950–85 period and by 0.5 percentage point thereafter. Moreover, through an economic model capturing income distribution, the chapter shows that *targeted* fiscal restraint—involving tough policy choices on what budget items to cut and which to protect or expand—can bring inflation down at lower cost to aggregate consumption and income inequality while protecting lower-income families.

Box 2.1. Does Public Wage Policy Make Inflation More Persistent?

This box explores the interplay between public wages, private wages, and inflation. Public wage setting needs to be mindful of developments in prices and private wages to attract and retain qualified civil servants while avoiding a wage-price spiral.

Public wage setting is important to attract and retain qualified civil servants. At the same time, public wage hikes can increase aggregate demand or influence wage setting in the broader economy, depending on labor market institutions (such as the density of unions or the degree of centralization of bargaining) and the size of the public sector.

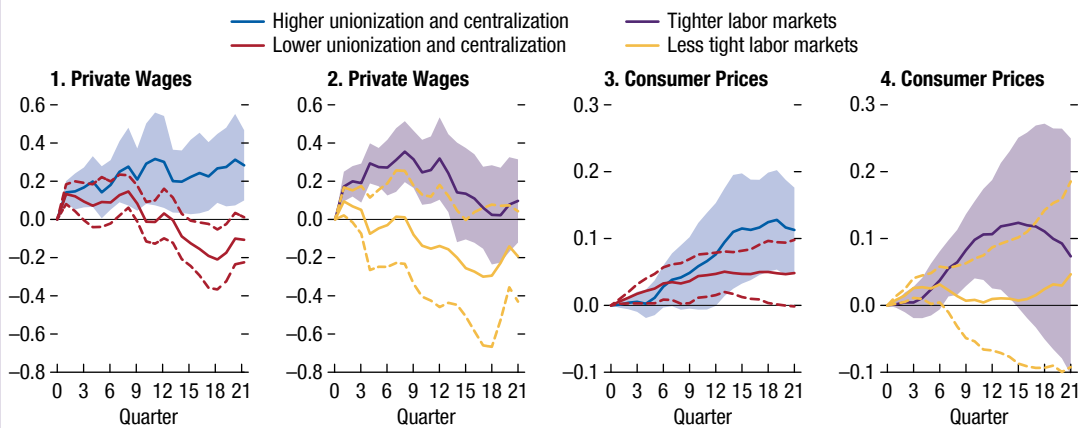
Applying the approach of Abdallah, Coady, and Jirasavetakul (2023) to an expanded country sample, this box estimates the effects of public wage spikes on private wages over the medium term using data from 30 member countries of the Organisation for Economic Co-operation and Development from the first quarter of 1990 to the second quarter of 2022. Changes in government wages are assumed to be predetermined with respect to the behavior of macroeconomic variables, as usually identified in the literature (see Blanchard and Perotti 2002; and Jørgensen and Ravn 2022).

The results suggest that, considering labor market institutions and conditions, public wages may have a significant and lasting effect on private wages and core Consumer Price Index (CPI) inflation in the sample (Figure 2.1.1). For countries with higher union density and centralization of wage bargaining, the peak responses of private wages and core CPI inflation to spikes in public wages are 0.32 percentage point and 0.12 percentage point, respectively. They also last for many quarters after the spike.

Prevailing macroeconomic conditions can also matter for the transmission of government wage shocks. For instance, workers' bargaining power is typically greater when labor markets are tight. Similarly, firms may have more pricing power when aggregate demand is strong. Figure 2.1.1 suggests that the impacts of government wage hikes on private wages and core CPI are significantly larger and longer-lasting when labor markets are tighter.

The findings imply that during periods of high inflation and tight labor markets, public wage policy should balance the need to attract and retain high-quality civil servants against the risk of fomenting inflationary pressures.

Figure 2.1.1. Effects of Public Wage Spikes on Private Wages and Core CPI Inflation
(Percent for the response of private wages; percentage points for core CPI)



Source: IMF staff calculations based on Abdallah, Coady, and Jirasavetakul (2023).
Note: Shaded areas and dashed lines represent the 90 percent confidence bands of the impulse responses. CPI = Consumer Price Index.

Box 2.2. Inflation Effect via the Wealth Channel during Historical Episodes

This box takes a historical perspective on the redistributive effect of inflation on households' assets and liabilities.

Some patterns of redistribution from inflation through the net wealth channel hold true in many historical episodes. Net holders of cash, bank deposits, and local currency (unindexed) bonds suffer real losses, while net borrowers (notably for fixed-rate mortgages) gain. Moreover, stockholders lose if inflation is joined by economic disruption. Homeowners and landowners have usually been shielded, but public policies, such as rent control or taxation, sometimes have partially undone such protection.

Comparing the portfolios of different demographic groups for a sample of more than 60,000 households in the United States, Wolff (1979) analyzed the impact of the 1969–75 period of inflation through the net wealth channel. The biggest gainers were homeowners who had large mortgages. Low-income households also gained if they had a mortgage.

Homeowners gained relative to renters, middle-aged households gained relative to younger and older ones, married couples gained relative to singles, and Whites gained relative to non-Whites. Inequality of wealth declined because lower-wealth groups had higher debt-to-asset ratios.

But the inflation protection of homeownership can be undone, at least in part, by government policies, as seen in *France* and *Germany*, for example, in the aftermath of World War I. Inflation once again hit net holders of nominal assets hardest, but homeowners were not unscathed. In *France*, rent control was severe during both world wars. Combined with inflation, this resulted in rents falling to one-tenth of their value in real terms between 1913 and 1950 (Piketty 2003). Likewise, in *Germany*, real estate lost one-fifth of its value during 1913–27 owing to a mix of rent regulation and taxation (Albers, Bartels, and Schularick 2022). The only asset that gained was land, with a strong rural-urban divide in the effect of inflation.

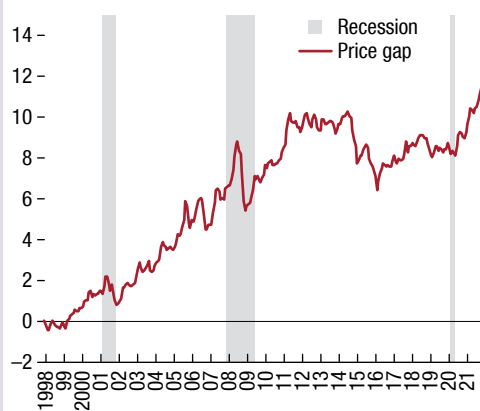
Box 2.3. Price Hikes and the Middle Class in the United States

The box shows that middle-income families in the United States experienced sharper rises in the cost of their consumption baskets, compared with higher-income families, not only during times of rapid inflation but also during the past two decades more generally.

Using US Bureau of Labor Statistics Consumer Expenditure Surveys, estimates show that prices rose faster for goods and services that make up a large share of the consumption baskets of US middle-income households as of 2021, confirming the findings by Cravino, Lan, and Levchenko (2020) (Online Annex 2.3).

New analysis reveals that such a price gap for goods and services consumed by the middle class constitutes a longer time trend. The relative price of the consumption basket for a middle-class family (40th–60th income percentiles) rose by 11.7 percent relative to the consumption basket of a higher-income family (top fifth percentile) between 1998 and 2021 (Figure 2.3.1). Potential factors underlying this difference include product innovations and price changes in imported goods (Cravino and Levchenko 2017; Jaravel 2019). These divergent price paths, along with static US middle incomes (Mishel and Bivens 2021), suggest a widening in the purchasing power of the two groups.

Figure 2.3.1. Inflation Differentials between Middle- and High-Income Families
(Percentage points)



Sources: IMF staff analysis based on Cravino, Lan, and Levchenko (2020); and US Bureau of Labor Statistics.
Note: Price gap is the accumulated inflation gap since 1998 between top 5th and 40th–60th income percentiles.

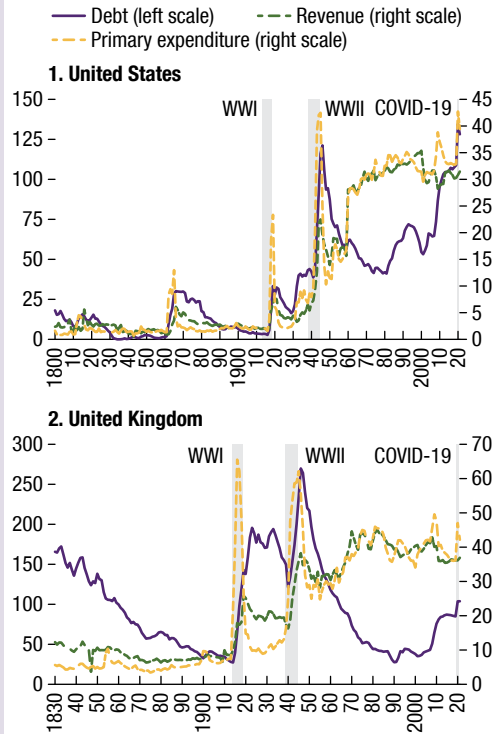
Box 2.4. Surges in Government Spending: A Historical Perspective

This box shows that large-scale fiscal support during the pandemic bears some similarities to war-related surges in public spending, which were followed by sustained inflation. Will history rhyme?

The economic impact and ensuing policy response of the COVID-19 pandemic have been compared with those of war periods (Dell’Ariccia and others 2020; Hall and Sargent 2022). Figure 2.4.1 shows that the hikes in debt and public primary expenditure in 2020 constitute one of the largest *annual* increases since the 1800s.

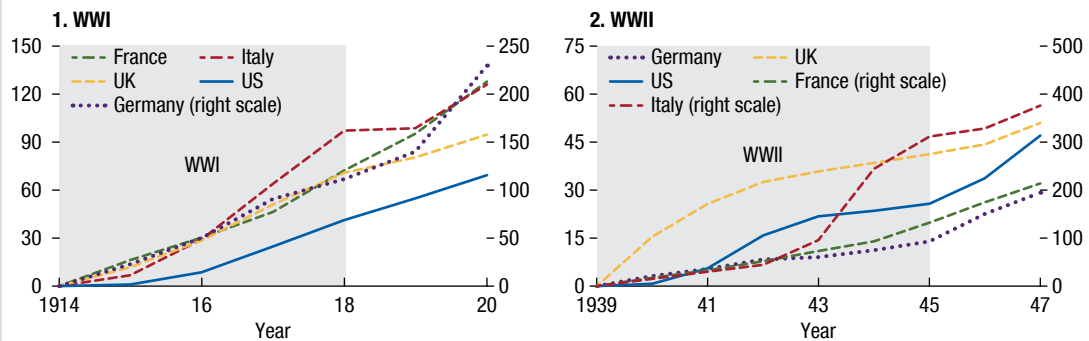
During World War I and World War II, several tactics were used for marketing government bonds (Eichengreen and others 2021), including forcing banks to buy bonds and imposing ceilings on Treasury rates. In more recent episodes, central banks purchased sovereign bonds in the secondary markets to reduce deflationary pressures. Even so, they enlarged balance sheets and raised their ratio of sovereign bonds to total assets (Ferguson, Schaab, and Schularick 2015; October 2020 *Global Financial Stability Report*, Chapter 1). Historically, wars have often been followed by a persistent rise in inflation (Bonam and Smădu 2021). After World War I, prices kept going up, reaching levels more than 70 percent higher in the *United States* and more than 90 percent higher in *France, Italy,* and the *United Kingdom* (Figure 2.4.2).

Figure 2.4.1. Surges in Public Expenditure, Revenue, and Debt over a Historical Span (Percent of GDP)



Sources: IMF Public Finances in Modern History database; and IMF staff calculations.
Note: WWI = World War I; WWII = World War II.

Figure 2.4.2. Price Level Rises with the World Wars (Percent)



Source: IMF staff analysis using the Jordà-Schularick-Taylor Macro-history Database.
Note: The lines are calculated by $100 \times (\ln P_t - \ln P_{start-of-war})$, in which P_t is the Consumer Price Index. WWI = World War I; WWII = World War II.

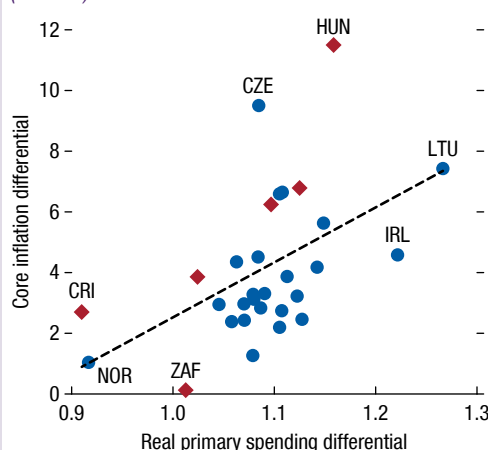
Box 2.4 (continued)

In *Austria, Germany, Hungary, and Poland*, inflation surged and turned into hyperinflation in the early 1920s and was brought down only by putting an end to financing government spending while adjusting the budgets into balance (Sargent 1982). During World War II, similar price surges were also observed. After the war, prices remained elevated in most countries, compared with before the war. Price levels were about 50 percent higher in the *United Kingdom* and in the *United States* and more than 200 percent higher in *France* and *Italy*.

Some authors have suggested that differences in fiscal policy during the COVID-19 pandemic relate to differences in inflation (de Soyres, Santacreu, and Young 2022). As shown in Figure 2.4.3, a small cross-section of countries, those where real spending grew more in the past three years, also experienced a larger increase in core inflation (that is, inflation excluding changes in energy and food prices).

As noted in the chapter, surprise inflation and the rebound in growth contributed to debt reduction in 2021 and 2022. Moderate inflation has reduced debt in the past when combined with financial repression—which, however, brings its own costs (Esteves and Eichengreen 2022; Mauro and Zhou 2021).

Figure 2.4.3. Correlation between 2022 Changes in Fiscal Policy and in Core Inflation since 2019 (Percent)



Source: IMF staff calculations using the World Economic Outlook database.

Note: Blue dots represent advanced economies. Red diamonds represent emerging market economies. Core inflation differential = core inflation in 2022 minus core inflation in 2019. Real primary spending differential = real primary spending in 2022 divided by real primary spending in 2019. Data labels in the figure use International Organization for Standardization (ISO) country codes.

References

- Abdallah, Chadi, David Coady, and La-Bhus Fah Jirasavetakul. 2023. “Public-Private Wage Differentials and Interactions Across Countries and Time.” IMF Working Paper 23/64, International Monetary Fund, Washington, DC.
- Adrian, Tobias, and Vitor Gaspar. 2022. “How Fiscal Restraint Can Help Fight Inflation.” *IMF Blog*, November 21. <https://www.imf.org/en/Blogs/Articles/2022/11/21/how-fiscal-restraint-can-help-fight-inflation>.
- Agarwal, Ruchir, and Miles Kimball. 2022. How Costly Is Inflation? *Finance and Development*, Analytical Series, April 7. <https://www.imf.org/en/Publications/fandd/issues/2022/03/Future-of-inflation-partII-Agarwal-kimball>.
- Albanesi, Stefania. 2007. “Inflation and Inequality.” *Journal of Monetary Economics* 54 (4): 1088–114.
- Albers, Thilo N. H., Charlotte Bartels, and Moritz Schularick. 2022. “The Distribution of Wealth in Germany, 1895–2018.” CESifo Working Paper 9739, Ifo Institute for Economic Research, Munich.
- Alfaro, Laura, Ester Faia, and Camelia Minoiu. 2022. “Distributional Consequences of Monetary Policy across Races: Evidence from the U.S. Credit Register.” Harvard Business School Working Paper 22–068, Boston, MA.
- Auclert, Adrien. 2019. “Monetary Policy and the Redistribution Channel.” *American Economic Review* 109 (6): 2333–67.
- Auclert, Adrien, Bence Bardóczy, Matthew Rognlie, and Ludwig Straub. 2021. “Using the Sequence-Space Jacobian to Solve and Estimate Heterogeneous-Agent Models.” *Econometrica* 89 (5): 2375–408.
- Autor, David, Arindrajit Dube, and Annie McGrew. Forthcoming. “The Unexpected Compression: Competition at Work in the Low Wage Economy.” Massachusetts Institute of Technology, Cambridge, MA.
- Badev, Anton, Thorsten Beck, Ligia Vado, and Simon Walley. 2014. “Housing Finance across Countries. New Data and Analysis.” Policy Research Working Paper 6756, World Bank, Washington, DC.
- Baez Ramirez, Javier Eduardo, Osman K. Inan, and Metin Nebiler. 2021. “Getting Real? The Uneven Burden of Inflation across Households in Turkey.” Policy Research Working Paper 9869, World Bank, Washington, DC.
- Bahadir, Berrak, and Inci Gumus. 2016. “Credit Decomposition and Business Cycles in Emerging Market Economies.” *Journal of International Economics* 103 (C): 250–62.
- Banerjee, Ryan, Valerie Boctor, Aaron Mehrotra, and Fabrizio Zampolli. 2022. “Fiscal Deficits and Inflation Risks: The Role of Fiscal and Monetary Regimes.” BIS Working Paper 1028, Bank for International Settlements, Basel.
- Bayer, Christian, Benjamin Born, and Ralph Luettkie. 2023. “The Liquidity Channel of Fiscal Policy.” *Journal of Monetary Economics* 134: 86–117.
- Beer, Sebastian, Mark Griffiths, and Alexander Klemm. 2023. “Tax Distortions from Inflation: What Are They? How to Deal with Them?” IMF Working Paper 23/18, International Monetary Fund, Washington, DC.
- Bénassy-Quéré, Agnes. 2022. “Public Finances: Inflation That Pays?” French Treasury article, July 12. Paris.
- Blanchard, Olivier, and Roberto Perotti. 2002. “An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output.” *Quarterly Journal of Economics* 117 (4): 1329–68.
- Blanco, Andrés, Pablo Ottonello, and Tereza Ranosova. 2022. “The Dynamics of Large Inflation Surges.” NBER Working Paper 30555, National Bureau of Economic Research, Cambridge, MA.
- Bonom, Dennis, and Andra Smădu. 2021. “The Long-Run Effects of Pandemics on Inflation: Will This Time Be Different?” *Economic Letters* 208: 110065.
- Cardoso, Eliana. 1992. “Inflation and Poverty.” NBER Working Paper 4006, National Bureau of Economic Research, Cambridge, MA.
- Cardoso, Miguel, Clodomiro Ferreira, José Miguel Leiva, Galo Nuño, Álvaro Ortiz, Tomasa Rodrigo, and Sirenia Vazquez. 2022. “The Heterogeneous Impact of Inflation on Households’ Balance Sheets.” Working Paper 176, Red Nacional de Investigadores en Economía (RedNIE), Madrid.
- Charalampakis, Evangelos, Bruno Fagandini, Lukas Henkel, and Chiara Osbat. 2022. “The Impact of the Recent Rise in Inflation on Low-Income Households.” Box 4 in *ECB Economic Bulletin*, Issue 7/2022, European Central Bank, Frankfurt.
- Choi, Sangyup, Davide Furceri, Prakash Loungani, Saurabh Mishra, and Marcos Poplawski-Ribeiro. 2018. “Oil Prices and Inflation Dynamics: Evidence from Advanced and Developing Economies.” *Journal of International Money and Finance* 82 (C): 71–96.
- Claeys, Grégory, and Lionel Guetta-Jeanrenaud. 2022. “Who Is Suffering Most from Rising Inflation?” *Bruegel* (blog), February 1, Bruegel, Brussels. <https://www.bruegel.org/blog-post/who-suffering-most-rising-inflation>.
- Cochrane, John. 1998. “A Frictionless View of US Inflation.” In *NBER Macroeconomics Annual 1998*, vol. 13, edited by Ben S. Bernanke and Julio J. Rotemberg. Cambridge, MA: MIT Press, 323–84.
- Coibion, Olivier, Yuriy Gorodnichenko, and Michael Weber. 2021. “Fiscal Policy and Households’ Inflation Expectations: Evidence from a Randomized Control Trial.” NBER Working Paper 28485, National Bureau of Economic Research, Cambridge, MA.
- Cravino, Javier, and Andrei A. Levchenko. 2017. “The Distributional Consequences of Large Devaluations.” *American Economic Review* 107 (11): 3477–509.
- Cravino, Javier, Ting Lan, and Andrei A. Levchenko. 2020. “Price Stickiness along the Income Distribution and the Effects of Monetary Policy.” *Journal of Monetary Economics* 110: 19–32.

- Dahan, Momi. 1996. “The Effect of Macroeconomic Variables on Income Distribution in Israel.” *Bank of Israel Economic Review* 69: 19–43.
- Dell’Ariccia, Giovanni, Paolo Mauro, Antonio Spilimbergo, and Jeromin Zettelmeyer. 2020. “Economic Policies for the COVID-19 War.” *IMF Blog*, April 1. <https://www.imf.org/en/Blogs/Articles/2020/04/01/blog040120-economic-policies-for-the-covid-19-war>.
- de Soyres, François, Ana Maria Santacreu, and Henry Young. 2022. “Fiscal Policy and Excess Inflation during Covid-19: A Cross-Country View.” *FEDS Notes*, Board of Governors of the Federal Reserve System, Washington, DC, July 15. <https://doi.org/10.17016/2380-7172.3083>.
- Doepke, Matthias, and Martin Schneider. 2006. “Inflation and the Redistribution of Nominal Wealth.” *Journal of Political Economy* 114 (6): 1069–97.
- Dynan, Karen. 2022. “High Inflation and Fiscal Policy.” Peter G. Peterson Foundation Expert Views on Inflation, Interest, and the National Debt, New York.
- Economist*, *The*. 2023. “Inflation Usually Hits America’s Poor Hardest. Not This Time.” February 2. <https://www.economist.com/graphic-detail/2023/02/02/inflation-usually-hits-americas-poor-hardest-not-this-time>.
- Eichengreen, Barry, Asmaa El-Ganainy, Rui Esteves, and Kris James Mitchener. 2021. “Public Debt through the Ages.” In *Sovereign Debt: A Guide for Economists and Practitioners*, edited by S. Ali Abbas, Alex Pienkowski, and Kenneth Rogoff. Oxford, United Kingdom: Oxford University Press.
- Erceg, Christopher J., and Jesper Lindé. 2012. “Fiscal Consolidation in an Open Economy.” *American Economic Review* 102 (3): 186–91.
- Esteves, Rui, and Barry Eichengreen. 2022. “Up and Away? Inflation and Debt Consolidation in Historical Perspective.” CEPR Discussion Paper 17559, Center for Economic and Policy Research, Washington, DC.
- Ferguson, Niall, Andreas Schaab, and Moritz Schularick. 2015. “Central Bank Balance Sheets: Expansion and Reduction since 1900.” CEPR Discussion Paper 10635, Center for Economic and Policy Research, Washington, DC.
- Gaspar, Vitor, Sanjeev Gupta, and Carlos Mulas-Granados. 2017. “Fiscal Politics.” In *Fiscal Politics*, edited by Vitor Gaspar, Sanjeev Gupta, and Carlos Mulas-Granados. Washington, DC: International Monetary Fund, 3–22.
- Gopinath, Gita. 2022. “How Will the Pandemic and War Shape Future Monetary Policy?” Remarks at the Jackson Hole Symposium, International Monetary Fund, Washington, DC. <https://www.imf.org/en/News/Articles/2022/08/26/sp-gita-gopinath-remarks-at-the-jackson-hole-symposium>.
- Gruss, Bertrand, and Suhaib Kebhaj. 2019. “Commodity Terms of Trade: A New Database.” IMF Working Paper 19/21, International Monetary Fund, Washington, DC.
- Hall, George J., and Thomas J. Sargent. 2022. “Three World Wars: Fiscal-Monetary Consequences.” *Proceedings of the National Academy of Sciences* 119 (18): e2200349119.
- Haltom, Renee. 2012. “Winners and Losers from Monetary Policy.” *Richmond Fed Region Focus*, Second/Third Quarter, Federal Reserve Bank of Richmond, Richmond, VA.
- Hellebrandt, Tomas, and Paolo Mauro. 2015. “The Future of Worldwide Income Distribution.” PIIIE Working Paper Series WP15–7, Peterson Institute for International Economics, Washington, DC.
- Hirschman, Albert O. 1985. “Reflections on the Latin American Experience.” In *The Politics of Inflation and Economic Stagnation*, edited by Leon N. Lindberg and Charles S. Maier. Washington, DC: Brookings Institution, 53–77.
- Ilzetzki, Ethan, Carmen Reinhart, and Ken Rogoff. 2019. “Exchange Arrangements Entering the 21st Century: Which Anchor Will Hold?” *Quarterly Journal of Economics* 134 (2): 599–646.
- Jaravel, Xavier. 2019. “The Unequal Gains from Product Innovations: Evidence from the US Retail Sector.” *Quarterly Journal of Economics* 134 (2): 715–83.
- Jaravel, Xavier. 2022. “Inflation and Inequality.” Unpublished, London School of Economics, London.
- Jordà, Òscar. 2005. “Estimation and Inference of Impulse Responses by Local Projections.” *American Economic Review* 95 (1): 161–82.
- Jordà, Òscar, Moritz Schularick, and Alan M. Taylor. 2016. “The Great Mortgaging: Housing Finance, Crises and Business Cycles.” *Economic Policy* 31 (85): 107–52.
- Jordà, Òscar, Moritz Schularick, and Alan M. Taylor. 2017. “Macrofinancial History and the New Business Cycle Facts.” In *NBER Macroeconomics Annual 2016*, vol. 31, edited by Martin Eichenbaum and Jonathan A. Parker. Chicago: University of Chicago Press, 213–63.
- Jørgensen, Peter L., and Søren H. Ravn. 2022. “The Inflation Response to Government Spending Shocks: A Fiscal Price Puzzle?” *European Economic Review* 141 (C): 103982.
- Kaplan, Greg, Benjamin Moll, and Giovanni L. Violante. 2018. “Monetary Policy According to HANK.” *American Economic Review* 108 (3): 697–743.
- Leeper, Eric. 1991. “Equilibria under ‘Active’ and ‘Passive’ Monetary and Fiscal Policies.” *Journal of Monetary Economics* 27 (1): 129–47.
- Mao, Bincheng. 2022. “Inflation Affects Women More Than Men. Civil Society Can Help.” *World Economic Forum* (blog), October 18. <https://www.weforum.org/agenda/2022/10/inflation-crisis-hits-women-harder/>.
- Mauro, Paolo, and Jing Zhou. 2021. “ $r-g < 0$: Can We Sleep More Soundly?” *IMF Economic Review* 69: 197–229.
- McKay, Alistair, and Ricardo Reis. 2016. “The Role of Automatic Stabilizers in the U.S. Business Cycle.” *Econometrica* 84 (1): 141–94.

- Mishel, Lawrence, and Josh Bivens. 2021. "Identifying the Policy Levers Generating Wage Suppression and Wage Inequality." Economic Policy Institute, Washington, DC.
- Mohrle, Sascha, and Timo Wollmershauser. 2021. "On the Distributional Effects of the Current High Inflation Rates." *Ifo Schnelldienst digital* 16: 1–6. Ifo Institute for Economic Research, Munich.
- Organisation for Economic Co-operation and Development (OECD). 2022a. "Pensions at a Glance 2021: OECD and G20 Indicators." Paris.
- Organisation for Economic Co-operation and Development (OECD). 2022b. "How Inflation Challenges Pensions." *OECD Policy Brief*, Paris.
- Organisation for Economic Co-operation and Development (OECD). 2022c. "Income Support for Working-Age Individuals and Their Families." *OECD Policy Brief*, Paris.
- Organisation for Economic Co-operation and Development (OECD). 2022d. "OECD Employment Outlook 2022." Paris.
- Piketty, Thomas. 2003. "Income Inequality in France, 1901–1998." *Journal of Political Economy* 111 (5): 1004–42.
- Prati, Alberto. 2022. "The Well-Being Cost of Inflation Inequalities." CEP Discussion Paper 1870, Centre for Economic Performance, London.
- Ramey, Valerie. 2019. "Ten Years after the Financial Crisis: What Have We Learned from the Renaissance in Fiscal Research?" *Journal of Economic Perspectives* 33 (2): 89–114.
- Ramey, Valerie A., and Sarah Zubairy. 2018. "Government Spending Multipliers in Good Times and in Bad: Evidence from US Historical Data." *Journal of Political Economy* 126 (2): 850–901.
- Sargent, Thomas. 1982. "The End of Four Big Inflation." In *Inflation: Causes and Effects*, edited by Robert E. Hall. Chicago: University of Chicago Press, 41–98.
- Scheve, Kenneth. 2001. "Public Attitudes about Inflation: A Comparative Analysis." *Bank of England Quarterly Bulletin* (Autumn): 283–94.
- Shiller, Robert. 1997. "Why Do People Dislike Inflation?" In *Reducing Inflation: Motivation and Strategy*, edited by Christina Romer and David Romer. Cambridge, MA: National Bureau of Economic Research Books, 13–70.
- Sims, Christopher. 1994. "A Simple Model for Study of the Determination of the Price Level and the Interaction of Monetary and Fiscal Policy." *Economic Theory* 4: 381–99.
- Süssmuth, Bernd, and Matthias Wieschemeyer. 2022. "Taxation and the Distributional Impact of Inflation: The U.S. Post-War Experience." *Economic Modelling* 111 (C): 105813.
- Suthaharan, Neyavan, and Joanna Bleakley. 2022. "Wage-Price Dynamics in a High-Inflation Environment: The International Evidence." *RBA Bulletin* (September): 51–60.
- Tanzi, Vito. 1977. "Inflation, Lags in Collection, and the Real Value of Tax Revenue." *IMF Staff Papers* 24: 154–67.
- US Congressional Budget Office (US CBO). 2022a. "Budgetary Effects of Higher Inflation and Interest Rates." Response letter from Director Mr. Phillip L. Swagel to the Honorable Mr. Mike Crapo, Ranking Member of the US Congress' Committee on Finance, March 2. Washington, DC.
- US Congressional Budget Office (US CBO). 2022b. "Workbook for How Changes in Economic Conditions Might Affect the Federal Budget: 2022 to 2032." June. Washington, DC. <https://www.cbo.gov/publication/57980>.
- US Congressional Budget Office (US CBO). 2022c. "How Inflation Has Affected Households at Different Income Levels Since 2019." September. Washington, DC.
- Wolff, Edward N. 1979. "The Distributional Effects of the 1969–75 Inflation on Holdings of Household Wealth in the United States." *Review of Income and Wealth* 25 (2): 195–207.

