



FEDERAL RESERVE BANK *of* CLEVELAND

2020 Annual Report



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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Executive Summary

In 2020, the Center for Inflation Research (CfIR) completed another full year of productive and successful activities. The Center made progress in all areas of its objectives—generating analyses on policy-relevant inflation issues, producing research and promoting scholarly debates, and providing resources to educate the public and create a general awareness and better understanding of inflation. Highlights include the initiation of a research project collecting daily survey data from consumers, the successful convening of the Federal Reserve Bank of Cleveland’s annual inflation conference, and an update to the educational content on the Center’s website. As a result of these activities and increased media attention, the Center’s reputation among academics, policymakers, and the public as a resource for inflation-related expertise continues to grow.

Accomplishments in 2020 include the following.

Research. Federal Reserve Bank of Cleveland staff produced 19 inflation-related articles and papers documenting research findings. These appeared in the Bank’s *Economic Commentary* and working papers series. Some of the topics covered included the Great Inflation (1965–1982), inflation nowcasting, trend inflation, and the relationship between expectations and inflation. The Center initiated one new and ongoing research project, a daily survey of consumers that assesses their expectations for inflation and other items in the midst of the coronavirus outbreak.

Professional collaboration. The Center engaged researchers to present and discuss their latest work through a number of channels. In collaboration with the European Central Bank, the Center organized and hosted the Bank’s annual inflation conference. The Center also organized sessions at two external academic conferences. In addition, the Center hosted a number of formal and informal visits throughout the year by prominent researchers from academia.

Education. The Center’s Inflation 101 webpages underwent a major redesign to increase the accessibility and appeal of the content to the widest possible audience. Center staff collaborated with educational consultants from the Bank’s Learning Center to restructure the site around three key questions and two paths, one less technical and one more technical. In addition, the team added a number of new graphic elements and multimedia features. Three short videos explaining basic inflation concepts are also under development.

Awareness. Center staff worked to build awareness of the Center in several ways. Economists from the Center were interviewed in media outlets ranging from Bloomberg to the *New York Times*. On another front, Center staff worked with marketing consultants on the Bank’s strategic communications team to develop a plan for achieving greater visibility of the Center and a wider audience for its research and data products. In the area of communications, the Center posted the executive summary of the *2019 Annual Report* and continued to send its e-newsletter to subscribers. The mailing list added approximately 100 new subscribers in 2020, and subscribers now number more than 300.

Center for Inflation Research 2020: Insights in a Year of Major Change

The work of the Center for Inflation Research in 2020 was shaped by two major developments with direct relevance for inflation – the COVID-19 pandemic and the Federal Open Market Committee’s (FOMC) shift to a flexible average inflation-targeting (FAIT) regime. Also driving the work were questions about the nature of inflation that are at the center of active inflation research.

With the onset of the COVID-19 pandemic, the central focus of the Center concerned the impact of the virus on the inflation outlook. This assessment was particularly challenging because the COVID-19 shock was unprecedented in magnitude and also generated countervailing demand- and supply-side effects on inflation. In an effort to understand the economic impacts of the virus, Cleveland Fed researchers developed and launched a COVID-19 survey. The survey has been able to capture how consumers’ beliefs have changed over time, and regular updates have allowed us to monitor and report on inflation expectations. Center staff used this survey to answer a number of other questions that were especially relevant to the economic outlook and that had a bearing on inflation, such as consumers’ willingness to wear masks and to resume certain types of spending activities.

The FOMC’s shift to the FAIT regime in August 2020 represented a significant change in monetary policy. Because the efficacy of monetary policy is greatly enhanced when the public understands the operational framework, the Center focused on gauging the public’s familiarity with the adoption of the FAIT regime. Drawing upon the Center’s survey work, Cleveland Fed researchers found that households’ knowledge about the FAIT regime was quite limited around the time of the announcement, suggesting the need for a broader and ongoing communications effort on the part of policymakers.

In addition to the topics described above, Cleveland Fed staff published new research on a variety of other inflation topics, including the optimal inflation rate, inflation nowcasting and forecasting, the effects of energy price shocks, and the origins of the Great Inflation. The inflation-related research presented at Center-sponsored academic forums in 2020 examined the Phillips curve, the formation of inflation expectations, and how price-setting behavior feeds into inflation.

Looking ahead, the Center will address important questions about inflation that have emerged in the past year and others that remain unanswered. For example, it is extremely important to determine if the pandemic may be altering the dynamics of the inflation process on a longer-term basis. Another question on which there is no consensus, despite its recognized importance, is how inflation expectations are formed. On questions related to the Phillips curve, debate continues about its slope and whether it has changed over time. These topics remain areas for future research and will continue to be featured at our sponsored conferences.

Center Leadership

The leadership of the Center remained in place with one addition. Leading the Center now are four economists specializing in inflation: Edward S. Knotek II, Robert Rich, Raphael Schoenle, and Mathieu Pedemonte, who joined this year. Seven external experts from academia, central banking, and the private sector serve on the Center's advisory council and provide guidance and feedback to leadership.



Edward S. Knotek II
Senior Vice President



Robert Rich
Director



Raphael Schoenle
Deputy Director



Mathieu Pedemonte
Research Economist

The Center hosted a meeting of its advisory council on October 14, 2020. The conversation focused on a review of the Center's accomplishments, a presentation of selected research by Center staff, and a discussion of current inflation-related issues, including modifications to the Federal Open Market Committee's Statement on Longer-Run Goals and Monetary Policy Strategy, structural changes that may be impacting the inflation process, and inflation-related research topics.

Council Members

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

Emi Nakamura

Chancellor's Professor of Economics, University of California, Berkeley

Frank Smets

Director General of the Directorate General Research, European Central Bank

Silvana Tenreyro

Professor, London School of Economics and Political Science

Member, Bank of England's Monetary Policy Committee

Fellow, British Academy

Vice President and President Elect, European Economic Association

Mark W. Watson

Howard Harrison and Gabrielle Snyder Beck Professor of

Economics and Public Affairs, Princeton University

Research

A selection of the inflation-related *Economic Commentaries* and working papers that were produced in 2020 and a long-term research project that was initiated during the year are outlined below.

Economic Commentaries

[Why Are Headline PCE and Median PCE Inflation So Far Apart?](#)

Daniel R. Carroll, Ross Cohen-Kristiansen

This article investigates which components of the PCE price index might be responsible for a gap between the headline and median PCE inflation measures that persisted from 2012 to early 2021. The authors find that two categories of components explain most of the difference since 2012, and they argue that such out-sized impacts of a few components reinforce the need for policymakers to consider both headline and median PCE inflation measures.

[Forward Guidance during the Pandemic: Has It Changed the Public's Expectations?](#)

Wesley Janson, Chengcheng Jia

In responding to the COVID-19 crisis, the Federal Reserve both lowered the federal funds rate target and provided information to the public about the likely path of future policy rates. The authors study whether this information—or “forward guidance”—succeeded in altering the public’s expectations of future policy rates, GDP growth, and inflation. They find it altered expectations about future policy rates in certain cases but not GDP growth or inflation. They suggest the difference might be explained by the public’s having interpreted FOMC statements in different ways.

[A Growth-Augmented Phillips Curve](#)

Kristen Tauber, Willem Van Zandweghe

This article argues that the Phillips curve relationship is alive and well, but it hasn’t been apparent in recent years because the relevant gauge of activity has changed from economic slack to economic growth.

[How Aggregation Matters for Measured Wage Growth](#)

Michael Morris, Robert Rich, Joseph Tracy

This article compares two aggregation methods for computing wage gains—growth in an average wage (average hourly earnings) and average wage growth. The different aggregation methods generate significantly different behavior for measured wage gains, with average wage growth being persistently higher and more cyclical compared to growth in average hourly earnings.

[Consumers and COVID-19: A Real-Time Survey](#)

Edward S. Knotek II, Raphael Schoenle, Alexander Dietrich, Keith Kuester, Gernot Müller, Kristian Ove R. Myrseth, Michael Weber

This article summarizes results from an ongoing survey that asks consumers questions related to the recent coronavirus outbreak, including their expectations for how the economy is likely to be affected by the outbreak and how their own behavior has changed in response to it.

[A Forecasting Assessment of Market-Based PCE Inflation](#)

Mark Bognanni

This article explores the potential for market-based inflation measures to improve inflation forecasting. It compares the pseudo-real-time forecasting performance of a suite of models for forecasting total or “headline” PCE inflation over the short and medium run.

[Revisiting Wage Growth after the Recession](#)

Roberto Pinheiro, Meifeng Yang

An earlier study of sluggish wage growth during the recovery after the Great Recession found that slow growth was due to low labor productivity growth. This article analyzes revised data from the Bureau of Labor Statistics (BLS) up through the first quarter of 2019 and finds instead that wage growth has been in line with what one would expect given the observed inflation rate and the growth rate of labor productivity. The BLS’s large data revisions explain the change in results.

[The CPI-PCEPI Inflation Differential: Causes and Prospects](#)

Wesley Janson, Randal J. Verbrugge, Carola Conces Binder

The consumer price index (CPI) and personal consumption expenditures price index (PCEPI) are two inflation measures. The CPI is widely used as the reference rate for numerous financial contracts, but the Federal Open Market Committee’s inflation target is stated in terms of the PCEPI. This article examines the differential between the two rates since 1978, explains why it has varied significantly over time, and provides an estimate of the likely differential going forward.

Working Papers

[Macroeconomic Changes with Declining Trend Inflation: Complementarity with the Superstar Firm Hypothesis](#)

Takushi Kurozumi, Willem Van Zandweghe

Recent studies indicate that the profit share of income has increased, while the labor and investment shares of spending have decreased. This paper finds that a decline in trend inflation can account for a substantial portion of the changes. The authors also find support for the hypothesis that a rise in the productivity of “superstar firms” has played a role in the observed changes.

[Even Keel and the Great Inflation](#)

Victoria Consolvo, Owen F. Humpage, Sanchita Mukherjee

During the early part of the Great Inflation (1965–1975), the Federal Reserve undertook operations to assist the US Treasury’s coupon security sales. In this paper, the authors show that the Fed routinely undertook these operations only when it was otherwise tightening monetary policy and that the actions added approximately 1 percentage point to the overall 5.1 percent average annual US inflation rate over these years.

[Real-Time Density Nowcasts of US Inflation: A Model-Combination Approach](#)

Edward S. Knotek II, Saeed Zaman

The authors present a flexible modeling framework they have developed to produce density nowcasts for US inflation at a trading-day frequency. Their framework has several unique features that enable it to provide density nowcasts that can accommodate non-Gaussian properties. The authors document the competitive properties of the nowcasts generated from the framework using high-frequency, real-time data over the period 2000–2015.

[Output-Inflation Trade-offs and the Optimal Inflation Rate](#)

Takushi Kurozumi, Willem Van Zandweghe

This paper shows that strategic complementarity in price-setting, induced by a non-CES aggregator of goods, increases the optimal inflation rate in staggered price models. It alters output-inflation trade-offs by leading higher trend inflation to steepen the model-based Phillips curve and decrease the steady-state average markup, and thus reduces the inflation-related weight in a model-based welfare function for higher trend inflation and the steady-state welfare cost of higher trend inflation. Moreover, it lessens the welfare difference between 2 percent and 4 percent inflation targets.

[Average Inflation Targeting and Household Expectations](#)

Olivier Coibion, Yuriy Gorodnichenko, Edward S. Knotek II, Raphael Schoenle

The authors use a daily survey of US households to study how the Federal Reserve’s announcement of its new strategy of average inflation targeting affected households’ expectations. Results suggest that most households did not hear the announcement and that, even if they did hear it, the announcement had little effect on their expectations.

[News and Uncertainty about COVID-19: Survey Evidence and Short-run Economic Impact](#)

Alexander Dietrich, Keith Kuester, Gernot Müller, Raphael Schoenle

This paper describes a survey of households that asks participants about their expectations of the economic fallout of the COVID-19 pandemic in real time and at a daily frequency. It presents findings on the evolution of inflation expectations and output projections since early March 2020. The authors then use the survey data to model the economic costs of the pandemic.

[Asymmetric Responses of Consumer Spending to Energy Prices: A Threshold VAR Approach](#)

Edward S. Knotek II, Saeed Zaman

This paper documents asymmetric responses of consumer spending to energy price shocks: Positive energy price shocks have a larger effect on consumption than negative energy price shocks (consumption falls more with positive shocks than it rises with negative shocks). The authors find that the estimated asymmetric responses are strongest for durable goods, but asymmetries are also present in the responses of nondurables and services.

[Raising the Inflation Target: How Much Extra Room Does It Really Give?](#)

Raphael Schoenle, Jean-Paul L’Huillier

This paper studies the effects of raising the inflation target and finds that because of the way the private sector will alter its behavior in response to an increase, policymakers must raise the optimal inflation target higher than earlier computations suggest to achieve the same amount of “extra room.”

Long-term Research Project

Consumers and COVID-19. During the first quarter, Center staff began a [daily survey of consumers](#) that assesses their expectations for inflation (along with many other items) in the midst of the coronavirus outbreak.

Professional Collaboration

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

Events

The Inflation: Drivers and Dynamics 2020 Conference. The conference is the fifth installment of the Cleveland Reserve Bank's signature inflation conference, and the second since the Center made it an annual event. This year's conference was cosponsored by the Center and the European Central Bank, and it was held on May 21–22 in a virtual setting. The conference featured 10 papers, a keynote presentation, and remarks by 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. Videos of the sessions were posted to the Center's [conference website](#) and [that of the Central Bank Research Association](#).

Central Bank Research Association 2020. The Center sponsored presentation and poster sessions on inflation during the [2020 meeting of the Central Bank Research Association](#) (CEBRA), held September 1–3, 2020, at the London School of Economics and Political Science. The presentation session featured four papers on topics related to the causes and dynamics of inflation. The poster session featured six papers on topics related to the causes, dynamics, and persistence of inflation.

ASSA 2020 Session: Inflation and Price Setting. The Center helped the CEBRA organize a session on [inflation and price setting at the 2020 Allied Social Sciences Association \(ASSA\) annual meeting](#), which was held January 3–5, 2020, in San Diego, California. The session featured presentations on four papers, with four well-known economists in the field of inflation participating as discussants.

Computational and Financial Econometrics 2020. The Center organized a session at the [14th International Conference on Computational and Financial Econometrics](#) (CFE), held virtually December 19–21. The session featured presentations on four papers on the topic of inflation dynamics and communications, one of which was coauthored by Center economists.

Visitors

Mark Bills
Hazel Fyfe Professor in Economics, University of Rochester

Carlos Carvalho
Associate Professor at Pontifical Catholic University of Rio de Janeiro, Former Deputy Governor of the Central Bank of Brazil

Olivier Coibion
Professor of Economics, University of Texas at Austin

Yuriy Gorodnichenko
Quantedge Presidential Chair in Economics, University of California, Berkeley

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

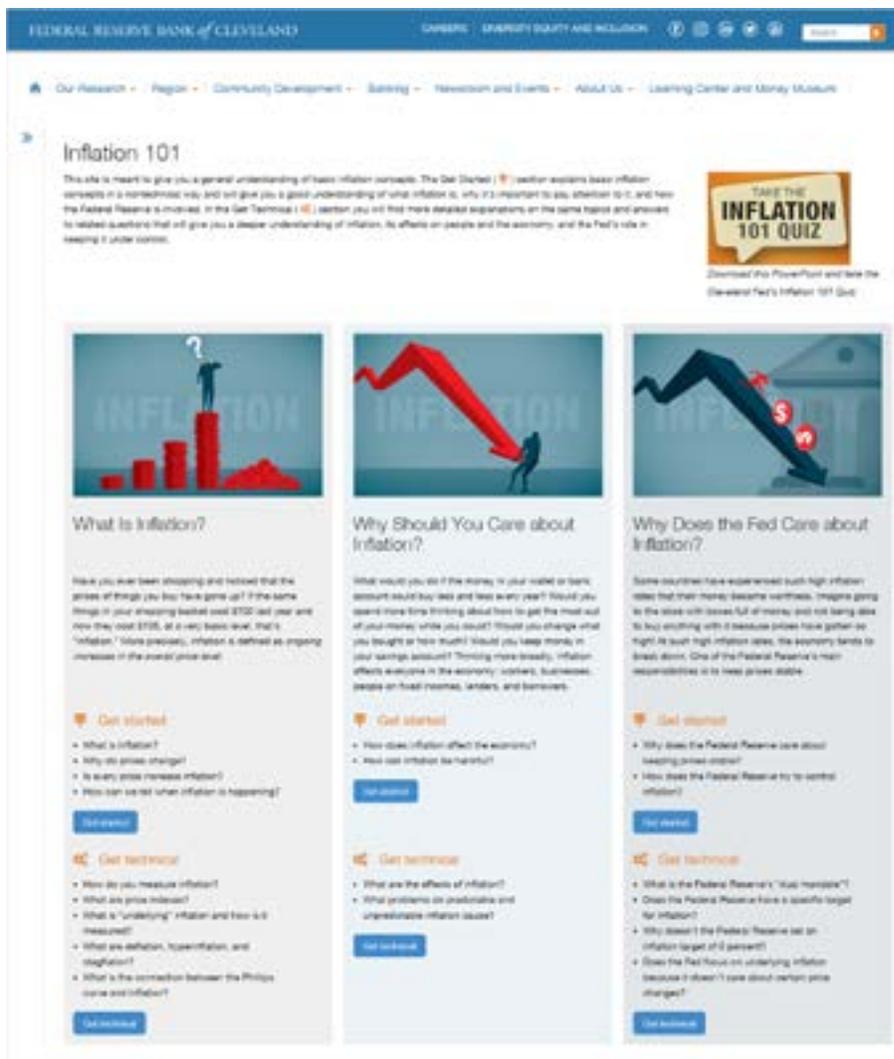
Education

The Center's [Inflation 101](#) webpages were restructured around three key questions: What is inflation? Why should you care about inflation? Why does the Fed care about inflation? Visitors can now follow a less technical path called Get Started and a more technical one called Get Technical. A number of new graphic elements and multimedia features were added including the following.

Inflation 101 quiz. A slide show that asks and answers questions about basic inflation knowledge.

The good old days? A slide show that lets visitors compare the wages of familiar professions and the price of common items across decades.

What's a dollar worth? An inflation calculator hosted on the Federal Reserve Bank of Minneapolis's website that allows visitors to compare current prices to past prices.



The Center's Inflation 101 webpages were redesigned to be more engaging and visually appealing to a broader audience. The material is now organized by three key questions and divided into a less technical and a more technical path. New graphics and interactive elements have also been added.

Inflation, deflation, or disinflation? A video hosted on the Federal Reserve Bank of Philadelphia's website that attempts to clarify the differences between the related (but often confused) terms: inflation, deflation, and disinflation.

How is inflation measured? An infographic that explains how price indexes are used to measure inflation.

How many ways can you measure inflation? An infographic that explains the most common inflation indicators.

How does inflation affect your buying power? An infographic that shows the effect of inflation on the prices of five common items from 1980 to 2020.

Inflation is just one of the Fed's jobs. A video explaining the role of the Federal Reserve and the importance of keeping inflation under control.

The dual mandate. An infographic explaining the two parts of the Fed's mandate.

The Fed's dual mandate. A video of former Federal Reserve Chair Ben Bernanke explaining the two parts of the Federal Reserve's dual mandate and how they sometimes conflict.

Chair the Fed. An interactive game hosted by the Federal Reserve Bank of San Francisco that lets players explore what decisions are involved in monetary policymaking.

Awareness

Center staff continued to build awareness of the Center in 2020 in several ways.

Media interviews

Cleveland Reserve Bank economists were interviewed in media outlets ranging from Bloomberg to the *New York Times*. A list of the interviews appears below.

Robert Rich

- MNI Market News, discussing the strong July CPI release.
- *Central Banking on Air* podcast, discussing new Federal Reserve Bank of Cleveland research on the Phillips curve and the choice of alternative inflation targets.
- *Bloomberg Businessweek*, discussing concerns about the onset of deflation from the COVID-19 pandemic.

Randy Verbrugge

- MNI Market News, discussing his work on the price inflation Phillips curve.
- Bloomberg, discussing the challenges that the COVID-19 pandemic presents for the measurement of inflation.

Edward S. Knotek II

- MNI Market News, discussing inflation expectations and the Consumers and COVID-19 survey.

Daniel Carroll

- *Marketplace*, discussing the median PCE inflation rate.

Members of the Center

- *Bloomberg*, discussing inflation trends with reporter Jordan Yadoo.
- *New York Times*, discussing inflation trends with reporter Jeanna Smialek.

Marketing plan

Center staff worked with marketing consultants in the Bank's strategic communications group to develop a plan for achieving greater visibility of the Center and a wider audience for its research and data products.

Communications

Center staff produced communications for the public through data releases, an annual report, and the Center's e-newsletter.

Data releases. Center staff released data updates for four inflation indicators throughout the year. The series are the median consumer price index, median PCE inflation, inflation expectations, and inflation nowcasting.

Annual Report. The Center produced an annual report for 2019 and posted the executive summary on its webpage.

CfIR E-Newsletter. The Center sent two issues of its e-newsletter to subscribers. The mailing list added approximately 100 new subscribers in 2020, for a total of more than 300 subscribers. The e-newsletter contains descriptions of and links to recent research papers, information about upcoming events, and news of Center developments such as the Inflation 101 enhancement. The e-newsletter is sent by email, and recipients can forward it to other interested parties to increase dissemination.

Looking ahead to 2021, 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, and providing new resources on the website to inform the public about inflation.