Extending the Range of Robust PCE Inflation Measures*

Sergio Ocampo† Raphael Schoenle‡ Dominic A. Smith§

University of Western Ontario Brandeis University Bureau of Labor Statistics

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Abstract

Robust inflation measures gauge inflation behavior by excluding volatile expenditure categories from headline inflation. We evaluate the forecasting performance of a wide set of such measures between 1970 and 2024, including core, median, and trimmed mean personal-consumption-expenditure (PCE) inflation. Core inflation performs significantly worse than official median and trimmed mean inflation. Among a set of alternative trimmed mean measures, there is no single best trim based on forecasting performance: A wide set of trims generates statistically indistinguishable average errors. Nonetheless, different trims imply different predictions for trend inflation in any given month, within a range of 0.5 to 1 percentage points. This range and its midpoint outperform all trimmed mean inflation measures in tracking trend inflation, suggesting the use of the *range* of inflation implied by the set of *near-optimal trims* as a valuable complement to any single inflation measure.

JEL Codes: E3, E5, E6

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†Email: socampod@uwo.ca; website: https://sites.google.com/site/sergiocampod/.

‡Email: schoenle@brandeis.edu; website: https://people.brandeis.edu/~schoenle/.

§Email: smith.dominic@bls.gov; website: https://www.bls.gov/pir/authors/smith.htm.

1 Introduction

The return of high and volatile inflation after the 2020 pandemic has renewed attention toward inflation measures that serve as indicators of current and future inflation trends. The three most common inflation measures used for this purpose are "core" personal consumption expenditure (PCE) inflation, trimmed mean PCE inflation (Federal Reserve Bank of Dallas, 2021), and median PCE inflation (Federal Reserve Bank of Cleveland, 2021). Core inflation excludes a fixed set of historically volatile categories, such as food and energy, from headline inflation, while the other two measures exclude expenditure categories with the highest and lowest inflation rates before computing mean inflation, varying the set of excluded categories every month. These measures are referred to as *robust inflation measures* and are commonly used by central bankers to communicate the behavior of inflation to the public.[1]

In this paper, we contribute to understanding the behavior of robust inflation measures during high-inflation regimes when gauging trend inflation is most important for central bankers. We do so by re-evaluating the forecasting performance of the previously mentioned robust inflation measures between 1970 and 2024 against standard benchmarks (see, Bryan and Cecchetti, 1994; Clark, 2001; Dolmas, 2005), and by further extending our analysis to alternative trimmed mean measures. Our sample includes several episodes of high-inflation, including those in the 1970s and the recent post-pandemic inflation.

Several insights emerge when we evaluate the forecasting performance of a wide set of such robust measures of inflation. First, we find that *trimmed mean and median inflation clearly outperform core inflation* in terms of their root-mean-square error (RMSE) against standard measures of trend inflation—measured using a 36-month centered moving average of headline inflation.[2] This finding might seem surprising given communication practices

[1]For instance, the president of the Federal Reserve Bank of Richmond has stated that "*I want to see inflation, and median and trimmed mean, compellingly headed back to our target*" (Torres, 2023a,b). The Bank of Canada (2024) and the Sveriges Riksbank (2024) list trimmed mean and median inflation as part of their preferred measures of "*underlying*" inflation, as do other central banks.

[2]The RMSE of core inflation against trend inflation is 21 to 65 percent higher than that of trimmed mean and median inflation, respectively.

and public attention toward core inflation—the series is often referenced over alternative measures by Federal Open Market Committee (FOMC) officials in speeches (Powell, 2022) and reports to congress (FOMC, 2024). However, these results are in line with, and extend to recent high inflation, previous work evaluating core PCE and CPI inflation that also find trimmed mean and median inflation series to be superior (see, among others, Detmeister, 2012; Ball, Leigh, Mishra, and Spilimbergo, 2021; Verbrugge, 2022).[3] Consequently, we focus on the properties of trimmed mean inflation measures in our subsequent analysis, rather than core inflation.

Second, we find *there is no single best robust measure in terms of predictive performance*. We arrive at this result after constructing alternative trimmed mean inflation series by systematically varying the shares of expenditure with the highest and lowest inflation being excluded, as in Bryan, Cecchetti, and Wiggins (1997), Dolmas (2005), Meyer and Venkatu (2014), and Meyer, Venkatu, and Zaman (2013). We rank these series based on their forecasting performance, comparing their RMSEs with measures of trend inflation.

Our findings cast a nuanced picture: The official median and trimmed mean measures perform nearly as well as the best of the alternative robust measures across periods and trend targets, even though the best trims vary significantly depending on the sample. For instance, the best trims over the extended 1970 to 2024 sample exclude 46 percent of expenditure, while the best trims in the more recent 2000-2024 period exclude 41 percent. For reference, median inflation trims all but one expenditure category and the official trimmed mean series removes 55 percent of expenditure. Nevertheless, the RMSEs of the official measures and the best alternative trimmed mean measures are statistically indistinguishable in most cases.

Moreover, an important third insight emerges when we look beyond predictive performance: *Similarities in predictive performance obscure economically significant differences in the behavior of the series in any given period and across time.* The range

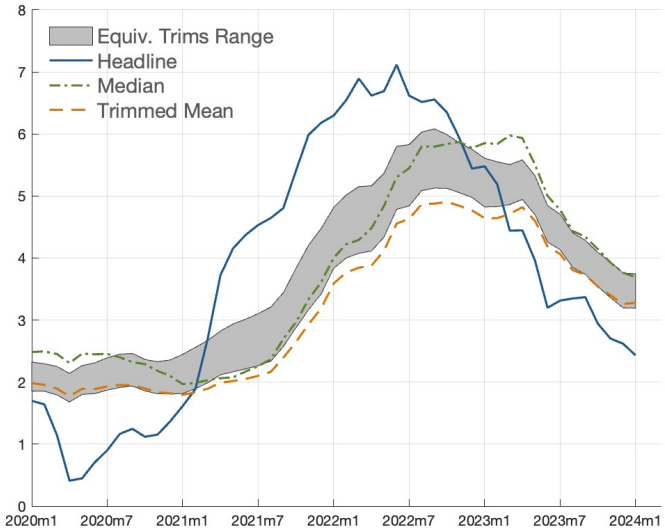
[3] Crone, Khettry, Mester, and Novak (2013) find core, median, and trimmed mean inflation to be no better than using headline inflation in linear forecasting models as in Blinder and Reis (2005). However, central banks' communication has centered on the raw level of robust inflation series as an indicator for trend inflation and not on their usefulness as inputs for other forecasting models, which motivates our methodology.

between the *levels* of the *official* robust inflation series is wide, on average 0.48 percentage points before 2020, growing to 0.67 percentage points from 2020 onward. This finding implies that these measures often provide different signals in any given month, while tracking the trend equally well only on *average*. For example, 12-month median inflation fell from 2.5 to 2.0 percent between March 2020 and February 2021, while trimmed mean inflation was almost flat, and core inflation rose from 1.5 to 1.8 percent. *These three series provided different signals about the path of inflation at exactly the time that inflation was heating up.* The following month, 12-month headline inflation exceeded the FOMC's target of 2 percent and has yet to recover to that level.

This pattern also holds when we broaden the set of robust inflation measures to include *alternative* trimmed mean measures chosen based on their average predictive performance. There is no single best series based on predictive performance. On the contrary, *there is a wide range of trims with statistically the same performance.* Moreover, the range of levels for the resulting robust inflation measures remains wide among the measures whose RMSEs against trend inflation are statistically equivalent to the RMSE of the best trims—between 0.55 and 1.20 percentage points.

Nevertheless, *this range is informative about the path of inflation.* For instance, as we show in Figure 1, the range of equivalent trims indicated flat inflation from March to November 2020. By February 2021 its lower and upper bounds had increased by 10 to 20 basis points and proceeded to increase steadily. The range increased more quickly than median inflation during the first six months of rising inflation after the pandemic, and remained above the official trimmed mean throughout. The range was also faster to decrease, doing so one month after headline inflation peaked in June 2022—while median and trimmed mean inflation remained high and stable for about ten months before changing their trend. This pattern holds throughout the sample. In fact, this range (and even its midpoint) provides a better predictor of trend inflation than even the best single trimmed mean inflation series, with an RMSE 15 percent smaller than that of the best trim.

Figure 1: Range of Robust Measures of Inflation, 2020–2024



Notes: The figure shows the range of inflation implied by the set of trimmed mean inflation measures whose root-mean-square error with respect to current trend inflation are statistically equivalent to the best trim at the 5 percent level. The figure also includes trimmed mean personal consumption expenditure (PCE) and median PCE as calculated by the authors using the methodologies of Federal Reserve Bank of Cleveland (2021) and Federal Reserve Bank of Dallas (2021), as well as headline PCE inflation.

Overall, while our results may appear negative, in that *no single* best robust measure emerges, a positive and practically important message also arises: Communication about inflation trends can be complemented by reporting the *range* of inflation implied by the set of best trimmed mean measures, in addition to the level of any one series. This range provides an effective way of communicating information from measures of trend inflation, especially in times of heightened volatility when individual measures conflict with each other.[4] Communicating the range of inflation implied by the best trimmed mean measures also aligns with the experimental findings of Kostyshyna and Petersen (2024) who show that providing a range of inflation estimates anchors inflation expectations as much as providing a single point estimate, while more effectively reducing the probability assigned

[4]Communicating inflation and inflation targets affects inflation expectations and monetary policy. See, Coibion, Gorodnichenko, and Weber (2022), Handlan (2022), and Gorodnichenko, Pham, and Talavera (2023) for recent applications and the review by Blinder, Ehrmann, Fratzscher, De Haan, and Jansen (2008).

by households to very high and very low inflation outcomes.

Finally, a fourth insight coming out of our analysis is that *trimmed mean inflation measures are more informative about the state of current trend inflation than about future trend inflation*—measured using two-years-ahead headline inflation. In fact, the RMSE of the best trimmed mean measure is at least twice as large when predicting future trend inflation (relative to current trend inflation) and the sets of trims with the best forecasting performance are much larger.[5] These results on the performance of individual robust inflation measures speak to their difficulty in capturing changes in inflation trends, made apparent in our extended sample containing several of these episodes in its earlier and later periods. They suggest that robust inflation measures may be of more practical use for tracking current than future inflation trends.

Relative to the literature, we focus on core and trimmed-mean inflation measures used by central bankers for communication with the public at large, partially because of their relative simplicity. There are other inflation measures with desirable properties for forecasting and policy relevance obtained from dynamic factor models (see, among others, Forni, Hallin, Lippi, and Reichlin, 2000; Cristadoro, Forni, Reichlin, and Veronese, 2015; Reis and Watson, 2010; Stock and Watson, 2016; Ahn and Luciani, 2024), from statistical estimates of trend inflation (such as, Stock and Watson, 2007; Chan, Koop, and and, 2013; Chan, Clark, and Koop, 2018), and from indices designed to reflect consumer welfare (see, for instance, Eusepi, Hobijn, and Tambalotti, 2011). Our analysis complements this larger literature on inflation measures by providing an updated and extended analysis of the predictive performance of trimmed-mean inflation measures. We provide insights on the informativeness of the simple individual trimmed mean measures while suggesting new ways of communicating about the behavior of inflation.

In particular, our results for alternative trimmed mean measures extend those of Meyer, Venkatu, and Zaman (2013) and Meyer and Venkatu (2014) for Consumer Price Index (CPI)

[5]This result from our extended sample aligns with the finding that trimmed mean measures are better at nowcasting than forecasting without further adjustments (Verbrugge and Zaman, 2024).

to PCE inflation going back to 1960 and update them forward to 2024, including three additional high-inflation episodes. We focus on PCE inflation for two main reasons: First, it is the series targeted by the Federal Reserve when setting monetary policy. Second, unlike the CPI, the historical PCE series are regularly revised to follow a consistent methodology. In constructing alternative trimmed-mean measures, we target ex-post measures of trend inflation computed from moving averages of realized headline inflation that are used in the construction of the official trimmed-mean inflation series. These moving average measures are also consistent with the average inflation targeting policy of the U.S. Federal Reserve Open Market Committee. We show in appendix figure B.3 how these measures of trend inflation compare to alternatives.

Our analysis also goes beyond studying predictive performance, highlighting implications for the levels of robust inflation series. The papers cited above examine trimmed mean measures of CPI inflation going up to 2013 and also find wide sets of trims with equivalent forecasting performance. However, and unlike them, we find these sets to be asymmetric and to change substantially over time for PCE inflation, even if we restrict the sample to 1970–2013 to cover a similar period. The sets of best trims skew towards higher upper trims, particularly for the most recent sample covering 2000–2024. The asymmetry means that the median inflation series is only part of the set of best trims for some samples. The changing results across targets and samples lead us to conclude that there are no basis for selecting a single series among the PCE trimmed mean inflation measures (implying a range of inflation), unlike Meyer and Venkatu (2014) who find the median CPI inflation to perform well throughout among other CPI measures and, therefore, argue for its use.

Finally, we also provide a new public good by extending the official trimmed mean and median PCE inflation measures back to 1960 as part of constructing and evaluating robust inflation series.[6] These series are currently published starting in 1977, covering only one high inflation episode before 2020; a key data limitation. Consequently, work studying the

[6]Our series are available at https://ocamp020.github.io/Robust_Inflation_Series.xlsx.

forecasting properties of robust inflation measures has been constrained to samples in which inflation has been consistently low and stable, missing both the episodes of high inflation in the 1960s and 70s and the recent episode of post-pandemic inflation (see, among others, Dolmas, 2005; Rich and Steindel, 2007; Crone, Khettry, Mester, and Novak, 2013; Meyer and Zaman, 2019). We therefore complement the literature by analyzing the performance of a wide range of trimmed mean inflation measures over this extended sample.

2 Extending Robust PCE Inflation Measures

This section details the computation of headline, core, median, and trimmed mean PCE inflation series beginning in 1959 and ending in February 2024, extending the official median and trimmed mean inflation series to cover 1960–77.[7] We extend these series replicating the methodologies of the Federal Reserve Banks of Dallas and Cleveland (see, Bryan and Pike, 1991; Bryan and Cecchetti, 1994; Dolmas, 2005; Carroll and Verbrugge, 2019).[8] This extension increases the number of months in the sample by almost 40 percent relative to the conventionally available official series, providing us with two additional episodes of rising inflation (1968 and 1973) and covering 178 months of high inflation (above 5 percent).

Extending the official robust inflation measures to the 1960–77 period is of interest for two reasons: First, it provides a more consistent view of the patterns for these robust inflation measures in periods of rising and high inflation. The 1960–77 period provides us with two additional episodes of rising inflation (1968 and 1973), adding to the four episodes of rising inflation in the post-1977 period. There are only three episodes between 1960 and 2024 for which headline PCE inflation is above 5 percent, covering a total of 178 months, 44 of which fall into the 1960–77 period. Second, we can use these series as reference points when we evaluate the predictive performance of a wide set of inflation series in the next section.

[7] Throughout the paper we will focus on inflation over a 12-month period, but plot each series at a monthly frequency. Using inflation over 12 months prevents seasonality from complicating the analysis.

[8] Currently available official series begin in 1977 to coincide with the introduction of personal computers to the PCE.

In extending the sample, we also document changes in the number of expenditure categories available in PCE data and the frequency of their price updates (see Appendix A). We find that prices were not updated regularly for up to 20 percent of expenditure categories prior to 1970, which leads to focus most of our analysis on the period from then onward. We also provide a time-consistent set of categories for calculating alternative trimmed mean measures, harmonizing differences in the construction of the official trimmed mean and median inflation series.

2.1 PCE Inflation Data

Our analysis is based on the underlying data supplements of the National Income and Product Accounts PCE data release (Bureau of Economic Analysis, 2022) between January 1959 and February 2024 to construct robust inflation series.[9] The PCE data provide disaggregated price indexes and expenditure weights that cover US consumer spending.

Two main issues accompany the use of these data and the replication of official robust inflation measures. First, new expenditure categories are introduced over time, as is the case with expenditure on personal computers, a category introduced in 1977. The changes in the set of expenditure categories are reflected in differences between the set of categories used in the construction of official trimmed mean inflation and that used for median inflation. We harmonize the set of expenditure categories by establishing a consistent set of 182 series that

[9]The main input for BEA price indexes is the CPI, but unlike the CPI, the PCE is revised for historical consistency when methods change enabling our consistent backwards extensions. Disaggregated PCE series can be accessed at `https://apps.bea.gov/national/Release/XLS/Underlying/Section2All_xls.xlsx`. By contrast, extending the median and trimmed mean CPI series is of limited use because the individual CPI component series are not revised when the methodology used to calculate inflation for individual components is changed. Changes in methodology can imply significant changes in the volatility of inflation as shown by Hazell, Herreño, Nakamura, and Steinsson (2022) and Bolhuis, Cramer, and Summers (2022).

are available for the entire period or as soon as a new good is introduced.[10] Second, the price series for multiple expenditure categories were not updated on a monthly basis before 1970, including owners' equivalent rent, the category with the highest weight (see Figure A.4 in Appendix A). This issue is reflected in the levels of the median inflation series, as we show in Figure 2. We therefore focus our analysis in Sections 3 and 4 on the 1970–2024 period.

2.2 PCE Inflation Measures

Headline and Core Inflation Headline inflation is a Fischer index of all underlying inflation categories (see Appendix A.1). Core PCE inflation excludes all series under food and beverages purchased for off-premises consumption, gasoline and other energy goods, and electricity and gas. We take headline and core PCE inflation directly from the tables published by the BEA.[11]

Trimmed-Mean Inflation Trimmed-mean PCE inflation measures select a set of expenditure categories in each month by removing the categories with the lowest inflation rates that represent α percent of expenditure and the categories with the highest inflation rates accounting for β percent of expenditure (see Appendix B.3). Trimmed-mean measures are characterized by these cutoffs and not by the expenditure categories included, which vary every month.

The official trimmed mean inflation measure sets $\alpha = 24$ and $\beta = 31$, it is published monthly by the Federal Reserve Bank of Dallas (Dolmas, 2005). It is available from 1977 onward because 1977 is the years personal computers were introduced to the PCE (Federal

[10] The set of 182 categories we use differs from the 177 categories used by the Dallas Fed and 200 categories used by the Cleveland Fed. When new expenditure categories are introduced, they often have almost-zero spending, as they represent new goods. In those cases, we assume that the goods they represent were not available before their introduction in the PCE, and we assign to them a retroactive weight of zero. The complete list of the series included in each inflation measure can be found in `http://dominic-smith.com/data/category_definitions.xlsx`. In a previous version of this paper, we established that these differences do not impact the results (Ocampo, Schoenle, and Smith, 2022).

[11] We use series DPCERG for headline inflation and series DPCCRG for core inflation (Bureau of Economic Analysis, 2022). In Appendix B.4, we study the impact of removing housing services from inflation measures. Doing this is similar to proposed measures of "super-core" inflation.

Reserve Bank of Dallas, 2021). The median inflation series is calculated by trimming out all categories except the one with the median inflation rate in every month (that is, $\alpha = \beta = 50$). The official median PCE inflation is published monthly by the Federal Reserve Bank of Cleveland (Bryan and Pike, 1991; Bryan and Cecchetti, 1994; Carroll and Verbrugge, 2019) and is also available from 1977 onwards (Federal Reserve Bank of Cleveland, 2021).

2.3 Extended PCE Inflation Series

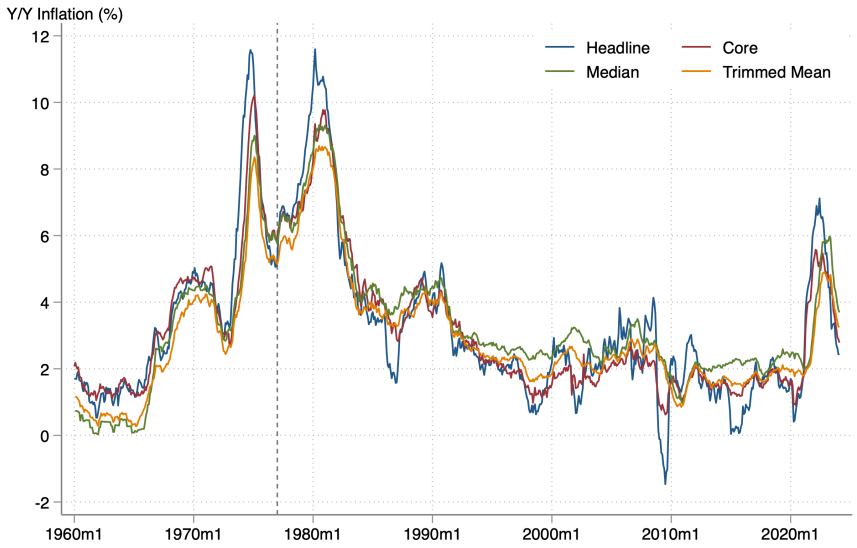
Figure 2 plots our measures of headline, core, trimmed mean, and median PCE inflation. As is apparent, we successfully replicate the official trimmed mean and median inflation series after 1977 while also extending them back to 1960 (see Figures A.1 and A.2 in Appendix A). These two extended robust inflation measures also track the behavior of headline inflation despite significant disagreement between them, which translates into similar predictive performance as we show in the next section. The average range between the levels of the robust inflation series is 0.49 percentage points. These differences between the series increase at the end of the sample, with the average range increasing to 0.70 percentage points between 2021 and 2024 (see Figure B.1 in Appendix B).[12] As the next section makes clear, this pattern of a similar predictive performance (over time) paired with economically significant differences in month-to-month levels is common across a wide range of trimmed mean measures.

2.4 Differences Between Trimmed-Mean Inflation Measures

The differences between the inflation measures come from the underlying set of expenditure categories used to compute them. Trimming categories narrows the range of inflation rates used to construct robust inflation measures. Figure 3 illustrates this by plotting the 10th, 24th, 50th, 69th, and 90th percentiles of month-to-month inflation across expenditure

[12]There are other disagreements. For instance, the sign of the change (increasing or decreasing) of core PCE inflation matches that of headline PCE in 74 the months in our sample; the values for median and trimmed mean PCE inflation are 67 and 57 months, respectively.

Figure 2: Robust Measures of Inflation, 1960–2024



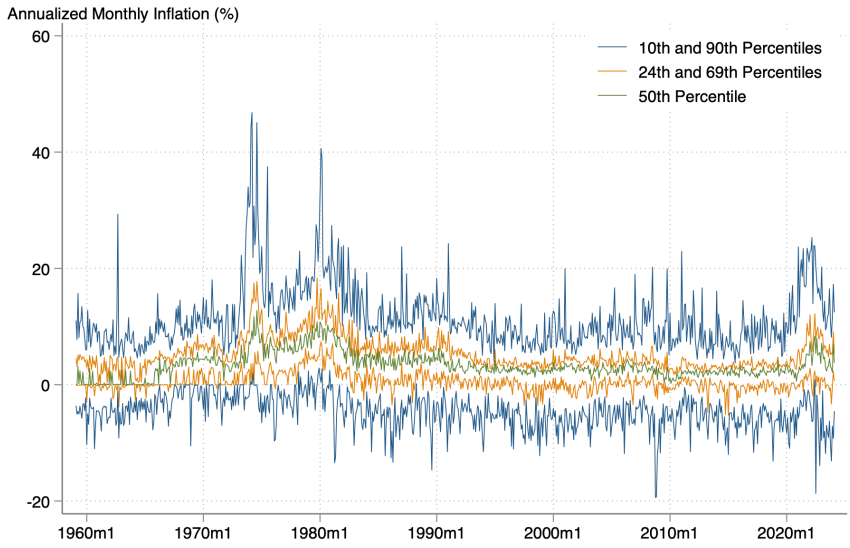
Notes: The figure shows trimmed mean personal consumption expenditure (PCE) and median PCE as calculated by the authors using the methodologies of Federal Reserve Bank of Cleveland (2021) and Federal Reserve Bank of Dallas (2021). Appendix A shows that these measures match those produced by the relevant Federal Reserve Banks after 1977. The vertical line in January 1977 indicates that the official trimmed mean and median measures are available starting in 1977. Headline and core inflation are taken directly from the PCE data published by the Bureau of Economic Analysis.

categories. The 24th and 69th percentiles correspond to the trims of the official trimmed mean inflation series, and the 50th percentile to the trim of the official mean inflation series.

The distribution of inflation rates across categories is remarkably wide, with a range between the 10th and 90th percentiles of 1.32 percentage points on average, which makes trimming consequential in many periods, particularly during those with high headline inflation. The interquartile range (the range between the 25th and 75th percentiles of the distribution) is 0.45 percentage points on average, of similar magnitude to the range between the levels of the three robust inflation measures in Figure 2.

The set of categories which are included in the calculations of the trimmed mean and median inflation measures varies over time, as it depends on the contemporaneous distribution of inflation across expenditure categories. However, there are certain regularities. The categories most commonly excluded are food and fuel categories (for

Figure 3: Range of Underlying Inflation, 1960–2024



Notes: The figure shows the authors' calculations of the range of inflation series used for different inflation measures from 1960 to 2024. The lines correspond to the 10th and 90th percentiles of the cross section of monthly inflation rates in the 177 series considered for the trimmed mean measure, the 24th and 69th percentiles of the PCE inflation series that correspond to the range used for trimmed mean inflation, and the median inflation series. Percentiles are weighted using the average real expenditure on each category in months t and $t-1$.

example, eggs, vegetables, gasoline), which are some of the categories excluded from core PCE. This set is much larger for median inflation. In fact, 62 of the 182 categories we consider never coincide with the median inflation category, while every category is included in the trimmed mean at some point. Table B.2 lists the categories most commonly excluded and included in the construction of median and trimmed mean inflation.

3 Evaluating Official Robust Inflation Measures

How well do the official robust inflation measures match current and future inflation trends across multiple samples? Our analysis shows that trimmed mean and median inflation outperform core inflation across all samples and objectives. Moreover, the performance of these two series is similar across the samples we consider, with the official trimmed mean

series slightly outperforming median inflation in terms of capturing current- and future-trend inflation. However, the similar performance of the series obscures significant differences in their monthly levels, which our analysis lays out in full in Section 4.

3.1 Measures of Trend Inflation

The goal of trimmed mean measures of inflation is to identify the behavior of underlying trend inflation by removing extreme, transitory movements in inflation series. Therefore, to gauge the performance of trimmed mean measures we require some measure of trend inflation. Multiple such measures have been proposed. Other papers studying the performance of trimmed mean measures primarily use ex-post moving averages (Bryan and Cecchetti, 1994), while others have proposed statistical measures of trend inflation recovered by decomposing inflation using unobserved component models with stochastic volatility, as in Stock and Watson (2007) and the subsequent models in Chan, Koop, and and (2013) and Chan, Clark, and Koop (2018). We focus on moving average measures as our main measures of trend inflation as these appear most consistent with the average inflation targeting policy of the U.S. Federal Reserve Open Market Committee, but also gauge robustness to other measures.

Our main measure of current trend inflation is a 36-month centered moving average of headline inflation. Thus, it includes data from 18 months before to 18 months after the current period. This measure was proposed by Bryan, Cecchetti, and Wiggins (1997) and has been used as a benchmark since. It provides an ex-post proxy for what underlying inflation was at a point in time.

Our main measure of future trend inflation is constructed as a 12-month forward moving average of headline inflation that starts one year ahead of the current period, which corresponds to the two-years-ahead annual inflation. Thus, it includes data between 12 and 24 months in the future. As Meyer and Venkatu (2014) highlight, future inflation is particularly relevant as decision makers, such as central bankers, are forward-looking and make decisions based on the expected behavior of inflation. Meyer, Venkatu, and Zaman

(2013) and Meyer and Venkatu (2014) use the annualized CPI inflation rate over the next 36 months as the main target in their analysis (similar to our alternative forward measure described below) but find similar results when using the 24-months-ahead annualized rate of CPI inflation.

We also construct an alternative measure of current trend inflation using the trend component of Christiano and Fitzgerald's (2003) band-pass filter (removing frequencies below 39 months) and an alternative measure of future trend inflation constructed as the 24-month forward-looking average rate of inflation as in Dolmas (2005).[13] We plot all these series in Figure B.3 of Appendix B.2 along with the trend inflation series from Stock and Watson (2007) and Chan, Clark, and Koop (2018). All series track each other closely with discrepancies in the timing of changes, with the notable exception of the series from Chan, Clark, and Koop (2018) that is markedly smoother than all the others. We also provide the results of our evaluation of the official series against the alternative trend inflation measures in the Appendix.

3.2 Evaluation Criteria

To evaluate the performance of inflation series, we compare each inflation measure we construct to the target trend measures discussed above and calculate the root mean squared error (RMSE). This is the same criteria used by Dolmas (2005) to select the trimming cutoffs of the official trimmed mean inflation series. We consider a long sample (1970–2024), an old sample (1970–1989), and a recent sample (starting in 2000).

Given a target $\bar{\pi}$ (for current or future trend inflation), we evaluate how well an inflation measure π^i, $i \in \{\text{core, trimmed mean, median}\}$, tracks it over a given sample. We do so by

[13] The trend component of the band pass filter removes high frequency movement in inflation. Dolmas (2005) found that removing frequencies below 29 months maximizes the correlation between the resulting trend series and the Federal Funds rate target set by the Federal Open Market Committee.

calculating the RMSE for each candidate robust measure i as[14]

$$\text{RMSE}^i = \sqrt{\frac{1}{T}\sum_t (\pi_t^i - \bar{\pi}_t)^2}. \tag{1}$$

3.3 Performance of Official Measures

A clear result emerges from the comparison of the official robust inflation measures (core, trimmed mean, and median) against current and future trend inflation: Trimmed-mean and median inflation outperform core inflation in all samples regardless of whether we compare them against current or future inflation trends, as Table 1 shows. For instance, the RMSE of trimmed mean and median inflation is between 20 and 25 percent lower than that of core inflation when targeting current trend inflation in the 1970–2024 sample.[15] Furthermore, these differences are always statistically significant, as we verify in the last column of Table 1 where we report the p-value of the Diebold and Mariano (1995) test under the null hypothesis of no difference in the prediction error between core inflation and the official trimmed mean and median inflation series.

Although these results may be somewhat surprising given the attention core inflation receives in policy discussions and news coverage, they are in line with Detmeister (2012), Ball et al. (2021), Verbrugge (2022), and other studies that also find that core inflation is outperformed by trimmed mean measures using other targets and time periods.[16] The focus on core inflation started during the Greenspan era as chair of the FOMC (see, Blinder

[14] We use the level of inflation π^i without transforming it. Transformations such as linear regressions improve the fit of robust inflation measures such as median inflation by removing a consistent bias in certain measures (Rich, Verbrugge, and Zaman, 2022); however, these measures are most often communicated and used without such transformations.

[15] We also compare the performance of robust inflation measures to the performance of headline PCE inflation. Headline inflation corresponds to the no-trimming limit. The RMSE that the official trimmed mean and median inflation series produce is between 50 and 75 percent of the RMSE of headline inflation, verifying that trimming does improve the series' predictive performance.

[16] Crone et al. (2013) also find that there is no advantage to core inflation over alternative robust measures in the context of linear prediction models. Unlike us, they do not find trimmed mean and median inflation to be significantly better. Their analysis differs from ours in its scope (going only until 2013) and method, as we use the level of the robust inflation measures as predictors of trend inflation in line with the practice of policy makers and previous studies.

and Reis, 2005) and the FOMC started publishing statistics on core PCE inflation next to headline PCE inflation in 2007 (Crone et al., 2013). The FOMC still makes explicit mention of core inflation (over other measures) in official reports to congress (FOMC, 2024) and in speeches by its chair (Powell, 2022). This practice is not shared by other central banks. For instance, the Bank of Canada (2024) and the Sveriges Riksbank (2024) reference versions of the trimmed mean and median inflation measures as their "preferred" measures of "underlying" inflation.

An additional result arises when comparing robust inflation measures: The official trimmed mean inflation series slightly outperforms the official median inflation series in capturing the behavior of current and future trend inflation, except when targeting current trend inflation in the restricted sample (1970–89), when the pattern reverses. However, the RMSEs produced by the two official measures are not statistically different in most cases (see the second-to-last column of Table 1). The differences between the performances of trimmed mean and median inflation are higher when predicting current trend inflation than when predicting the future trend, but the null hypothesis is only strongly rejected for the recent sample (starting in 2000). These same patterns hold when looking at alternative trend inflation measures as we show in Table B.3 of Appendix B.2.

However, this last result obscures a key insight from our analysis: Despite the official trimmed mean and median inflation series' similar prediction errors, their levels differ substantially in most months. The average range between the levels of these two series is 0.49 percentage points over our sample and grows larger by the end of the sample (see Figure B.1 in Appendix B). These differences can result in meaningful discrepancies in the signals that these series provide. As we showed in Figure 1 in the Introduction, 12-month median inflation was decreasing and trimmed mean inflation was almost flat at the same time that headline inflation was rising above the FOMC's target in the first months of 2021.

This key insight also arises from analyzing alternative robust measures as we do below; namely, relying on the average prediction performance of the series obscures underlying

Table 1: Predicting Performance of Official Measures

Target	Sample	PCE Inflation Measure RMSE			DM Test: $\Pr(z > \lvert DM \rvert)$	
		Core	Trimmed Mean	Median	TM vs Med.	Core vs Other
Current Trend	1970-2024	1.47	1.11	1.18	0.015	0.000
	1970-1989	1.84	1.62	1.52	0.088	0.001
	2000-2024	1.34	0.81	1.02	0.000	0.004
Future Trend	1970-2024	2.45	2.14	2.17	0.197	0.000
	1970-1989	3.35	3.02	3.02	0.903	0.000
	2000-2024	1.99	1.66	1.71	0.161	0.019

Notes: The table presents the predictive performance of personal-consumption-expenditure (PCE) inflation measures with respect to different trend inflation targets for different samples. Performance is measured by the series' root-mean-square error (RMSE) with respect to trend inflation. The table reports the RMSEs for core, trimmed mean, and median inflation. The last two columns report the p-value of the Diebold and Mariano (1995) test for the difference between the RMSEs of trimmed mean and median inflation and the difference of the core inflation series and the best of the trimmed mean and the median inflation series.

differences in their predictions for any given month. Further, we see no systematic way to determine which series is providing the best signal at any point in time.

4 Optimal Trimmed-Mean Measures

The analysis in this section shows that there is no single "best" trim when one systematically varies lower and upper trimming cutoffs (α, β) for PCE inflation. In fact, many combinations yield statistically indistinguishable RMSEs, with optimal trims tending to be asymmetric and shifting across samples. Rather than pointing to selecting a single series, our findings suggest that using the range—or even the midpoint—of these near-optimal trims offers a more informative indicator of current trend inflation because it outperforms any single trimmed-mean measure in tracking the trend. Results also show that while trimmed-mean measures are effective for nowcasting a current trend, they struggle when predicting future trend inflation.

Specifically, we vary the trim cutoffs used to construct trimmed mean measures by considering all integer combinations of trims for $\alpha, \beta \in [0, 50]$, in a similar way to Meyer,

Venkatu, and Zaman (2013) and Meyer and Venkatu (2014), and evaluate the predictive performance of each series against measures of trend inflation. The resulting set of measures includes the official trimmed mean, median, and headline inflation series as special cases. Appendix B.3 extends the results to alternative measures of trend inflation.

4.1 Optimal trimming cutoffs

There are large differences between the optimal trimming cutoffs and the trims of the official measures ($\alpha = 24$ and $\beta = 36$, or $\alpha = \beta = 50$). The optimal cutoffs are asymmetric, trimming more from the top than from the bottom ($\beta^\star > \alpha^\star$). More importantly, they vary significantly across targets and when comparing the most recent sample (2000–24) to the longer and older samples. Table 2 presents the results.

However, our results also show that this large variation in optimal trims does not translate into a significantly lower RMSE. In fact, the official measures perform almost as well as those with the optimal trimming cutoffs. The RMSE of the optimal trims is at most 4 percent lower, and the differences are never statistically significant at the 5 percent level. The last column of Table 2 reports the p-value of the Diebold and Mariano (1995) test when comparing the predictive performance of the best trim with the better of the two official robust inflation measures (see Table 1).

No single optimal trim The similarity in the performance of the official robust inflation measures and the optimal trimmed measures is part of a larger pattern: For every target and sample, a wide set of trims has a similar forecasting performance. Moreover, there is a set of *near-optimal* trims whose RMSE is statistically indistinguishable from the RMSE of the best trim. These near-optimal trims are asymmetric—once again trimming more of the high-inflation categories, $\beta > \alpha$—and their sets are much larger (and asymmetric) when targeting future trend inflation. Figures 4 and 5 present these results by plotting the RMSEs of all trim combinations for the two target trends and the three samples (relative to the lowest

Table 2: Best Trims for Trimmed-Mean Inflation

Target	Sample	Best Trims			Official Trims	DM Test
		Lower	Upper	RMSE	min(RMSE)	$\Pr(z > \lvert DM \rvert)$
Current Trend	1970-2024	17	19	1.08	1.11	0.065
	1970-1989	18	16	1.46	1.52	0.235
	2000-2024	18	23	0.80	0.81	0.403
Future Trend	1970-2024	35	41	2.11	2.14	0.213
	1970-1989	15	17	2.91	3.02	0.412
	2000-2024	24	28	1.63	1.66	0.288

Notes: The table reports the best trim as determined by the predictive performance across trims for different targets of trend inflation and different samples. The table also reports the root-mean-square error (RMSE) for the best trims and the lower RMSE of the official trimmed and median inflation series. The last column reports the p-value of the Diebold and Mariano (1995) test for the difference between these RMSEs.

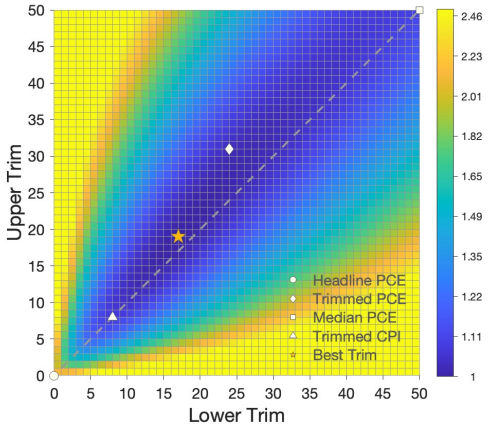
RMSE across all trim combinations) and the sets of near-optimal trims for different cutoffs of the Diebold-Mariano test, respectively. Figures B.4 and B.5 of Appendix B.3 present the results for our alternative measures of trend inflation.

This pattern is explained by the effect of trimming on the underlying distribution of monthly inflation rates. As trimming cutoffs increase, the range of inflation rates taken into account is reduced, affecting the variability and the mean prediction of the resulting trimmed mean series. Take, for instance, an increase in the upper trim that eliminates more series with high inflation. This reduces the average and standard deviation of the prediction implied by the trimmed mean series. However, the reduction in variability is empirically smaller than the reduction in the average prediction, actually making the trimmed mean series *relatively* more variable as the upper trim increases. In fact, the coefficient of variation (the ratio of the standard deviation to the mean) increases rapidly with the trimming cutoff, moving from 0.6 to 0.8.[17] As a result, similar RMSEs can be obtained from different trim combinations that imply different average predictions.

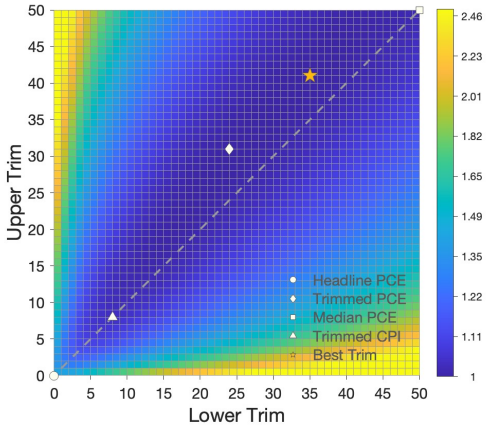
[17]Figure B.6 makes the effect of trimming precise by plotting the coefficient of variation and the RMSE for trimmed mean series that target current trend inflation. Near the optimal trim, the RMSE does not change much, but the slope of the coefficient of variation is positive.

Figure 4: RMSE across Trims

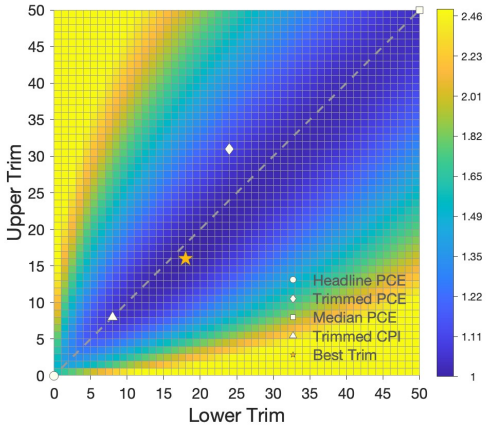
(a) Current Trend: 1970-2024



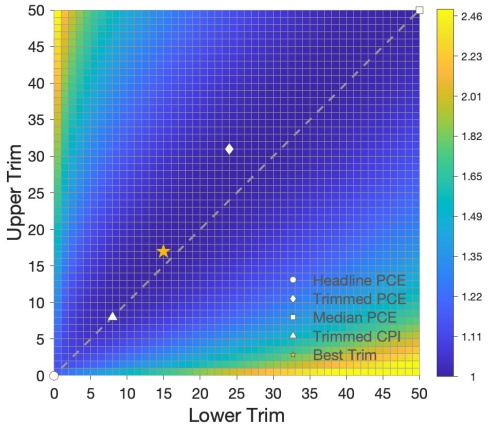
(b) Future Trend: 1970-2024



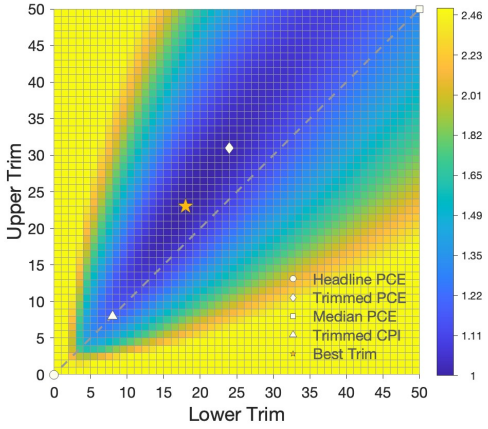
(c) Current Trend: 1970-1989



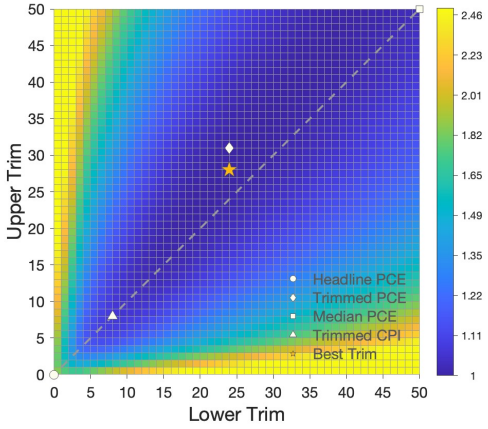
(d) Future Trend: 1970-1989



(e) Current Trend: 2000-2024



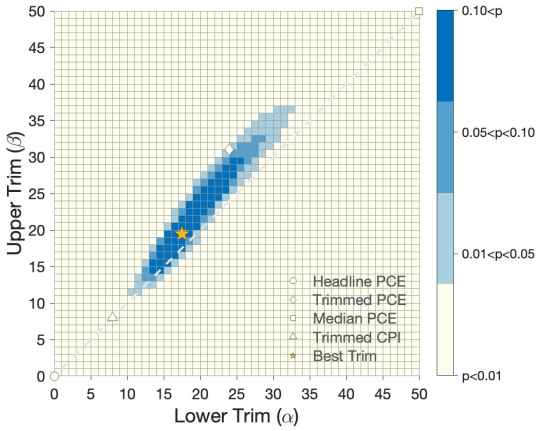
(f) Future Trend: 2000-2024



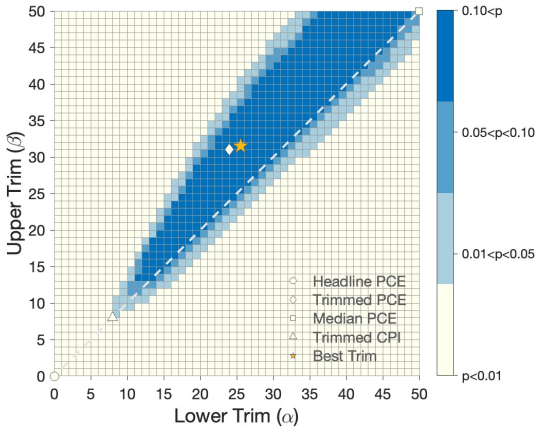
Notes: The figures show heat maps of the root-mean-square error (RMSE) when targeting current and future trend inflation with different trimmed mean inflation measures. To ensure comparability across plots, the RMSEs are reported relative to the RMSE of the best trim reported in Table 2.

Figure 5: Statistical Difference of RMSE across Trims

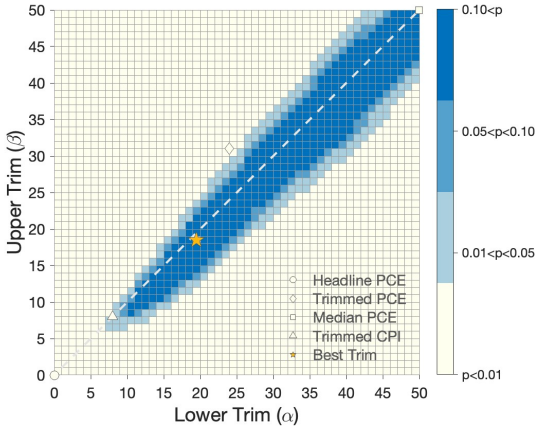
(a) Current Trend: 1970–2024



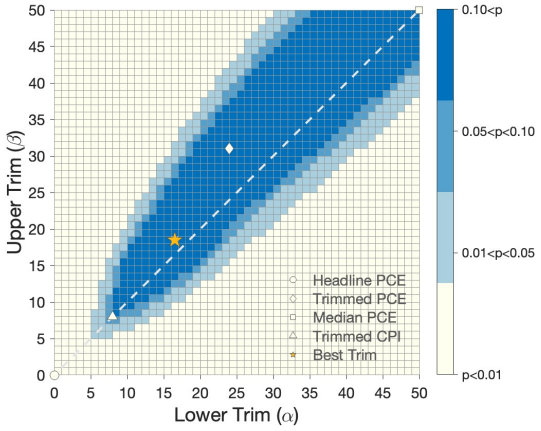
(b) Future Trend: 1970–2024



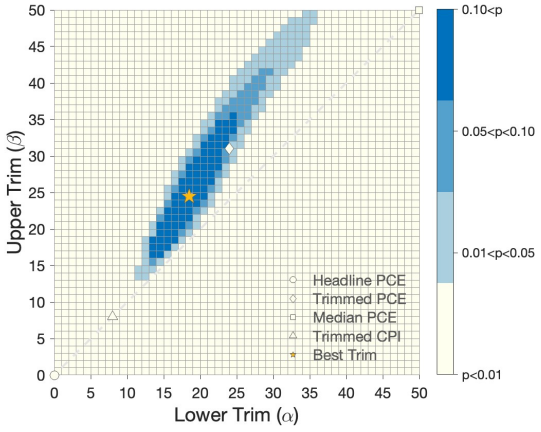
(c) Current Trend: 1970–89



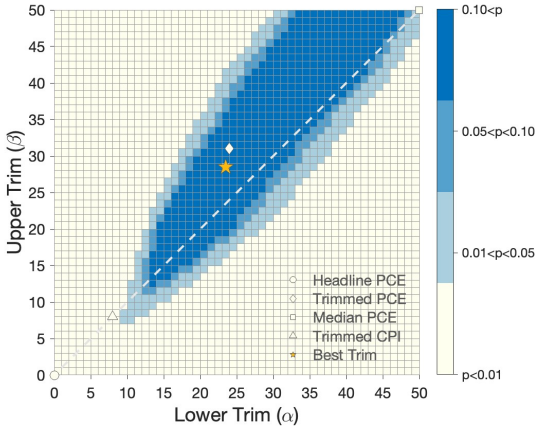
(d) Future Trend: 1970–89



(e) Current Trend: 2000–2024



(f) Future Trend: 2000–2024



Notes: The figures group trims according to the outcome of the Diebold and Mariano (1995) test, which compares the root-mean-square error (RMSE) implied by the trims with the RMSE of the best trim as presented in Table 2. The trims are grouped based on the p-value of the test. The darkest region consists of trims whose RMSE is statistically equivalent to the lowest RMSE across all trims.

Our results are consistent with previous work that compared different trimmed mean inflation series. See, for example, Meyer, Venkatu, and Zaman (2013) and Meyer and Venkatu (2014) who evaluate trimmed mean CPI measures up until 2013 and also find wide sets of trims to have equivalent forecasting performance. However, they find these sets to be formed by symmetrical trims, unlike what we find in our extended analysis of PCE inflation series. In particular, they find median CPI inflation (corresponding to symmetric trims of $\alpha = \beta = 50$) to be among the set of near-optimal trims. Our results show asymmetrical trims to be superior in the context of PCE inflation, particularly for the most recent sample starting in 2000. This asymmetry makes it so that the median PCE inflation measure is actually not part of the set of near-optimal trims except for the older sample covering 1970–1989.

4.2 Performance beyond prediction errors

A naive reading of the results above might suggest that a wide range of trims is functionally equivalent, with the only difference given by the choice of trim points when targeting the behavior of current or future trend inflation. However, the small differences in the RMSEs of different trims hide significant variation in the prediction levels of the implied trimmed mean series.

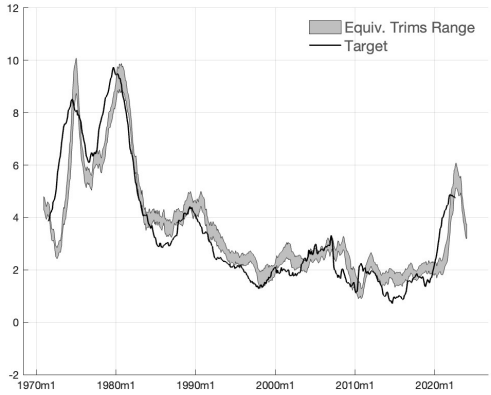
Figure 6 plots the range of inflation implied by the sets of near-optimal trims—those whose prediction error is closest to the error of the best trim—for the 1970–2024 sample when targeting current and future trend inflation.[18] The average range is 0.55 percentage points when targeting current trend inflation and 1.20 percentage points when targeting future trend inflation. This variation in prediction levels makes it even more complicated to select a single optimal series, as there are other near-optimal series with different implications for trend inflation in any given month.

Nevertheless, the behavior of the range—taken as a whole—is informative about the

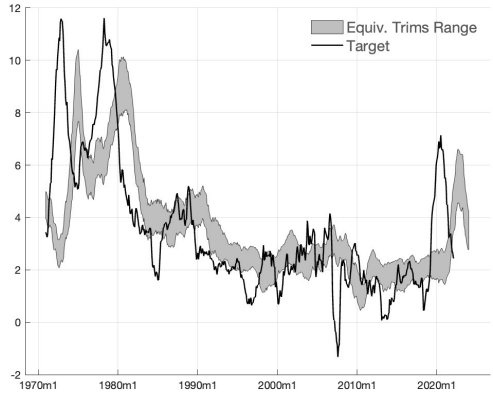
[18] Figure B.7 plots the distance between the lowest and highest predictions for the current and future trend for the set of near-optimal trims and the best 50 and 100 trims according to their RMSE. Figure B.8 complements this information by presenting the average range of inflation implied by each trim combination.

Figure 6: Prediction Range across Best Trims across Time

(a) Centered Trend



(b) Future Trend



Notes: The figures plot the range of predictions for the current and future trends between 1970 and 2024 of the set of trimmed mean measures of inflation that are statistically equivalent at the 5 percent level according to the Diebold and Mariano (1995) test of the difference of their root-mean-square errors (RMSEs) with respect to the RMSE of the best trim for each target (see Table 2). The start- and end-dates for each figure reflect the data requirements for the ex-post measures of trend inflation.

behavior of trend inflation. Consider, for instance, the range for trend inflation leading to February 2024 implied by the set of near-optimal trims described above. The range started to decline after August 2022 (one month after headline inflation peaked), while median and trimmed mean inflation only started to decrease in May 2023, when they started tracking the upper and lower edges of the range; see Figure 1. The final predictions for current trend inflation in February 2024 are between 3.05 and 3.55 percent, a range of 50 basis points.[19]

Focusing on the *range of inflation levels* implied by the best trimmed mean measures can therefore provide a useful indicator of trend inflation. Indeed, we verify next that the range (and even its midpoint) provides better predictors of trend inflation over the whole sample than even the best single trimmed mean inflation measure. The range implied by the best trimmed mean inflation measures also provides a transparent way to capture and communicate uncertainty over the behavior of inflation, especially when accompanied by selected robust inflation series (such as median or trimmed mean inflation). We observe that

[19]Figure B.10 plots the inflation predictions among the near-optimal trims in February 2024. Figure B.9 plots the range implied by the set of near-optimal trims in the 1971–1977 and 2008–2012 periods.

the range is widest at times when headline inflation is high or is undergoing rapid changes (see Figure B.7). In this way, the range provides additional and useful information for policy makers and the public at large.[20]

4.3 Back to prediction: The range of near-optimal trims

Taken together, our results indicate that focusing on a set of trimmed mean inflation measures, instead of selecting a single measure, may provide complementary information on the behavior of trend inflation to that in any one inflation measure. The range of inflation generated by the set of near-optimal trims described above is a natural candidate for this because they are all equally good on average at tracking trend inflation, and because the information they provide can be effectively communicated through their range of inflation predictions, as Figure 6 illustrates. Communication can be streamlined by focusing on the range of inflation generated by the set of best 50 trims, which has similar properties to the one generated by the set of equivalent trims (which contains 74 series), while being less complex and in this way easier to communicate.

Moreover, the range of inflation implied by the set of near-optimal trims is a better predictor of the behavior of trend inflation than the point estimate of even the best trim combination. To gauge the range's predictive performance we compute its RMSE as the minimum distance between the value of the target trend measure and the range,

$$\text{RMSE}^{\text{range}} = \sqrt{\frac{1}{T}\sum_{t}\left(\max\left\{\ \bar{\pi}_t - \max_{i\in\text{range}}\{\pi_t^i\}\ ,\ \min_{i\in\text{range}}\{\pi_t^i\} - \bar{\pi}_t\ ,\ 0\ \right\}\right)^2}, \tag{2}$$

so that the error is zero if the trend falls within the range and the distance to the nearest endpoint if it falls outside. The range in Figure 6a delivers a RMSE of 0.73 against current trend inflation, well below the RMSE of the best trimmed-mean series (1.08, Table 2).

[20] Kostyshyna and Petersen (2024) find no detrimental effects of communicating ranges over point estimates of inflation. Instead, ranges are more informative for households with extreme values of expected inflation.

While a lower RMSE is to be expected when using a range of inflation instead of a point estimate, the gains in predictive performance do not come entirely from the width of the range. Two simple additional calculations help to show this. First, there is information in the range beyond its width. Using the midpoint of the range as a point estimate for trend inflation and computing the RMSE as in equation (1) delivers a RMSE of 0.91 over the whole sample. This is almost half of the difference between the RMSE of the range prediction and the point estimate of the best trim. Second, not all ranges are equally informative. Consider a range around the official trimmed mean series of the same width as the range in Figure 6a. This new range delivers a RMSE of 0.90 (computed as in 2), virtually the same as using only the point estimate from the midpoint of the near-optimal trims' range.

Current vs future inflation Finally, our analysis also shows that measures of trimmed mean inflation have a hard time tracking changes in future trend inflation, instead lagging its movements, as Figure 6 makes clear. This is particularly evident in the two instances of high inflation in the pre-1977 sample—that we added to the official series—and at the end of the sample, when inflation rises again. In fact, the predicted range for future trend inflation does not start increasing until inflation has already peaked. By contrast, the range of trimmed mean inflation measures is more informative about the behavior of current trend inflation. These results suggest that trimmed mean measures are best used to understand current inflation, with other methods such as those in Verbrugge and Zaman (2024) better suited for predicting future inflation.

5 Conclusion

Economists often use robust inflation series such as core inflation or median inflation to communicate with the public and gauge the behavior of trend inflation. Our evaluation of the performance of the official series for various targets and across various samples shows them to be robust across time and comparable with the performance of the best trimmed

mean inflation measure, which selects trimming cutoffs to minimize prediction error.

Among the official robust measures, trimmed mean and median inflation clearly outperform core inflation, constituting a somewhat surprising result given policy practices and public attention to core inflation. However, a more consequential result concerning the choice of optimal robust measures emerges from our analysis. Results based on the average predictive performance of the series obscure an underlying pattern of trimmed mean measures. A wide range of measures have the same predictive performance, but they produce substantially different predictions in any given month.

We conclude that following a set of trimmed mean measures rather than a single series may provide additional insight about the behavior of inflation. This information can be effectively communicated by reporting the range of predictions from the set of measures with the best predictive performance, as we do in Figures 1 and 6. This range is more informative about trend inflation than any single series among the ones we consider, so that even its midpoint outperforms the best trimmed mean inflation measure in tracking inflation. In this way, this range informs us about the behavior of trend inflation while indicating uncertainty in a way that is easy to communicate to the public. It can also provide a more credible signal to households with more uncertainty about inflation, anchoring their inflation expectations as shown in Kostyshyna and Petersen (2024).

While we also explored alternative trimmed mean measures not reported here and found similar results,[21] future work may consider a twist to our analysis. Such work may consider evaluating the predictive power of robust measures of inflation for particular *alternative targets*—for example, current or future inflation rates relevant for different sub-groups of the US population. This differential evaluation may provide valuable new insights into robustness in the context of heterogeneous effects of monetary policy.

[21] In particular, we constructed trimmed mean measures excluding housing, which is the single largest expenditure category and one of the series most commonly included in the official trimmed mean and median inflation measures (see Table B.2). We found that housing does not play a large role in the behavior of trimmed mean inflation measures. All of our results are preserved when excluding housing from the set of expenditure categories, as we show in Appendix B.4.

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A Replication of Trimmed-Mean and Median PCE Inflation Series

A.1 Headline and Core PCE Inflation

Headline inflation is calculated as a Fisher index of the underlying inflation components at the lowest level of aggregation. A Fisher index is the geometric mean of a Laspeyres and a Paasche index, which are calculated respectively as

$$\Pi_t^L = \frac{\sum_i p_t^i q_{t-1}^i}{\sum_i p_{t-1}^i q_{t-1}^i}; \quad \Pi_t^P = \frac{\sum_i p_t^i q_t^i}{\sum_i p_{t-1}^i q_t^i}, \tag{A.1}$$

where p_t^i and q_t^i are, respectively, the price level and quantity of expenditure category i at time t. Core PCE inflation is computed in the same way, but excludes all series under food and beverages purchased for off-premises consumption, gasoline and other energy goods, and electricity and gas.

A.2 Trimmed-Mean PCE Inflation Measures

Trimmed-mean PCE inflation measures select a set of expenditure categories in each month by removing the categories with the lowest inflation rates that represent α percent of expenditure and the categories with the highest inflation rates accounting for β percent of expenditure. The categories included in a given month are assigned weights using an average of the expenditure on each category at current-period quantities and previous-period quantities, which approximates the weights used in the PCE index formula,

$$\omega_t^i = \frac{1}{\alpha + \beta}\left(\frac{1}{2}\frac{p_{t-1}^i q_{t-1}^i}{\sum_i p_{t-1}^i q_{t-1}^i} + \frac{1}{2}\frac{p_{t-1}^i q_t^i}{\sum_i p_t^i q_t^i}\right). \tag{A.2}$$

The trimmed mean inflation series is the expenditure-weighted mean across the selected categories, where the weights are adjusted to reflect the fact that $\alpha+\beta$ percent of expenditure has been trimmed out. Once the monthly gross rates, $\Pi_t^{tm,mo}$, are constructed, they are chained to form a yearly inflation index,

$$\Pi_t^{tm} = \prod_{s=0}^{11} \Pi_{t-s}^{tm,mo}, \quad \Pi_t^{tm,mo} = \sum_i \omega_t^i \frac{p_t^i}{p_{t-1}^i}. \tag{A.3}$$

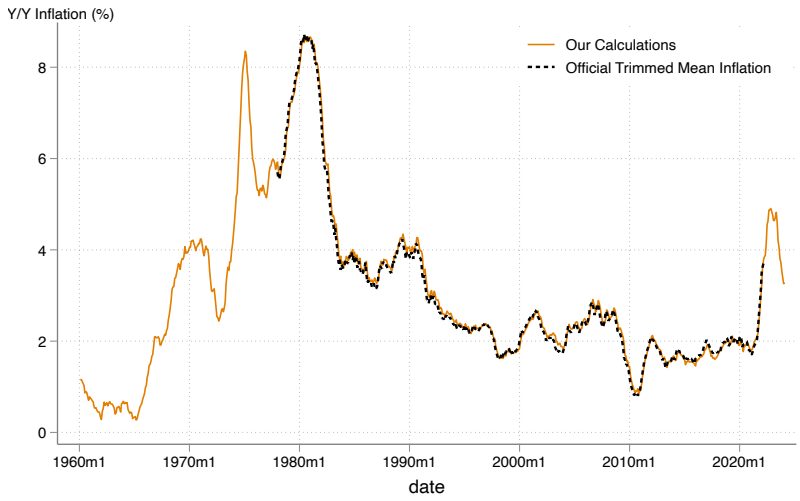
The median inflation series is calculated by trimming out all categories except the one with the median inflation rate in every month (that is, $\alpha = \beta = 50$). The chained index is

$$\Pi_t^m = \prod_{s=0}^{11} \frac{p_{t-s}^{i(m,t-s)}}{p_{t-s-1}^{i(m,t-s)}}, \tag{A.4}$$

where $i(m, t-s)$ is the index of the series with the median inflation at time $t-s$.

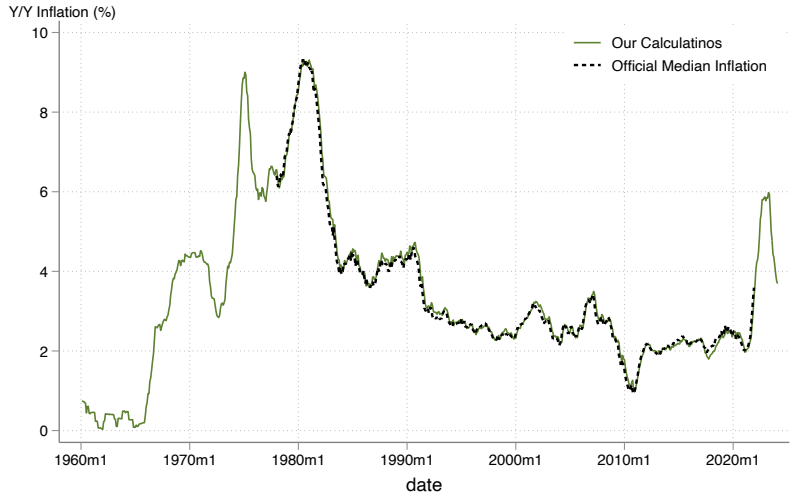
A.3 Replication of official trimmed-mean series

Figure A.1: Replication of Trimmed-Mean PCE Inflation, 1960–2024



Notes: The figure shows the authors' calculation of trimmed mean PCE inflation along with the official trimmed mean PCE series.

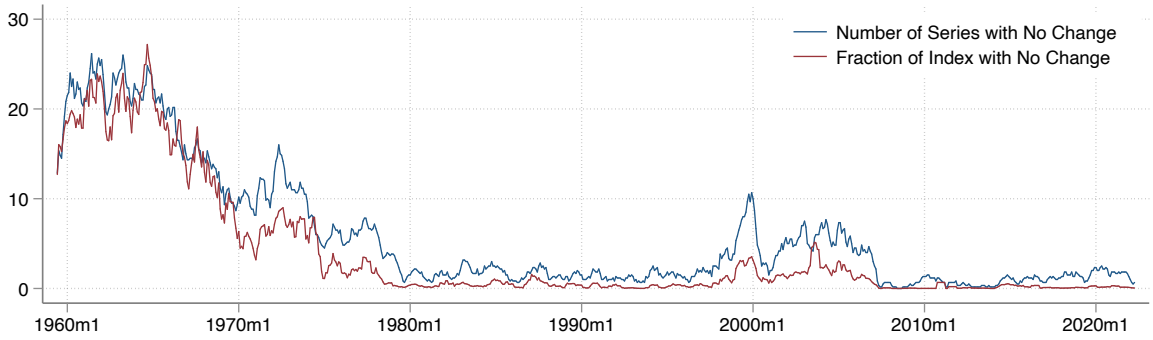
Figure A.2: Replication of Median PCE Inflation, 1960–2024



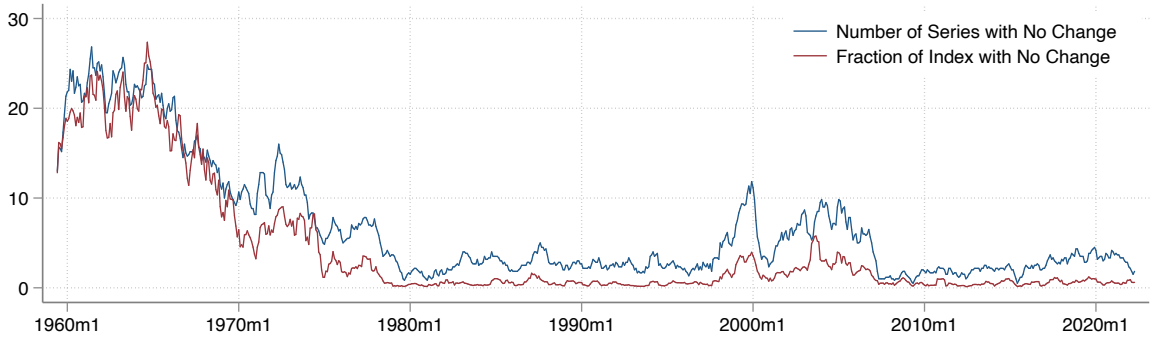
Notes: The figure shows the authors' calculation of median PCE inflation along with the official median PCE series.

Figure A.3: Number of Series with No Monthly Price Changes

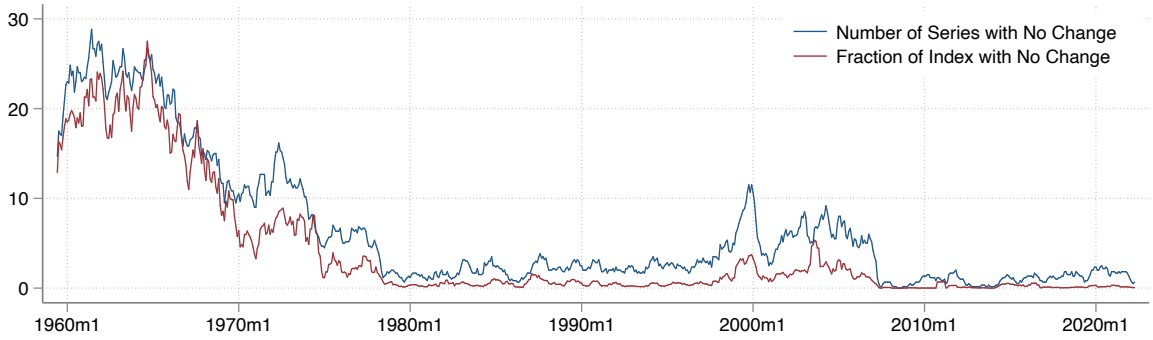
(a) Trimmed Mean



(b) Median



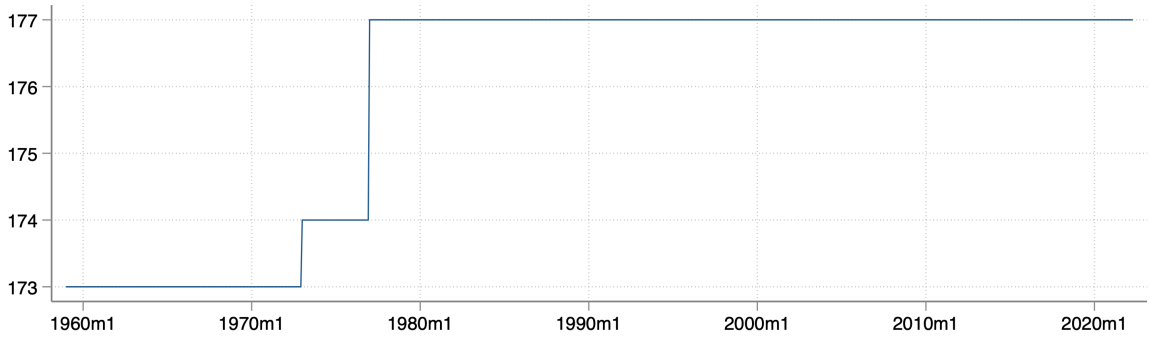
(c) Time Consistent



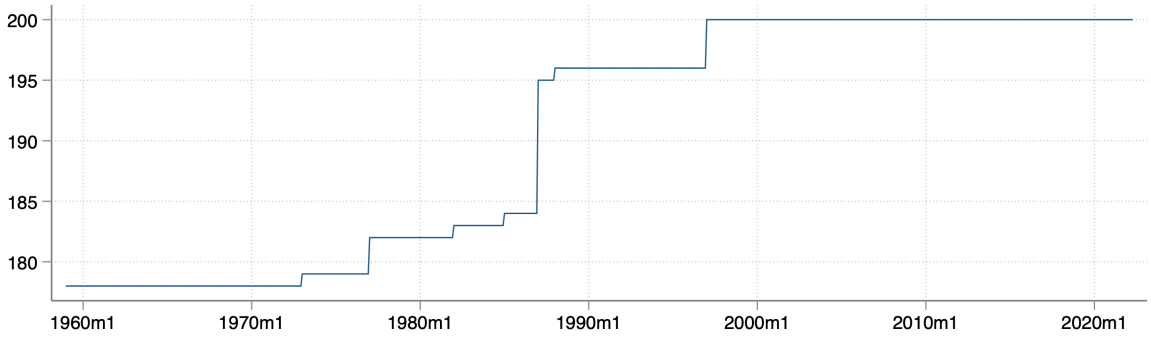
Notes: The lines plot the number of series and fraction of total expenditure (in percent) with no monthly price change for each of the three sets of series used in the paper.

Figure A.4: Number of Series with Positive Expenditure

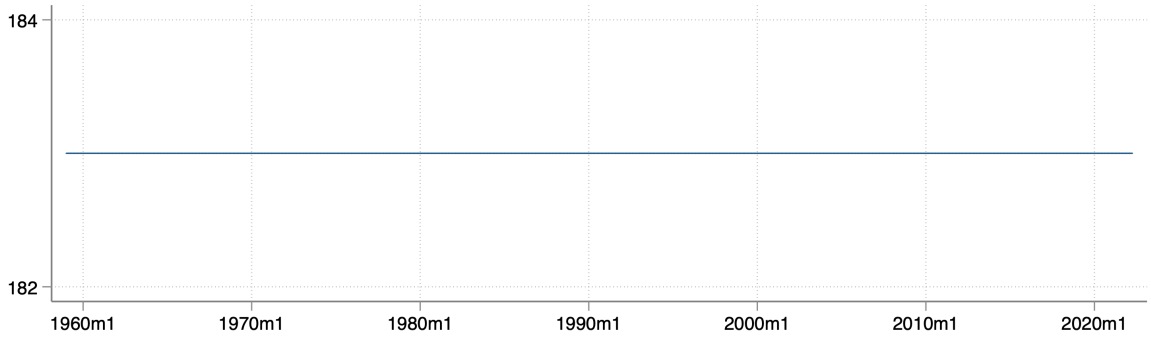
(a) Trimmed Mean



(b) Median



(c) Time Consistent



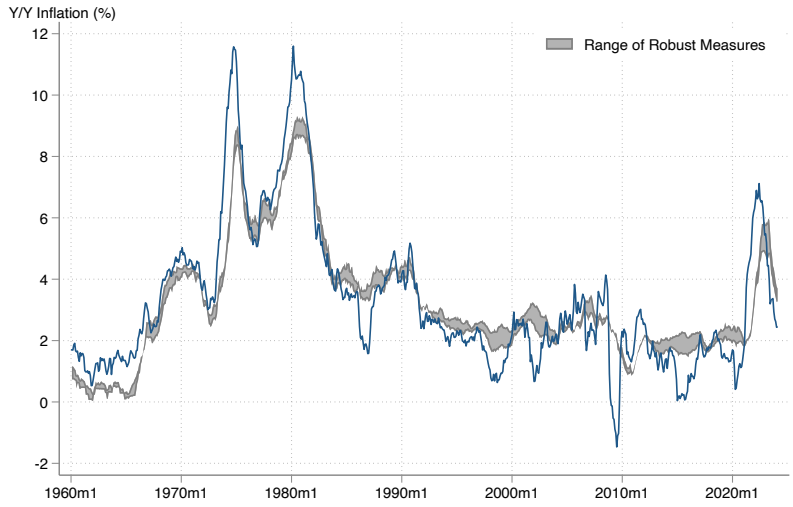
Notes: The lines plot the number of series with positive expenditure in the PCE series over time from the set of series considered by the trimmed mean inflation, median inflation, and the time consistent set constructed in the paper.

B Additional Results

B.1 Time Series Properties

The level of agreement between the series is also captured by the range of values they cover, shown in Figure B.1 along with the level of headline PCE inflation. The range is 0.49 percentage points on average over the whole sample, 0.47 percentage points when inflation is less than 2.5 percent, and 0.54 percentage points when inflation is above 5 percent. Thus, the range values covered by robust inflation measures is disproportionately wider when inflation is low than when inflation is high. This again shows that there is substantially more agreement between the signals provided by the different inflation measures when inflation is high.

Figure B.1: Range of Robust Inflation Measures, 1960–2024



Notes: The figure shows the authors' calculations of the range of robust inflation measures (core inflation, median inflation, and trimmed mean inflation) from 1960 to 2024. We report year-over-year inflation to smooth out variations in monthly inflation. The range is shown in the shaded area. The blue line corresponds to headline inflation.

The variability of the robust inflation measures is also higher during low-inflation episodes despite these measures being constructed to be less responsive to transitory movements in inflation. Even though the robust inflation measures are overall less volatile than headline inflation, this pattern does not hold throughout the whole sample. Table B.1 reports the mean, standard deviation, and coefficient of variation of the four inflation series for different samples that depend on the level of headline inflation, Figure B.2 plots the time series of the standard deviations.

When inflation is below 2.5 percent, median and trimmed mean inflation are more volatile than headline inflation, and when inflation is between 2.5 and 5 percent all three robust inflation measures are more variable than headline inflation. Moreover, the coefficient of variation is highest when headline inflation is below 2.5 percent. The robust

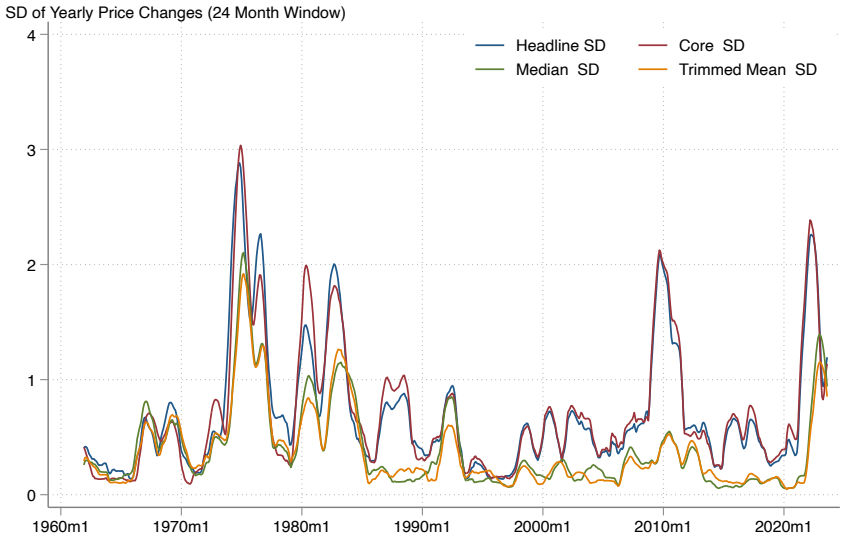
Table B.1: Summary Statistics: Inflation Measures

	Inflation Measures			
	Headline	Core	Median	Trimmed Mean
	Full Sample (748 months)			
Mean	3.27	3.21	3.33	2.96
Std. Dev.	2.42	2.13	2.01	1.86
Coeff. Var.	0.74	0.66	0.60	0.63
	$\pi < 2.5\%$ (373 months)			
Mean	1.55	1.73	2.01	1.72
Std. Dev.	0.67	0.53	0.95	0.70
Coeff. Var.	0.43	0.31	0.47	0.41
	$2.5\% \leq \pi < 5\%$ (252 months)			
Mean	3.61	3.51	3.55	3.17
Std. Dev.	0.71	1.06	0.84	0.77
Coeff. Var.	0.20	0.30	0.24	0.24
	$5\% \leq \pi$ (123 months)			
Mean	7.76	7.09	6.85	6.31
Std. Dev.	2.00	1.59	1.60	1.57
Coeff. Var.	0.26	0.22	0.23	0.25

Notes: The numbers are mean, standard deviation, and coefficient of variation of the different inflation measures for different samples determined by the level of PCE inflation. All numbers are in percentage points.

inflation measures also change their ranking in terms of how volatile they are. Core inflation is the most volatile in the complete sample, but median inflation is more volatile when inflation is low (below 2.5 percent) and trimmed mean inflation is more volatile when inflation is high (above 5 percent).

Figure B.2: Time-Series Variability of Measures of Inflation, 1960–2024



Notes: The figure shows the authors' calculations of the standard deviations of headline inflation, core inflation, median inflation, and trimmed mean inflation for a rolling window of 24 months.

Table B.2: Most Commonly Excluded and Included Expenditure Categories

	Median	Trimmed Mean	Middle 80% (10, 10) Trim
		Most Commonly Excluded	
1		Eggs	Eggs
2	66 series are	Food on farms	Vegetables
3	never median	Vegetables	Food on farms
4		Fruit	Fuel Oil
5		Gasoline	Gasoline
		Most Commonly Included	
1	Owner-occ homes	Owner-occ homes	Owner-occ homes
2	Other purchased meals	Other purchased meals	Other purch meals
3	Tenant-occ homes	Casino gambling	Tenant-occ homes
4	Nonprofit hospitals	Owner-occ mobile homes	Casino gambling
5	Physician services	Tenant-occ homes	Lotteries

Notes: The table reports the five expenditure categories most commonly excluded and the five most commonly included when computing median and trimmed mean inflation as well as those excluded and included when trimming the middle 90 percent of expenditure, setting trims to $\alpha = \beta = 10$, with a consistent set of inflation categories. All the results are from the authors' calculations of the series reported in Figure 2. In the case of median inflation (first column), all categories but one are included in a given month, so we report the number of series that are never included. A series is considered "included" if any of the weight of the series is used in the calculation.

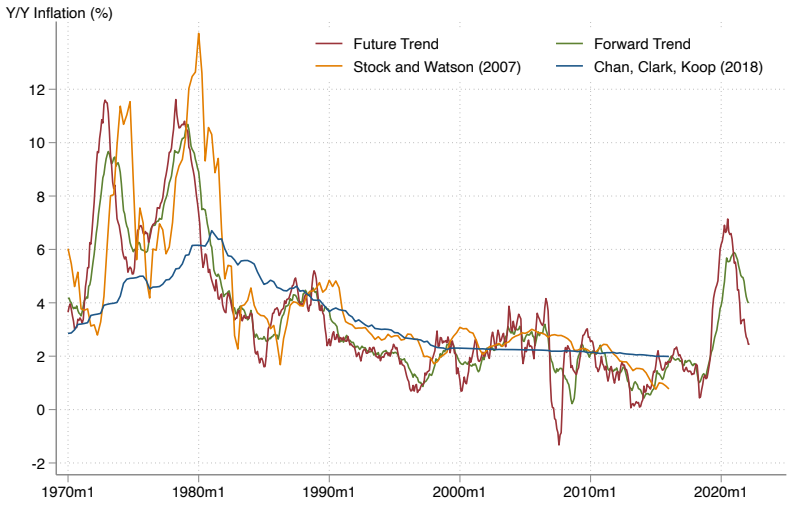
B.2 Alternative Measures of Trend Inflation

Figure B.3: Time Series of Trend Inflation

(a) Measures of Current Trend Inflation



(b) Measures of Future Trend Inflation



Notes: The first panel presents two measures of current trend inflation, a 36-month centered inflation trend (current trend), and a band-pass filter trend (band-pass trend) as described in Section 3, together with the series of year-on-year headline PCE inflation. The second panel presents two measures of future trend inflation, a 12-month forward moving average of headline inflation with data between 12 and 24 months ahead (future trend), and a 24-month forward moving average (forward trend). The other two lines are taken from `https://joshuachan.org/estimates.html` which contains calculations for the series in Stock and Watson (2007) and Chan, Clark, and Koop (2018).

Table B.3: Ranking of Various Methods of Calculating Robust Measures

Target	Sample	PCE Inflation Measure RMSE			DM Test: $\Pr(z > \lvert DM \rvert)$	
		Core	Trimmed Mean	Median	TM vs Med.	Core vs Other
	1970-2024	1.47	1.11	1.18	0.015	0.000
Current	1970-1989	1.84	1.62	1.52	0.088	0.001
Trend	2000-2024	1.34	0.81	1.02	0.000	0.004
	1970-2024	1.50	1.27	1.34	0.011	0.001
Band-Pass	1970-1989	1.79	1.66	1.57	0.042	0.011
Trend	2000-2024	1.35	1.07	1.27	0.000	0.040
	1970-2024	2.45	2.14	2.17	0.197	0.000
Future	1970-1989	3.35	3.02	3.02	0.903	0.000
Trend	2000-2024	1.99	1.66	1.71	0.161	0.019
	1970-2024	1.96	1.67	1.71	0.104	0.000
Forward	1970-1989	2.68	2.39	2.36	0.614	0.001
Trend	2000-2024	1.56	1.26	1.36	0.001	0.052

Notes: The table presents the predictive performance of different PCE inflation measures with respect to different trend inflation targets in different samples. The performance is measured with the series' root-mean-square error (RMSE) with respect to trend inflation. The table reports the RMSEs for core, trimmed mean, and median inflation. The last two columns report the p-value of the Diebold and Mariano (1995) test for the difference between the RMSEs of the trimmed mean and median inflation series and the difference of the core inflation series and the best of the trimmed mean and the median inflation series.

B.3 Alternative Trimmed Mean Measures of Inflation

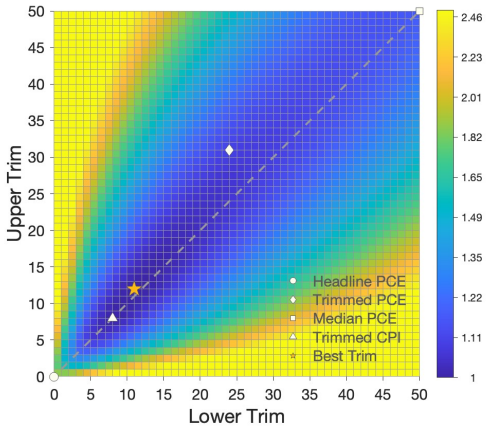
Table B.4: Best Trims for Trimmed-Mean Inflation

Target	Sample	Best Trims			Official Trims	DM Test
		Lower	Upper	RMSE	min(RMSE)	$\Pr(z > \lvert DM \rvert)$
	1970-2024	17	19	1.08	1.11	0.065
Current	1970-1989	18	16	1.46	1.52	0.235
Trend	2000-2024	18	23	0.80	0.81	0.403
	1970-2024	11	12	1.15	1.27	0.000
Band-Pass	1970-1989	10	9	1.39	1.57	0.007
Trend	2000-2024	13	16	1.00	1.07	0.019
	1970-2024	35	41	2.11	2.14	0.213
Future	1970-1989	15	17	2.91	3.02	0.412
Trend	2000-2024	24	28	1.63	1.66	0.288
	1970-2024	14	16	1.62	1.67	0.053
Forward	1970-1989	13	13	2.28	2.36	0.108
Trend	2000-2024	16	19	1.22	1.26	0.084

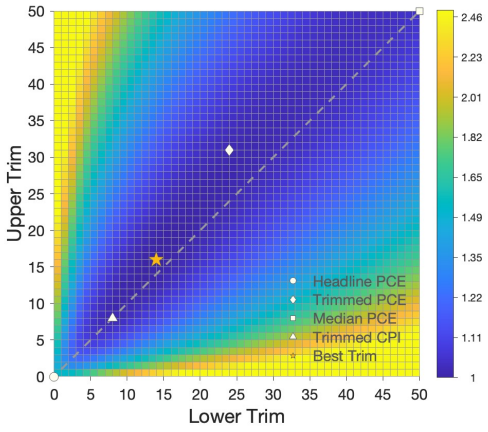
Notes: The table reports the best trims for different targets of trend inflation over different samples as determined by the predictive performance across trims. The root-mean-square error (RMSE) of the best trim is also reported along with the lowest RMSE of the official trimmed and median inflation series. The last column reports the p-value of the Diebold and Mariano (1995) test for the difference between the RMSEs of the best trim and the lowest of the official series.

Figure B.4: RMSE across Trims

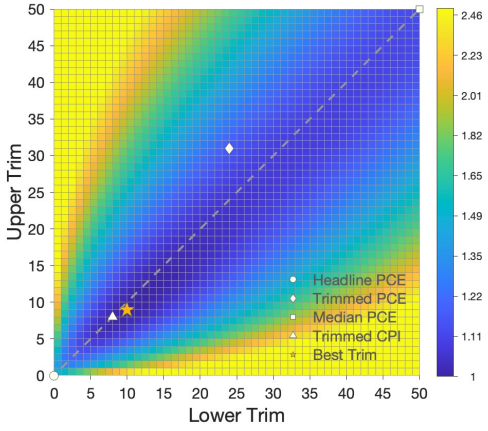
(a) Band-Pass Trend: 1970–2024



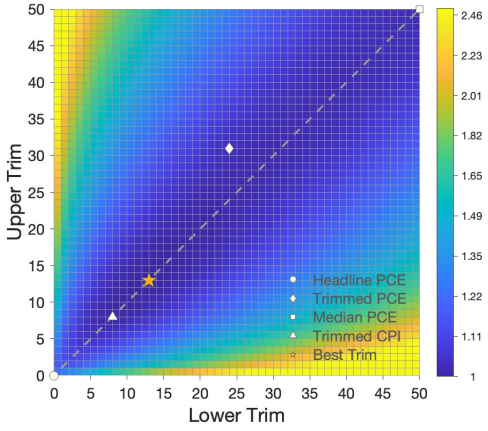
(b) Forward Trend: 1970–2024



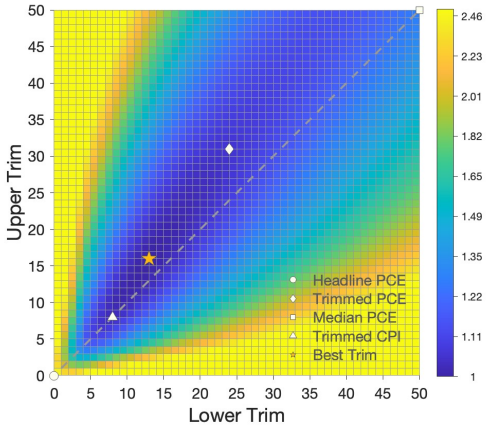
(c) Band Pass Trend: 1970–89



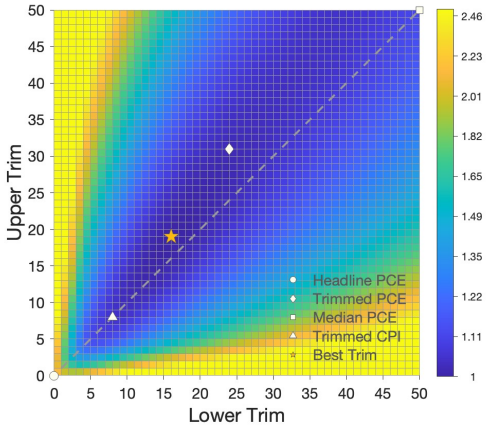
(d) Forward Trend: 1970–89



(e) Band-Pass Trend: 2000–2024



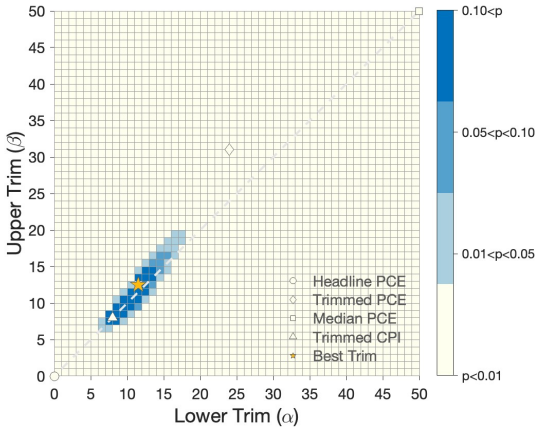
(f) Forward Trend: 2000–2024



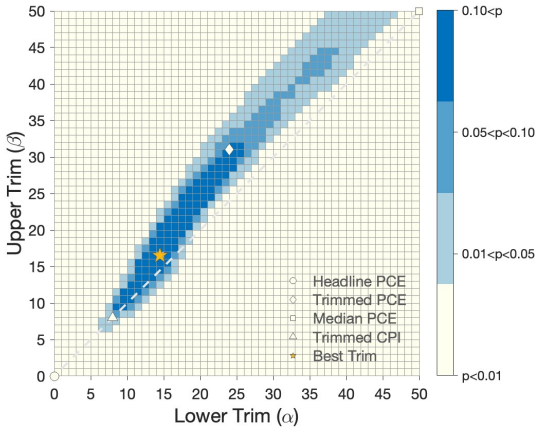
Note: *The figures show heat maps of the root-mean-square error (RMSE) when targeting band-pass and forward trend inflation with different trimmed mean inflation measures. To ensure comparability across plots, the RMSE numbers are reported relative to the RMSE of the best trim reported in Table B.4.*

Figure B.5: Statistical Difference of RMSE across Trims - Alternative Trends

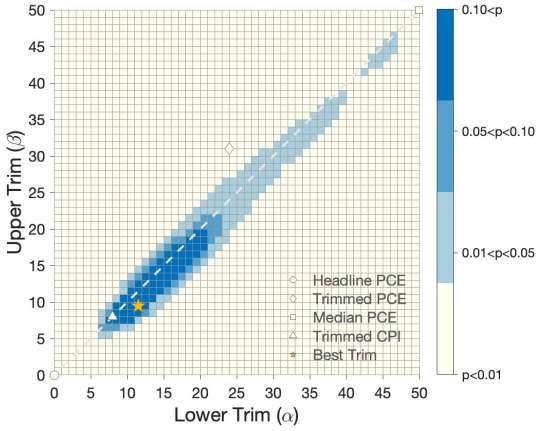
(a) Band-Pass Trend: 1970–2024



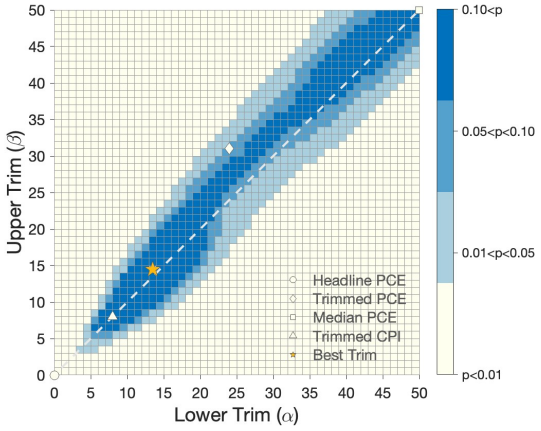
(b) Forward Trend: 1970–2024



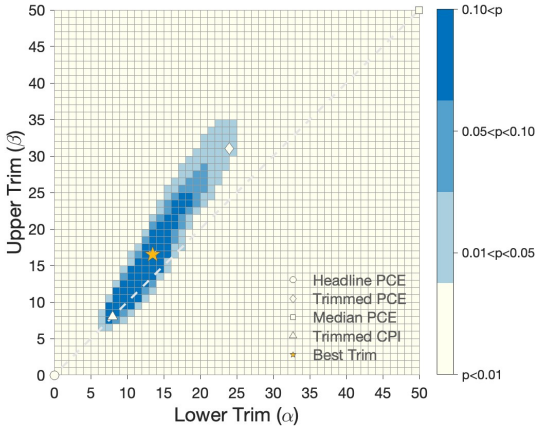
(c) Band-Pass Trend: 1970–89



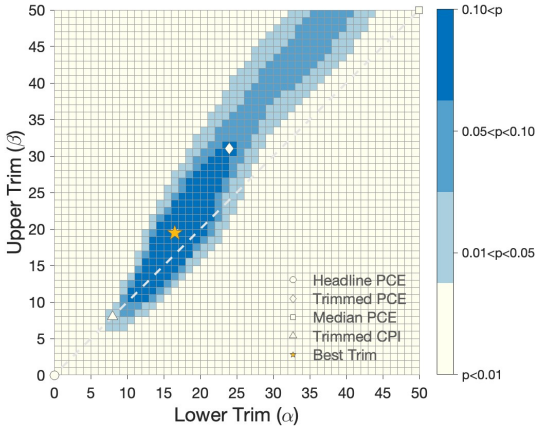
(d) Forward Trend: 1970–89



(e) Band-Pass Trend: 2000–2024



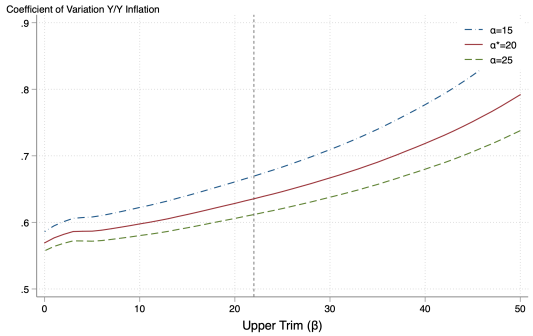
(f) Forward Trend: 2000–2024



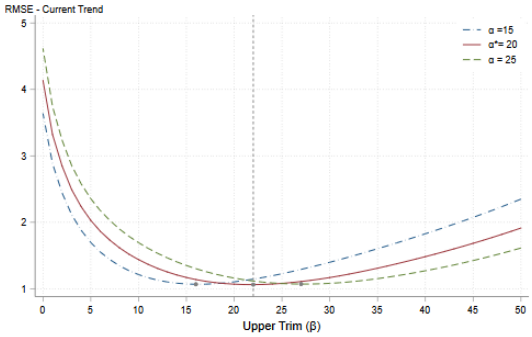
Note: The figures group trims according to the outcome of the Diebold and Mariano (1995) test, which compares the root-mean-square error (RMSE) implied by the trims with the RMSE of the best trim as presented in Table B.4. The trims are grouped based on the p-value of the test. The darkest region consists of trims whose RMSE is statistically equivalent to the lowest RMSE across all trims.

Figure B.6: The Behavior of Trimmed Mean Measures

(a) Coefficient of Variation



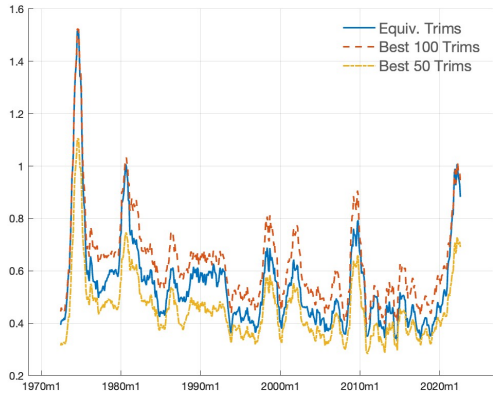
(b) RMSE - Current Trend



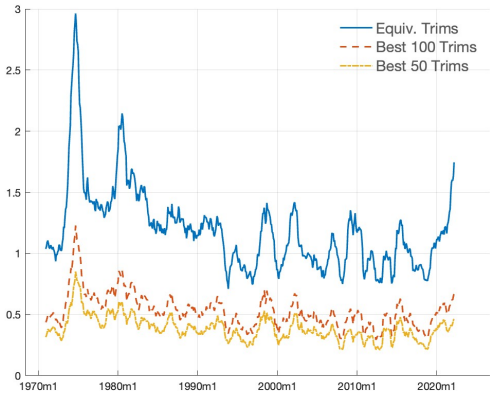
Notes: The left panel shows the coefficient of variation for different upper trims for trimmed mean measures with three different levels of lower trim. The coefficient of variation is the ratio between the standard deviation and the mean of thee series over the 1970–2024 sample. The right panel shows the RMSE of the series when targeting current trend inflation. The dotted vertical line signals the optimal upper trim and the $*$ indicates the optimal lower trim.

Figure B.7: Prediction Range across Best Trims across Time

(a) Centered Trend

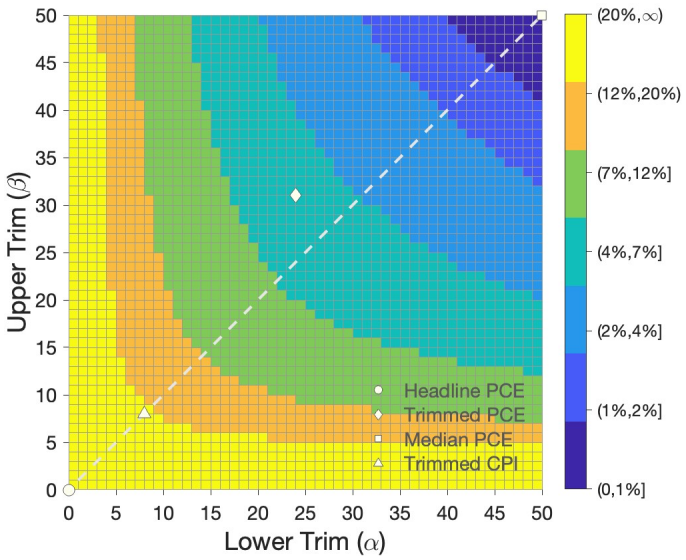


(b) Future Trend



Notes: The figures plot the range between the lowest and highest predictions for the current and future trends between 1970 and 2024 given a set of trimmed mean measures of inflation. There are three ranges for each inflation target: first, the range implied by considering the trims that are statistically equivalent at the 5 percent level according to the Diebold and Mariano (1995) test of the difference of their root-mean-square errors (RMSEs) with respect to the RMSE of the best trim (see Table 2); second, the range implied by considering the best 100 trims as ranked by their RMSE; third, the range implied by considering the best 50 trims as ranked by their RMSE.

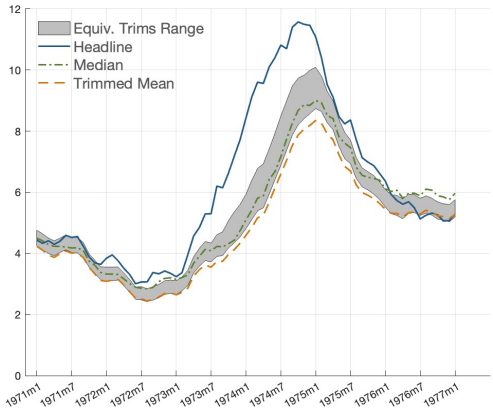
Figure B.8: Average Range of Inflation by Trims



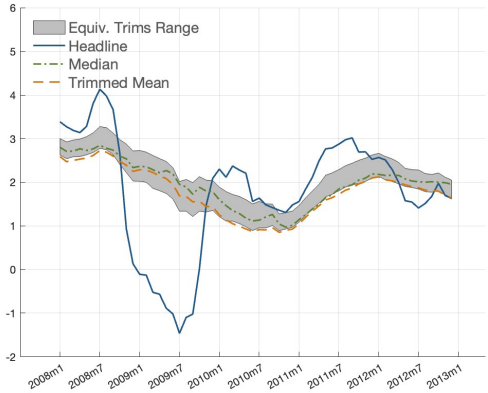
Note: The figure shows the average range of inflation rates across individual expenditure categories implied by each trim combination, $\pi_{1-\beta} - \pi_{\alpha}$.

Figure B.9: Range of Robust Measures of Inflation

(a) 1971–1976



(b) 1971–1976

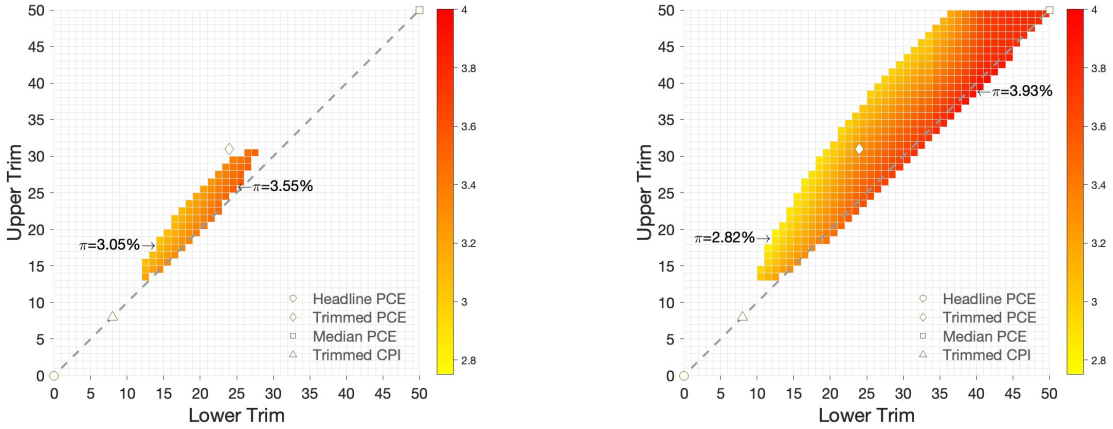


Notes: The figures shows the range (in gray) of inflation implied by the set of trimmed mean inflation measures whose RMSE with respect to current trend inflation are statistically equivalent to the best trim at the 5 percent level. The figure also includes trimmed mean personal consumption expenditure (PCE) and median PCE as calculated by the authors using the methodologies of Federal Reserve Bank of Cleveland (2021) and Federal Reserve Bank of Dallas (2021), as well as headline PCE inflation, taken directly from the PCE data published by the Bureau of Economic Analysis.

Figure B.10: Prediction across Best Trims - February 2024

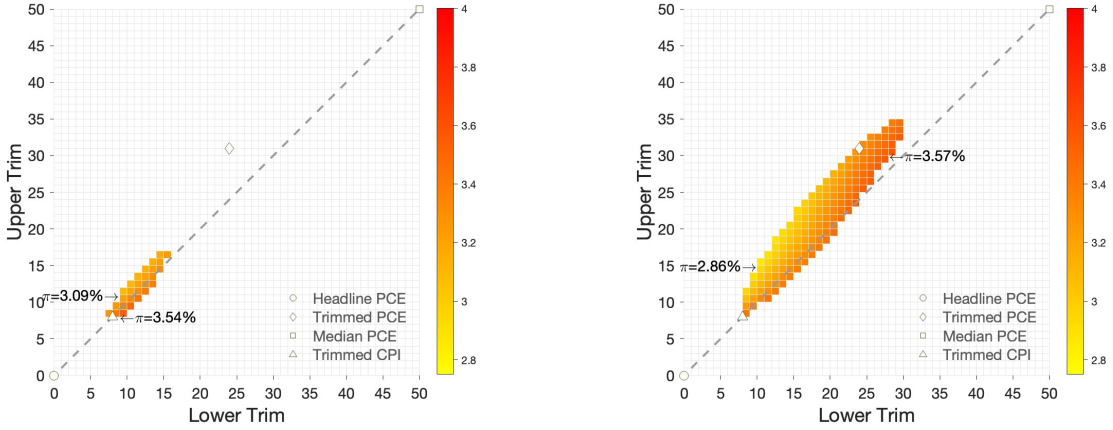
(a) Centered Trend

(b) Future Trend



(c) Band-Pass Trend

(d) Forward Trend



Note: The figures show heat maps of the prediction level for February 2024 across the best 50 trim combinations, ranked according to their RMSE when targeting band-pass or forward trend inflation over the sample 1970–2024. The best trims vary according to the trend inflation series being targeted. The set of best trims is defined as those with an RMSE statistically indistinguishable at the 5 percent significance level from the lowest RMSE across all trims.

B.4 Excluding Housing from Trimmed-Mean Inflation

Housing is the single largest expenditure category and may have different dynamics from the remainder of the consumption basket (Adams et al., 2024). It is also one of the series most commonly included in the official trimmed mean and median inflation measures (see Table B.2). This can raise questions over housing having too large of a role in the behavior of trimmed mean inflation measures. That is not the case. We now reproduce our main results while excluding owner occupied housing from the construction of trimmed mean measures and re-weighting the remaining categories accordingly. All of our results are preserved, with the obvious exception of the level of the optimal trim cutoffs that changes to reflect the exclusion of housing from the set of expenditure categories.

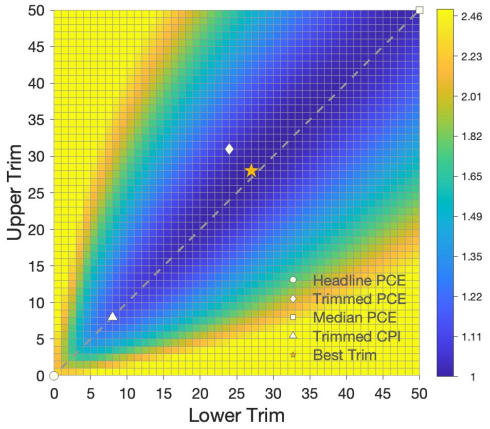
Table B.5: Best Trims for Trimmed-Mean Inflation without Housing

Target	Sample	Best Trim		
		Lower Trim	Upper Trim	RMSE
Centered Trend	1970–2024	27	28	1.20
	1970–1989	26	23	1.65
	2000–2024	27	30	0.88
Band-Pass Trend	1970–2024	20	20	1.22
	1970–1989	22	19	1.47
	2000–2024	18	19	1.09
Future Trend	1970–2024	47	50	2.19
	1970–1989	24	25	3.02
	2000–2024	47	49	1.65
Forward Trend	1970–2024	24	26	1.70
	1970–1989	24	23	2.37
	2000–2024	27	28	1.26

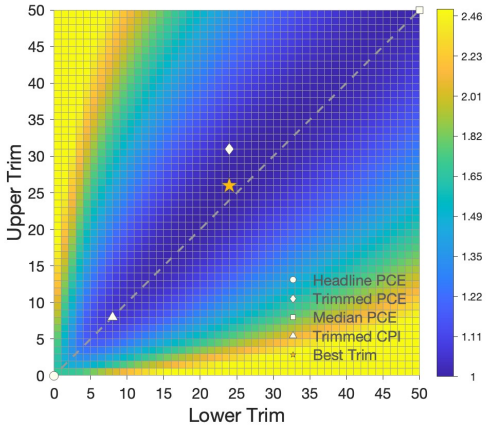
Notes: The table reports the best trims for different targets of trend inflation over different samples as determined by the predictive performance across trims. The root-mean-square error (RMSE) of the best trim is also reported.

Figure B.11: RMSE across Trims: 1970–2024 (Sample without Housing)

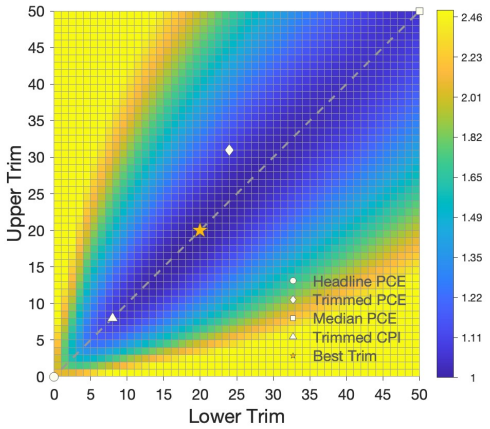
(a) Centered Trend



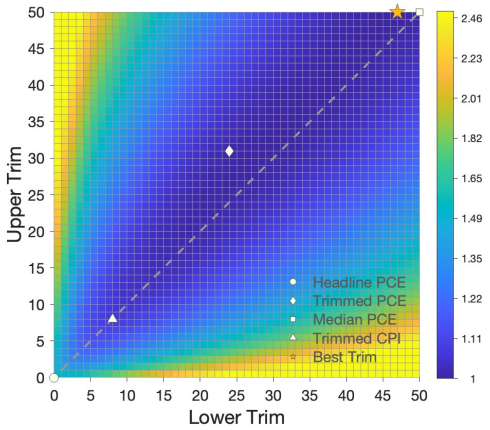
(b) Forward Trend



(c) Band-Pass Trend



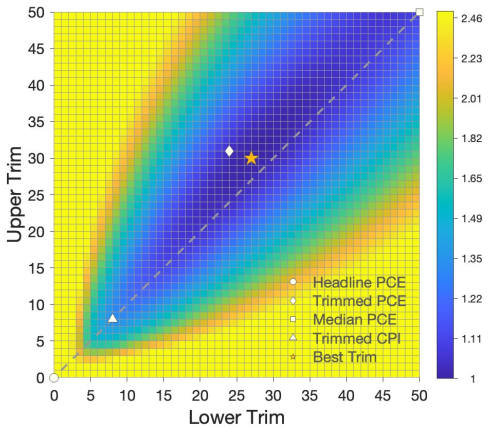
(d) Future Trend



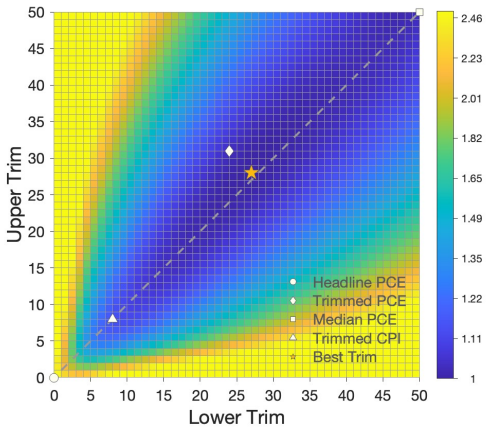
Note: The figures show heat maps of the RMSE when targeting trend inflation with different combinations of trimmed mean inflation measures. Four measures of trend inflation are considered. To ensure comparability across plots, the RMSE numbers are reported relative to the RMSE of the best trim reported in Table B.5.

Figure B.12: RMSE across Trims: 2000–2024 (Sample without Housing)

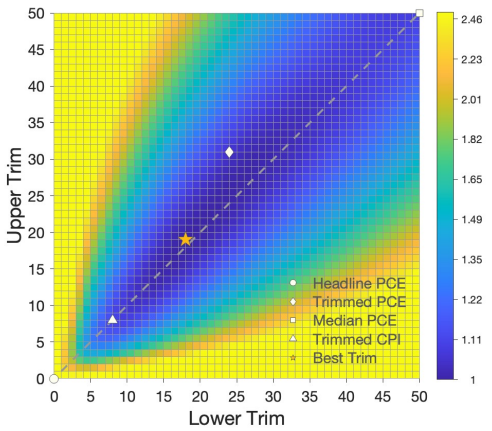
(a) Centered Trend



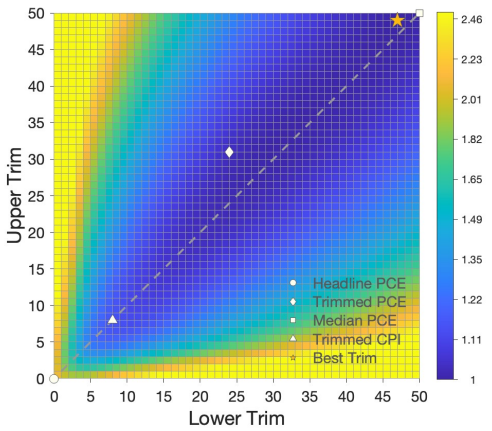
(b) Forward Trend



(c) Band-Pass Trend



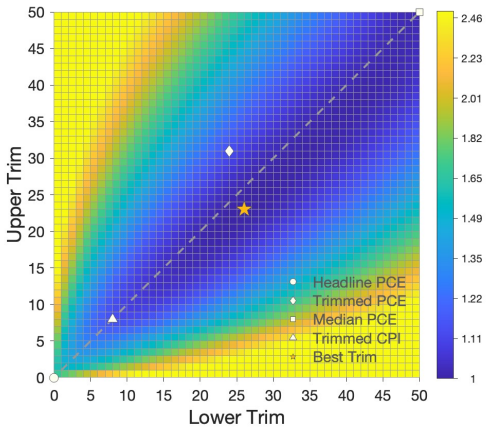
(d) Prediction



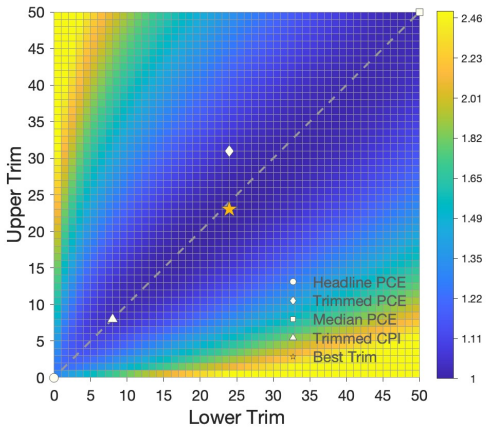
Note: The figures show heat maps of the RMSE when targeting trend inflation with different combinations of trimmed mean inflation measures. Four measures of trend inflation are considered. To ensure comparability across plots, the RMSE numbers are reported relative to the RMSE of the best trim reported in Table B.5.

Figure B.13: RMSE across Trims: 1970–89 (Sample without Housing)

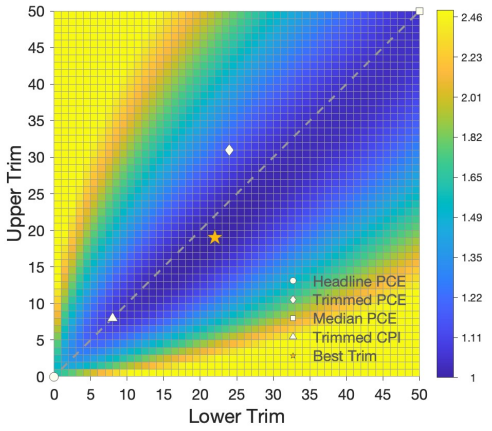
(a) Centered Trend



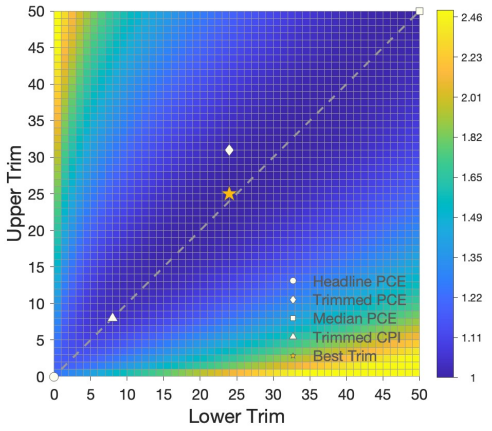
(b) Forward Trend



(c) Band-Pass Trend



(d) Prediction



Note: The figures show heat maps of the RMSE when targeting trend inflation with different combinations of trimmed mean inflation measures. Four measures of trend inflation are considered. To ensure comparability across plots, the RMSE numbers are reported relative to the RMSE of the best trim reported in Table B.5.