CfIR Center *for* Inflation Research

FEDERAL RESERVE BANK *of* CLEVELAND

2022 Annual Report

CfIR Center for Inflation Research

FEDERAL RESERVE BANK of CLEVELAND

The mission of the Center for Inflation Research is to improve the understanding of policymakers, researchers, and the public about inflation and the factors that influence its behavior. The Center is an initiative of the Federal Reserve Bank of Cleveland, www.clevelandfed.org.

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Center for Inflation Research Annual Report 2022. Edward S. Knotek II and Robert Rich. Federal Reserve Bank of Cleveland, August 2023.

Executive Summary

In 2022, the Center for Inflation Research (CfIR) completed another successful year of advancing its objectives and strengthening its reputation as a leading resource on inflation during a period in which inflation was a central issue on the minds of the public, policymakers, and researchers. The Center maintained its focus on generating insightful analysis on inflation issues, updating indicators and data related to inflation, producing quality research and promoting scholarly discourse, and contributing to a greater awareness and understanding of inflation. The Center began to publish the Indirect Consumer Inflation Expectations measure on a regular basis, and the measure has generated considerable interest as an alternative to other measures of consumers' inflation expectations and for its use in research. The Center held its annual inflation conference, hosted events that invited the public into conversations about the fundamentals of inflation and the perspectives of inflation experts, and continued to engage its advisory council in meaningful dialog. The Center's inflation indicators were widely covered in the media and were followed extensively by the broader public, with the inflation nowcasting page's garnering significant attention. The Center was also active in discussing inflation developments and promoting its work through interviews with media outlets and presentations with external audiences. With inflation releases remaining an object of significant interest during the year, Center staff, in partnership with the communications and marketing staff of the Federal Reserve Bank of Cleveland, worked to develop new communications strategies to promote data releases via social media. The "Inflation 101" section of the Center's webpages were further enhanced to include three brief stop-motion videos and two Q&A documents designed to further public understanding of key inflation issues.

Key accomplishments in 2022 follow.

Research. Bank staff produced 18 inflation-related articles and papers documenting research findings in the Bank's *Economic Commentary* and working papers series. Some of the topics covered included the use of an indirect approach to measure inflation expectations in a survey of consumers, the extent of passthrough from expected inflation to expected wage growth, the relationship between aggregate inflation expectations and the aggregation of individual category inflation expectations, and the properties of different rent inflation measures. The Center is also in the process of assuming responsibility for the Survey of Firms' Inflation Expectations (SoFIE) that will provide quarterly updates of top business executives' outlooks for inflation.

Professional collaboration. Through several channels, the Center engages researchers in presenting and discussing their latest work. In collaboration with the European Central Bank, the Center organized and cosponsored the Bank's signature annual inflation conference titled Inflation: Drivers and Dynamics. Papers from the conference are eligible for publication in a special issue of the prestigious *Journal of Monetary Economics*. The Center also cosponsored a conference with the National Bank of Poland and the Bank of Lithuania and organized sessions at three external academic conferences. The Center hosted formal and informal visits by prominent researchers and shared its expertise with federal agencies, providing reviews on a report produced by the US Government Accountability Office on inflation developments and the use of the Bank's inflation indicators.

Programs. Center staff sponsored three events as part of the Bank's *Conversations on Central Banking* series that brings together individuals with diverse backgrounds and views on current and prospective policy issues.

Education. The Center's "Inflation 101" content was expanded to include new graphic elements and multimedia features. The most significant additions were three brief stop-motion videos explaining the terms "shrinkflation," "hyperinflation," and "stagflation." The Center also provided two updates to the Q&A portion of the website based on key issues identified by readers who were encouraged to submit additional topics of interest.

Awareness. As the media increased its focus on inflation, the Center's economists were interviewed in media outlets ranging from Bloomberg to the *Wall Street Journal* and made live appearances on *Marketplace* and with Ideastream Public Media. Center staff worked with the Bank's communications, media relations, and marketing teams to increase the visibility of its work and make this work more accessible to a wider audience. The Center continues to distribute its quarterly newsletter to its growing subscriber base and has gained considerable traction through its use of social media to summarize developments in the Center's inflation indicators after their releases.

Center for Inflation Research 2022: Insights in a Year of Elevated and Persistent Inflation

The work of the Center for Inflation Research in 2022 was dominated by the persistently elevated readings for inflation during the year, as the United States and many other countries saw their highest inflation rates in decades. The high inflation environment took place despite a view, advocated by many commentators as late as the second half of 2021, that the recent surge in inflation would dissipate in 2022. Also driving the work were questions about the nature of inflation that are at the center of active inflation research.

During 2022, there was a dramatic shift in the characterization of and outlook for inflation. The sharp acceleration in inflation that started in spring 2021 did not recede and instead was followed by inflation readings that remained elevated in 2022. The reason inflation took off in 2021 and remained high in 2022 reflects a confluence of factors resulting in an imbalance between aggregate demand and aggregate supply. Demand grew at a robust pace because of previous stimulus provided through fiscal support and accommodative monetary policy. Strong demand met bottlenecks and strained supply chains. Demand–supply imbalances were amplified by a notable change in the composition of consumer spending, as demand shifted toward goods and away from services. The labor market showed ongoing tightness, as strong labor demand and lower labor force participation generated a marked pickup in wage growth. There were also significant supply shocks to energy and food resulting from the war in Ukraine. As the evidence continued to show that inflationary pressures were becoming more broad-based and persistent, the Federal Open Market Committee began to remove monetary policy accommodation in March 2022 and had raised the federal funds rate to a target range of 4.25 percent to 4.5 percent by the end of 2022.

The current high inflation environment has been at the center of considerable debate and analysis, and the Center has focused particular attention on several key issues. The combination of robust labor demand, low labor force participation rates, and accelerating wages raised questions about the advent of a wage-price spiral. If such a spiral emerged, the concern is that inflation would keep rising and that inflation expectations would become unanchored. To investigate this issue, Bank researchers fielded a survey in early 2022 to elicit consumers' inflation expectations and their income growth expectations and study the direction of causality between the two. Analysis of the data indicated a low passthrough of

20 percent from expected inflation to expected wage growth, while there was no statistical evidence of a meaningful effect of expected wage growth on expected inflation. Consequently, these findings suggested that there was limited risk of a wage-price spiral. Other results about labor market behavior in a high inflation environment emerged from the survey. Specifically, consumers report that higher expected inflation increases the likelihood that they will search for a new job to raise their income rather than work more hours or ask for a raise from their current employer. With low expected passthrough from inflation to wage growth and a high inflation environment, the findings provide one explanation for why consumers dislike inflation.

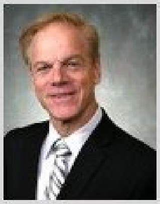
An area of ongoing interest among researchers and policymakers is the inflation expectations of consumers. Expanding the scope of previous work, Center researchers examined whether consumers have greater difficulty grasping the concept of aggregate inflation compared to the price changes of the underlying categories of goods and services. The idea is that consumers may find aggregate inflation to be a complicated abstract concept, whereas its constituent parts may be more tangible. To investigate this issue, Bank researchers used surveys to elicit consumers' expectations of aggregate inflation and inflation forecasts of the categories spanning the full range of personal consumption expenditures. The category-specific forecasts were combined using various methods to produce measures of aggregat*ed* inflation expectations. Compared to a measure of aggregate inflation expectations, aggregated inflation expectations are less noisy and have greater predictive content for planned consumer spending. The results also suggest that aggregated inflation expectations provide a more accurate representation of consumers' beliefs about future inflation and argue in favor of surveys' adopting a category-based approach rather than the standard direct approach to measure inflation expectations at the economy-wide level.

The pandemic continues to make the task of gauging the inflation outlook challenging. In response to this difficulty, the Center has focused on evaluating various data and indicators to determine which of these may be more informative about future inflation movements. Because rent is the largest component of the CPI, it has important implications for aggregate inflation dynamics. Looking at various rent growth indices, Cleveland Fed researchers together with researchers from the US Bureau of Labor Statistics find that rent inflation for new tenants leads the official Bureau of Labor Statistics rent inflation series by one year. In the case of measures of underlying inflation, Center staff focused on techniques to adjust the bias in these measures arising from skewness of the price change distribution of goods and services. Center staff also devoted attention to exploring different techniques (Bayesian nonparametric models and measures of underlying inflation augmented with robust measures of skewness) to improve inflation forecast accuracy.

In addition to the topics described previously, Bank staff published new research on a variety of other inflation topics, including the effect of different aggregation methods on economy-wide wage growth measures, which prices affect consumers' inflation expectations, issues related to the FOMC's adoption of an average inflation targeting regime, measuring the degree of consumers' inattention to inflation, and the role of sticky information and sticky prices in aggregate inflation dynamics. The inflation-related research presented at Center-sponsored academic forums in 2022 examined the Phillips curve, the formation of inflation expectations, and how the price-setting behavior of firms feeds into inflation.

Looking ahead, the Center will continue to address important questions that have emerged about inflation during the pandemic, along with other questions that remain unanswered. For example, it is important to continue to study and assess the relative contributions of supply and demand factors to the persistently elevated inflation readings since 2021. The unemployment rate is generally viewed as exerting an influence on inflation, but its movements reflect a mixture of transient and more persistent changes. Because the nature of the movements in the unemployment rate may have different effects on inflation, the Center is interested in determining if the Phillips curve is persistence dependent. These topics and others remain areas for future research and will continue to be featured at Center-sponsored conferences.

Center Leadership



Robert Rich
Director

Edward S. Knotek II
Senior Vice President and Director of Research

Ina Hajdini
Research Economist

Jean-Paul L'Huillier
Senior Research Economist

Mathieu Pedemonte
Research Economist

Robert Rich is the director of the Center, and the Center reports to Edward S. Knotek II, senior vice president and director of research. Other members of Center staff are Mathieu Pedemonte, Ina Hajdini, and Jean-Paul L'Huillier. Raphael Schoenle of Brandeis University continues to engage with the Center as a visiting research economist. In addition to these specialists in inflation, six experts from academia, central banking, and the private sector serve on the Center's advisory council and provide the Center with guidance and feedback.

The Center hosted its 2022 advisory council meetings on May 17 and September 28. Meeting conversations focused on current inflation-related issues and topics, the dynamics of inflation during the pandemic, the persistence of recent elevated inflation readings, and the inflation outlook. Conversations also featured a review of the Center's accomplishments and a presentation of selected research by Center staff.

Advisory Council Members, 2022

Oscar Arce
Director General Economics, European Central Bank

Olivier Coibion
Professor, University of Texas at Austin

Julia Coronado
President and Founder, MacroPolicy Perspectives
Clinical Associate Professor of Finance, University of Texas at Austin

Jon Faust
Senior Special Advisor to the Chair of the Federal Reserve

Sharon Kozicki
Deputy Governor, Bank of Canada

Ricardo Reis
A.W. Phillips Professor, London School of Economics and Political Science

Research

Outlined below is a selection of the inflation-related *Economic Commentaries*, working papers, and *Research [in] Brief* series that were produced in 2022 and long-term research projects maintained during the year.

Economic Commentaries

[Average Inflation Targeting in a Low-Rate Environment](#)
Chengcheng Jia

One significant change in the US economy in the last 20 years is the trend decline in real interest rates that pushes the policy rate near the effective lower bound (ELB) and puts downward pressure on inflation. This environment leaves conventional monetary policy tools less effective in accommodating adverse shocks. To better achieve the Federal Reserve's dual mandate at the ELB, the FOMC adopted a new framework called "average inflation targeting" (AIT). This article demonstrates that AIT is a better policy in a low-rate environment because of its ability to anchor inflation expectations and presents possible implications of the flexible implementation of AIT.

[Indirect Consumer Inflation Expectations](#)
Ina Hajdini, Edward S. Knotek II, Mathieu Pedemonte, Robert Rich, John Leer, and Raphael Schoenle

This article proposes a new, indirect way of measuring consumer inflation expectations: Given consumers' expectations about developments in prices of goods and services during the next 12 months, researchers ask them how their incomes would have to change to make them equally well-off relative to their current situation such that they could buy the same amount of goods and services as they can today. Using a massive number of survey responses at a high frequency, this paper shows that this measure of indirect consumer inflation expectations has risen sharply since early 2021. Higher inflation experiences correlate with higher indirect consumer inflation expectations across US cities and around the world.

[Adjusting Median and Trimmed-Mean Inflation Rates for Bias Based on Skewness](#)
Robert Rich, Randal J. Verbrugge, and Saeed Zaman

Median and trimmed-mean inflation rates tend to be useful estimates of trend inflation over long periods, but they can exhibit persistent departures from the underlying trend over shorter horizons. This article documents that the extent of this bias is related to the degree of skewness in the distribution of price changes. The shift in the skewness of the cross-sectional price-change distribution during the pandemic means that median PCE and trimmed-mean PCE inflation rates have recently been understating the trend in PCE inflation by about 15 and 35 basis points, respectively.

[Understanding Which Prices Affect Inflation Expectations](#)
Chris Campos, Michael McMain, and Mathieu Pedemonte

This article shows that the inflation expectations of professional forecasters and consumers are predicted by very different prices. While professional forecasters weigh prices similar to the consumer price index, consumers seem to focus on prices they see more often, such as those for food and new vehicles. These are also prices that have seen disproportionally high volatility since the onset of the pandemic. This article argues that heterogeneity in the importance of component-specific inflation can have relevant economic implications and disproportionate effects on consumers' inflation expectations that can, in turn, affect economic behavior.

A New Measure of Consumers' (In)Attention to Inflation
Hana Braitsch and James Mitchell

Since the onset of the SARS-CoV-2 (COVID-19) pandemic in March 2020, the Federal Reserve Bank of Cleveland has been running a daily survey that asks consumers for their views on how they are responding to COVID-19 and how COVID-19 is likely to affect the economy. Among the many questions asked, the survey solicits consumers' inflation expectations. This is an important data set given that such expectations, while affected by current and past inflation, have long been believed to influence future inflation. This article uses these daily expectations data to propose a new measure of how attentive consumers are to inflation.

Research [in] Brief

Do Prices of Certain Goods Distort Consumers' Inflation Expectations?
Consumers and professional forecasters differ in their predictions on inflation. Researchers study these differences by estimating what determines these groups' inflation expectations and then discuss potential implications.

Consumer (In)Attention to Inflation Influences Expectations
Consumers have expected inflation to increase since the COVID-19 pandemic, according to daily surveys from the Cleveland Fed. However, consumers who pay more attention to inflation overall expect more moderate increases in inflation than do inattentive consumers.

Inflation Expectations in the UK
Consumers in the UK closely following the late-September budget proposal expected higher inflation over the next year.

Working Papers

Average Inflation Targeting: Time Inconsistency and Intentional Ambiguity
Chengcheng Jia and Jing Cynthia Wu

The authors study the implications of the Fed's new policy framework of average inflation targeting (AIT) and its ambiguous communication. The central bank has the incentive to deviate from its announced AIT and implement inflation targeting ex post to maximize social welfare. The authors show two motives for ambiguous communication about the horizon over which the central bank averages inflation as a result of time inconsistency. First, it is optimal for the central bank to announce different horizons depending on the state of the economy. Second, ambiguous communication helps the central bank gain credibility.

Macroeconomic Forecasting in a Multi-Country Context
Yu Bai, Andrea Carriero, Todd E. Clark, and Massimiliano Marcellino

The authors propose a hierarchical shrinkage approach for multi-country VAR models. In implementation, they consider three different scale mixtures of Normals priors, specifically, Horseshoe, Normal-Gamma, and Normal-Gamma-Gamma priors. They provide new theoretical results for the Normal-Gamma prior. Empirically, the authors use a quarterly data set for the G7 economies to examine how model specifications and prior choices affect the forecasting performance for GDP growth, inflation, and a short-term interest rate. They then find that hierarchical shrinkage, particularly as implemented with the Horseshoe prior, is very useful in forecasting inflation. It also has the best density forecast performance for output growth and the interest rate. Adding foreign information yields benefits, as multicountry models generally improve on the forecast accuracy of single-country models.

Mis-specified Forecasts and Myopia in an Estimated New Keynesian Model
Ina Hajdini

The paper considers a New Keynesian framework in which agents form expectations based on a combination of mis-specified forecasts and myopia. The proposed expectations formation process is found to be consistent with all three empirical facts on consensus inflation forecasts, namely, that forecasters underreact to ex ante forecast revisions, that forecasters over-react to recent events, and that the response of forecast errors to a shock initially undershoots but then overshoots. The paper then derives the general equilibrium solution consistent with the proposed expectations formation process and estimates the model with likelihood-based Bayesian methods, yielding three novel results: (i) the data strongly prefer the combination of autoregressive mis-specified forecasting rules and myopia over other alternatives; (ii) the best fitting expectations formation process for both households and firms is characterized by high degrees of myopia and simple AR(1) forecasting rules; (iii) frictions such as habit in consumption, which are typically necessary for models with Full-information Rational Expectations, are significantly less important, because the proposed expectations generate substantial internal persistence and amplification to exogenous shocks. Simulated inflation expectations data from the estimated general equilibrium model reflect the three empirical facts on forecasting data.

Forecasting US Inflation Using Bayesian Nonparametric Models
Todd E. Clark, Florian Huber, Gary Koop, and Massimiliano Marcellino

The relationship between inflation and predictors such as unemployment is potentially nonlinear with a strength that varies over time, and prediction errors may be subject to large, asymmetric shocks. Inspired by these concerns, the authors develop a model for inflation forecasting that is nonparametric both in the conditional mean and in the error using Gaussian and Dirichlet processes, respectively. The authors discuss how both these features may be important in producing accurate forecasts of inflation. In a forecasting exercise involving CPI inflation, this approach has substantial benefits, both overall and in the left tail, with nonparametric modeling of the conditional mean being of particular importance.

[Greater Than the Sum of the Parts: Aggregate vs. Aggregated Inflation Expectations]
Alexander Dietrich, Edward S. Knotek II, Kristian Ove R. Myrseth, Robert W. Rich, Raphael Schoenle, and Michael Weber

Using novel survey evidence on consumer inflation expectations disaggregated by personal consumption expenditure (PCE) categories, the authors document the paradox that consumers' aggregate inflation expectations usually exceed any individual category expectation. The authors explores procedures for aggregating category inflation expectations and find that the inconsistency between aggregate and aggregated inflation expectations rises with subjective uncertainty and is systematically related to socioeconomic characteristics. Overall, the results are inconsistent with the notion that consumers' aggregate inflation expectations comprise an expenditure-weighted sum of category beliefs. Moreover, aggregated inflation expectations explain a greater share of planned consumer spending than aggregate inflation expectations.

[Low Passthrough from Inflation Expectations to Income Growth Expectations: Why People Dislike Inflation]
Ina Hajdini, Edward S. Knotek II, John Leer, Mathieu Pedemonte, Robert W. Rich, and Raphael Schoenle

Using a novel experimental setup, this paper studies the direction of causality between consumers' inflation expectations and their income growth expectations. A large, nationally representative survey of US consumers finds that the rate of passthrough from expected inflation to expected income growth is incomplete, on the order of 20 percent. There is no statistically significant effect going in the other direction. Passthrough varies systematically with demographic and socioeconomic factors, with greater passthrough for higher-income individuals than lower-income individuals, although it is still incomplete. Higher inflation expectations also cause consumers to report a higher probability that they will search for a new job that pays more. Using these survey findings to calibrate a search-and-matching model, the authors find that dampened responses of real wages to demand and supply shocks translate into greater fluctuations in output. Taken together, the survey results and model exercises provide a labor market channel to explain why people dislike inflation.

[Surveys of Professionals]
Michael P. Clements, Robert W. Rich, and Joseph Tracy

This chapter provides an overview of surveys of professional forecasters, with a focus on the US Survey of Professional Forecasters and the European Central Bank Survey of Professional Forecasters. A distinguishing feature of these surveys is that they collect point and density forecasts and make the data publicly available. The authors discuss their structure, issues involved in using the data, and the construction of measures such as disagreement and uncertainty at the aggregate and individual levels. The review also summarizes the findings of studies exploring issues such as the alignment of point forecasts with measures of central tendency from associated density forecasts, the coverage of density forecasts, the rounding of point and density forecasts, comparisons of forecast accuracy across respondents, and heterogeneity in forecast behavior and the persistence of these differential features. The authors conclude with some observations for future work.

[Heterogeneity and the Effects of Aggregation on Wage Growth]
Robert Rich and Joseph Tracy

This paper focuses on the implications of alternative methods of aggregating individual wage data for the behavior of economy-wide wage growth. The analysis is motivated by evidence of significant heterogeneity in individual wage growth and its cyclicality. Because of this heterogeneity, the choice of aggregation will affect the properties of economy-wide wage growth measures. To assess the importance of this consideration, this paper provides a decomposition of wage growth into aggregation effects and composition effects and use the decomposition to compare growth in an average wage—specifically average hourly earnings—to a measure of average wage growth from the Survey of Income and Program Participation. It finds that aggregation effects largely account for average hourly earnings growth being persistently lower and less cyclical than average wage growth over the period 1990–2015, with these effects reflecting a disproportionate weighting of high-earning workers. The analysis also indicates that composition effects now play a more limited role in the cyclicality of wage growth compared to results reported in previous studies for earlier time periods.

[Improving Inflation Forecasts Using Robust Measures]
Randal J. Verbrugge and Saeed Zaman

Both theory and extant empirical evidence suggest that the cross-sectional asymmetry across disaggregated price indexes might be useful in the forecasting of aggregate inflation. Trimmed-mean inflation estimators have been shown to be useful devices for forecasting headline PCE inflation. But does this stem from their ability to signal the underlying trend, or does it mainly come from their implicit signaling of asymmetry (when included alongside headline PCE)? We address this question by augmenting a "hard to beat" benchmark inflation forecasting model of headline PCE price inflation with robust measures of trimmed-mean estimators of inflation (median PCE and trimmed-mean PCE) and robust measures of the cross-sectional asymmetry (Bowley skewness; Kelly skewness) computed using the 180+ components of the PCE price index. We also construct new trimmed-mean measures of goods and services PCE inflation and their accompanying robust skewness. The results indicate significant gains in the point and density accuracy of PCE inflation forecasts over medium- and longer-term horizons, up through and including the COVID-19 pandemic. The authors find that improvements in accuracy stem mainly from the trend information implicit in trimmed-mean estimators but that skewness is also useful. Median PCE slightly outperforms trimmed-mean PCE; both outperform core PCE. For point forecasts, Kelly skewness is preferred; but for estimating stochastic volatility, Bowley skewness is preferred. An examination of goods and services PCE inflation provides similar inference.

[Disentangling Rent Index Differences: Data, Methods, and Scope]
Brian Adams, Lara Loewenstein, Hugh Montag, Randal J. Verbrugge

Prominent rent growth indices often give strikingly different measurements of rent inflation. The authors create new indices from Bureau of Labor Statistics (BLS) rent microdata using a repeat-rent index methodology and show that this discrepancy is almost entirely explained by differences in rent growth for new tenants relative to the average rent growth for all tenants. Rent inflation for new tenants leads the official BLS rent inflation by four quarters. As rent is the largest component of the consumer price index, this has implications for our understanding of aggregate inflation dynamics and guiding monetary policy.

[Indirect Consumer Inflation Expectations: Theory and Evidence]

Ina Hajdini, Edward S. Knotek II, John Leer, Mathieu Pedemonte, Robert W. Rich, Raphael S. Schoenle

Based on indirect utility theory, the authors introduce a novel methodology of measuring inflation expectations indirectly. This methodology starts at the individual level, asking consumers about the change in income required to buy the same amounts of goods and services one year ahead. Analytically, this methodology possesses smaller ex post aggregate inflation forecast errors relative to forecasts based on conventional survey questions. The authors ask this question in a large-scale, high-frequency survey of consumers in the United States and 14 other countries, and we show that indirect consumer inflation expectations perform well along several empirical dimensions. Exploiting the geographically detailed, high-frequency variation in the data, the authors then show that individual experiences matter for inflation expectations, in a nuanced way. For example, age and gender have different effects internationally, while individual inflation and local experiences are generally highly relevant. In an application to gasoline price changes, the authors identify large effects of experienced gasoline price changes on inflation expectations, characterized by both overreaction and persistence.

[Sticky Information Versus Sticky Prices Revisited: A Bayesian VAR-GMM Approach]

Takushi Kurozumi, Ryohei Oishi, and Willem Van Zandweghe

Several Phillips curves based on sticky information and sticky prices are estimated and compared using Bayesian VAR-GMM. This method derives expectations in each Phillips curve from a VAR and estimates the Phillips curve parameters and the VAR coefficients simultaneously. Quasi-marginal likelihood-based model comparison selects a dual stickiness Phillips curve in which, each period, some prices remain unchanged, consistent with micro evidence. Moreover, sticky information is a more plausible source of inflation inertia in the Phillips curve than other sources proposed in previous studies. Sticky information, sticky prices, and unchanged prices in each period are all needed to better describe inflation dynamics.

[The US Banks' Balance Sheet Transmission Channel of Oil Price Shocks]

Paolo Gelain and Marco Lorusso

The authors document the existence of a quantitative relevant banks' balance-sheet transmission channel of oil price shocks by estimating a dynamic stochastic general equilibrium model with banking and oil sectors. The associated amplification mechanism implies that those shocks explain a nonnegligible share of US GDP growth fluctuations, up to 17 percent, instead of 6 percent absent the banking sector. Also, they mitigated the severity of the Great Recession's trough. GDP growth would have been 2.48 percentage points more negative in 2008:Q4 without the beneficial effect of low oil prices. The estimate without the banking sector is only 1.30 percentage points.

Long-term Research Projects

Consumers and COVID-19. The Center stopped updating the Consumers and COVID-19 data on its website, but survey efforts to capture consumers' attitudes and expectations for many inflation-specific questions continue.

Inflation Expectations. The Center continued its work with the survey company Morning Consult to record consumers' inflation expectations in the US weekly and in 14 international countries monthly. Updates were made publicly available on the Central Bank Research Association (CEBRA) website. The survey results also enabled publication of the *Economic Commentary* "Indirect Consumer Inflation Expectations" and the working paper "Indirect Consumer Inflation Expectations: Theory and Evidence" by Ina Hajdini, Edward S. Knotek II, Mathieu Pedemonte, Robert Rich, John Leer, and Raphael Schoenle. A few highlighted findings are that the expectations data rose sharply with the inflation pickup in spring 2021, are strongly influenced by inflation experiences, and display notable differences across socioeconomic and demographic factors.

Firms' Price-Setting Behaviors. Researchers from the Center, together with researchers at the Federal Reserve Banks of Atlanta and New York, created a survey questionnaire that is being used to interview company representatives about their price-setting behavior. This project is being undertaken as part of a long-term effort to better understand and document firms' pricing practices.

Firms' Inflation Expectations. The Center assumed responsibility for fielding the Survey of Firms' Inflation Expectations (SoFIE) from Professor Olivier Coibion and Professor Yuriy Gorodnichenko in 2022. The Center is scheduled to begin posting the survey on a dedicated webpage by mid-2023.

Professional Collaboration

The Center sponsored the following events and invited the following scholars to visit and present their latest work and meet with Cleveland Fed research staff.

Events

Inflation: Drivers and Dynamics Conference 2022. The Center hosted its seventh installment of the Bank's signature inflation conference, the fourth since the Center made it an annual event. The 2022 conference was cosponsored by the Center and the European Central Bank, and it was held in person in Cleveland, Ohio, and virtually in a hybrid format on September 29–30. The conference featured 12 papers and a policy panel discussion with Loretta J. Mester, president and chief executive officer of the Federal Reserve Bank of Cleveland, and Philip R. Lane, a member of the executive board of the European Central Bank. The program and videos of the sessions were posted to the Center's conference website.

Central Bank Research Association 2022. The Center organized a presentation session on inflation during the 2022 meeting of the Central Bank Research Association (CEBRA), held at Pompeu Fabra University on August 29–31. The presentation session featured four papers on inflation drivers and dynamics. Videos for papers presented were posted to the conference website.

42nd International Symposium on Forecasting. The Center organized a presentation session at the 42nd International Symposium on Forecasting held at Oxford University on July 10–13.

Computational and Financial Econometrics 2022. The Center organized a session at the 16th International Conference on Computational and Financial Econometrics (CFE), which was hosted by King's College London on December 17–19. The session featured presentations on three papers on the topic of inflation dynamics, one of which was coauthored by Center economists.

Presentations

Center staff and Bank research economists made presentations at conferences and invited seminars.

Paola Boel

- "Liquidity, Capital Pledgeability and Inflation Redistribution," presented at the Bank of Italy and the Summer Workshop on Money, Banking Payments, and Finance.

Ina Hajdini

- "Low Passthrough from Inflation Expectations to Income Growth Expectations: Why People Dislike Inflation," presented at the Bank of Canada, the Inflation: Drivers and Dynamics 2022 Conference, and the Conference of Monetary Policy: Heterogeneity, Communication and Subjective Inflation Expectations.

Chengcheng Jia

- "Average Inflation Targeting: Time Inconsistency and Intentional Ambiguity," presented at the Bank of England and SNB-FRB-BIS High-Level Conference on Global Risk, Uncertainty, and Volatility.

Edward S. Knotek II

- "Low Passthrough from Inflation Expectations to Income Growth Expectations: Why People Dislike Inflation," presented at Bank of Canada/European Central Bank/Federal Reserve Bank of New York Conference on Expectations Surveys.
- "Greater than the Sum of Its Parts: Aggregate vs. Aggregated Inflation Expectations," presented at the Bank of Italy and the Computational and Financial Econometrics 2022 conference.

Jean-Paul L'Huillier

- "New Challenges to Monetary Policy," presented at the EABCN conference.

Mathieu Pedemonte

- "The Geographic Effect of Monetary Policy Shocks," presented at the Pontificia Universidad Católica de Chile and the Bank of Canada.
- "Low Passthrough from Inflation Expectations to Income Growth Expectations: Why People Dislike Inflation," presented at the Central Bank of Chile, the Federal Reserve System Macro Meeting, California Macroeconomics Conference, and the University of Chile.
- "Transmission of International Monetary Policy Shocks on Firms Expectations," presented at the Center for Economic Policy Research.

James Mitchell

- "Constructing Density Forecasts from Quantile Regressions: Multimodality in Macro-financial Dynamics," presented at the Society for Nonlinear Dynamics and Econometrics Conference 2022.
- "The Recalibrated and Copula Opinion Pool," presented at the International Society for Bayesian Analysis World Meeting.
- "Censored Density Forecasts: Production and Evaluation," presented at the University of Pennsylvania and Monash University.
- "The Predictive Content of Inflation Expectations Measures," presented at the 42nd International Symposium on Forecasting.

Robert Rich

- "All Forecasters Are Not the Same: Persistent Heterogeneity in Predictive Performance," presented at the Midwest Econometrics Group 2022 Conference.

Willem Van Zandweghe

- "Inflation Gap Persistence, Indeterminacy, and Monetary Policy," presented at the Society for Nonlinear Dynamics and Econometrics Conference 2022.

Randal Verbrugge

- "Late Fees and Nonpayment in Rental Markets, and Implications for Inflation Measurement: Theoretical Considerations and Evidence," presented at the American Real Estate and Urban Economics Association–Allied Social Sciences Associations 2022 Meetings.
- "The Predictive Content of Robust Measures for Headline Inflation," presented at the Canadian Economics Association.
- "Outside the Bounds: Do SPF Respondents Have Anchored Inflation Expectations?" presented at the Econometrics Society–African Meetings.
- "Death to Regression Modeling on Bandpass-Filtered Data: New Results on the General Undesirability of Filtering Dynamic Regressions, with a Proposed Solution," presented at the Australian Econometric Society and the Midwest Econometrics Group 2022 Conference.
- "Whose Inflation Expectations Best Predict Inflation?" presented at the SUERF Workshop 2022–The European Money and Finance Forum.

Saeed Zaman

- "Whose Inflation Expectations Best Predict Inflation?" presented at the SUERF Workshop 2022–The European Money and Finance Forum.
- "A Unified Framework to Estimate Macroeconomic Stars," presented at the Society of Economic Measurement Annual Conference.

Visitors

Mark Bils
Hazel Fyfe Professor in Economics, University of Rochester

David Berger
Professor of Economics, Duke University

Olivier Coibion
Professor of Economics, University of Texas at Austin

Ricardo Reis
A.W. Phillips Professor of Economics, London School of Economics and Political Science

Michael Weber
Associate Professor of Finance, University of Chicago Booth School of Business

Education

The Center implemented further enhancements to its "Inflation 101" section to ensure the content is broadly accessible to the widest possible audience.

Inflation videos. Center staff worked with a cross-functional team to develop brief stop-motion videos explaining the terms "shrinkflation," "hyperinflation," and "stagflation."

Expanded Q&A Content. The Center worked with a cross-functional team to expand its Q&A document to include topics concerning the sources for the inflation surge during 2021–2022 and the importance of long-run inflation expectations in the inflation process.

Programs

Cleveland Fed Conversations on Central Banking. The Center continued to sponsor the Bank's *Conversations on Central Banking* series, which provides a forum to convene experts on topics important to central bankers. Each event featured opening remarks by Loretta J. Mester, president and chief executive officer of the Federal Reserve Bank of Cleveland, followed by two to three distinguished panelists who provided short presentations. Each event concluded with general discussion and a Q&A session. The Center hosted sessions on March 1 (Inflation and Monetary Policy), May 17 (Inflation and Monetary Policy: Parallels to and Differences from the 1970s), and November 22 (Wages and Inflation).

FedTalk. The Bank's *FedTalk* series creates opportunities for Bank experts to interact with industry experts, local businesses, community organizations, policymakers, and engaged citizens to discuss various issues. On February 2, Ellis Tallman delivered a presentation on the economic outlook for 2022 focused on inflation, labor force participation, and the ongoing impact of the pandemic.

Awareness

Center staff continued to build awareness of the Center throughout 2022.

Media Interviews

Bank economists were interviewed in various media outlets. A list of the interviews follows.

Edward S. Knotek II

- Ideastream Public Media, discussing whether the United States is headed for a recession.

Mathieu Pedemonte

- *New York Times*, discussing the narrower range of items used by consumers to form inflation expectations.

Robert Rich

- *Marketplace* on National Public Radio, focusing on clearing up common misconceptions about inflation.
- Ideastream Public Media, discussing reasons why the current inflation environment is different than that of the 1970s.
- Dialogue podcast on inflation sponsored by John Glenn College of Public Affairs at the Ohio State University.

Ellis Tallman

- MNI Market News, reporting on the inflation outlook of business contacts in the Fourth Federal Reserve District.

Randal J. Verbrugge

- MNI Market News, discussing the outlook for rent inflation and its impact on inflation.

Additional Coverage

- Vox quoted Raphael Schoenle, discussing possible changes in the behavior of the Phillips curve.
- Multiple sources including ABC News, Associated Press, Bloomberg, *Barron's*, *Boston Globe*, CNBC, CNN, *Economist*, *Financial Times*, *MarketWatch*, MNI Market News, *National Review, New York Times*, *Reuters*, *Wall Street Journal*, and *Washington Post* cited the Center's inflation indicators and data throughout the year.
- Inflation-related research was cited in multiple venues, including the *New York Times*.
- Presentation to the National Association for Business Economics to discuss the Center and its available resources.
- Wharton Behind the Markets podcast discussing topics related to inflation developments and the outlook.

Other Activities and Coverage

Website Metrics. Website traffic for inflation-related products was very high in 2022 as inflationary pressures remained persistently elevated. The inflation nowcasting page was extremely popular and significantly outpaced viewership of the Bank's homepage. Other sites receiving considerable attention included median CPI and inflation expectations. The Bank's new website in fall 2022 benefited the Center's webpages in terms of appearance and functionality.

Marketing Plan. Center staff worked with the Bank's communications and marketing teams to develop a plan for achieving greater visibility for the Center and a wider audience for its research and data products. As part of this initiative, the Center published three new stop-motion videos explaining shrinkflation, hyperinflation, and stagflation.

Communications. Center staff produced communications for the public through data releases, social media posts and promotion campaigns, an annual report, and the Center's quarterly newsletter.

Data Releases. Center staff released data updates for four inflation indicators throughout the year: the median consumer price index (CPI), median personal consumption expenditures (PCE) inflation, inflation expectations, and inflation nowcasting.

Social Media Promotion Campaigns. Center staff engaged with the communications and marketing teams and began sending out tweets and other social media posts coinciding with monthly updates of inflation-related content on the Bank's website that included CPI and PCE inflation data releases.

Annual Report. The Center produced an annual report for 2021 that summarized its activities for the year.

CfIR Newsletter. The Center published its quarterly newsletter, which contains descriptions of and links to recent research papers, information about upcoming events, and news of Center developments such as the stop-motion videos, additional Q&A documents, and the Survey of Firms' Inflation Expectations.

Future Plans

Looking ahead to 2023, the Center plans to continue to build on its recent successes by contributing to policy conversations about inflation, conducting research on inflation and its determinants, organizing conferences, developing new data products, and providing new resources on the website to inform the public about inflation.