



# The Risks of Relying on an Inaccurate Inflation Measure



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The jury is still out on whether official CPI indices over- or underestimate inflation, but the latter would have consequences that reach far beyond consumers. Key macroeconomic data might be inaccurate, monetary policy could be too accommodative and investors could suffer from the “stealth devaluation” of important assets.

## Key takeaways

- For years, consumer-price inflation has been puzzlingly low; official figures may be flawed and not reflective of actual experienced inflation
- Politically welcomed changes in calculation methods have dampened official US consumer price indices since the 1980s
- CPI's key shortcomings: it isn't a true fixed “basket,” it suffers from contentious quality adjustments and it's biased towards higher-income households
- By mandate, central banks have been hyper-focused on consumer price inflation, resulting in overly expansive policy that has raised the risk of asset bubbles
- If inflation is being underestimated, social security and income inequality could suffer, and risks to financial stability may increase
- Central banks should pay more attention to asset-price inflation, and investors should consider real assets as an inflation hedge and diversifier

## Introduction

Despite central banks implementing ultra-expansive monetary policy measures in the aftermath of the great financial crisis, consumer-price inflation has remained puzzlingly low in most parts of the world. This is not to say that accommodation from central banks hasn't affected

prices at all – in fact, quite the opposite. The global economy has seen plenty of inflation, but it has been in asset prices rather than in goods and services prices.

While there are numerous explanations for the lack of consumer-price inflation in recent years – like lingering excess capacity, sluggish wage growth, demographic

shifts and spillover from technological disruption – one important question has been overlooked: is inflation being measured in an appropriate way?

In the following analysis, we aim to answer this question while highlighting several important considerations:

- Why consumer-price indices may suffer from methodological flaws and might not be ideal cost-of-living measures for broad swathes of the population.<sup>1</sup>
- How politically welcomed calculation changes dating back to the early 1980s contributed to lower official consumer-price inflation – which helped central banks achieve their inflation objectives and dampened public deficits.
- Why it's risky to have a narrowly defined target function for monetary policy – one that primarily focuses on inappropriately measured goods and service prices while neglecting asset prices.

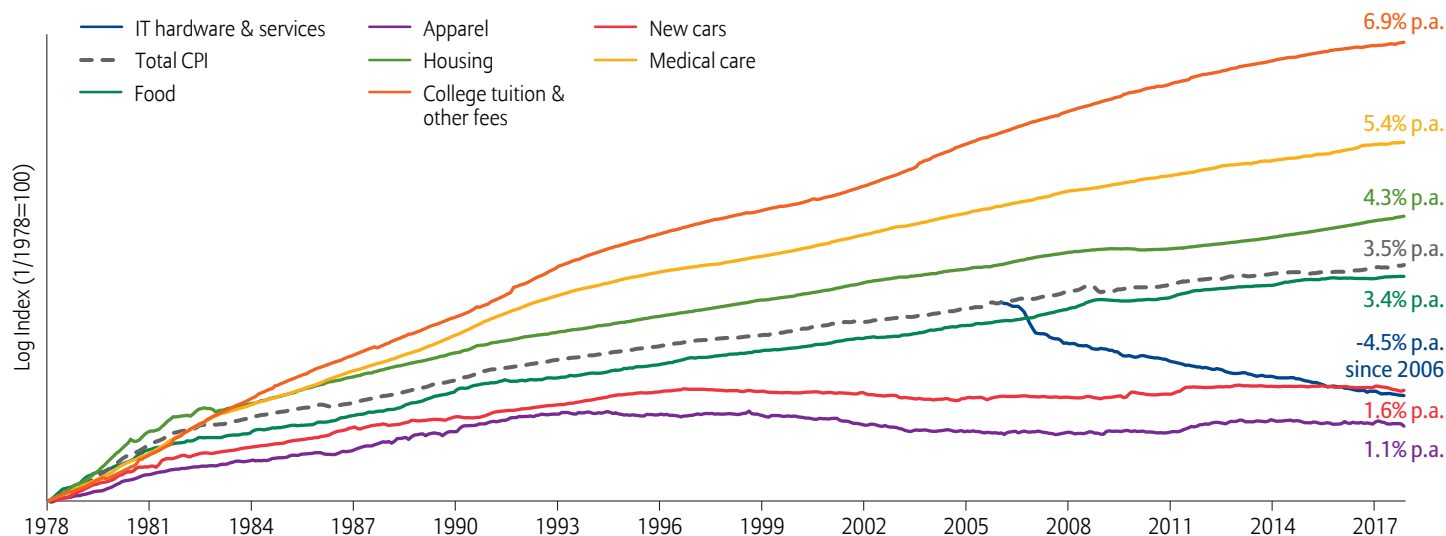
## Where are the fault lines in consumer price indices?

A consumer-price index (CPI) strives to measure the average change over time in the prices consumers pay for a “basket” of goods and services. Beyond this broad definition, the devil is in the details (see Figure 1). The actual CPI calculation is predicated on a multitude of often contentious methodological assumptions and quality adjustments, making these gauges imperfect measures of an unobservable “true” inflation.

### CPI is based on several contentious assumptions, making it an imperfect measurement of “true” inflation

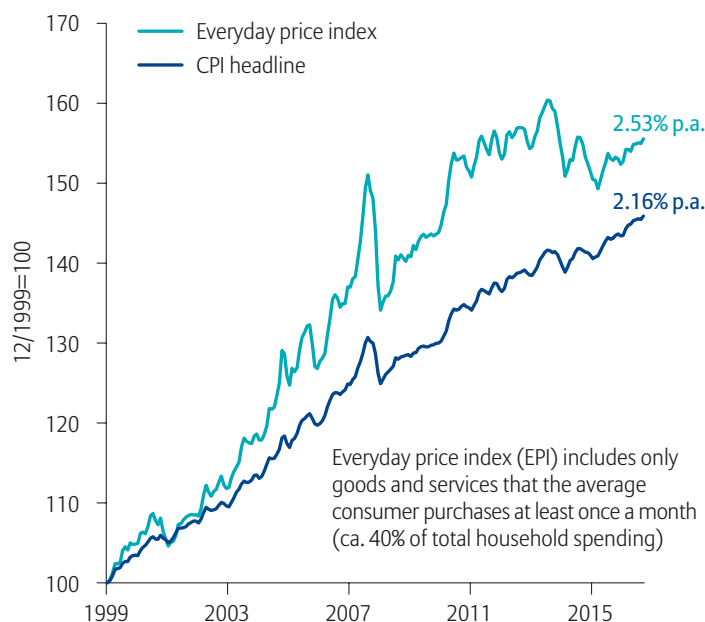
But before discussing potential reasons why inflation is mismeasured, it's essential to clarify some of the shortcomings of CPI's measurement and calculations – focusing in this case on the United States.

**Figure 1: Large Divergence Between US CPI Components and Total CPI**



Source: Allianz Global Investors, Bloomberg, Bureau of Labor Statistics. Data as at 30 November 2017.

**Figure 2: Over Time, “Everyday Goods” Inflation Is Higher than CPI**



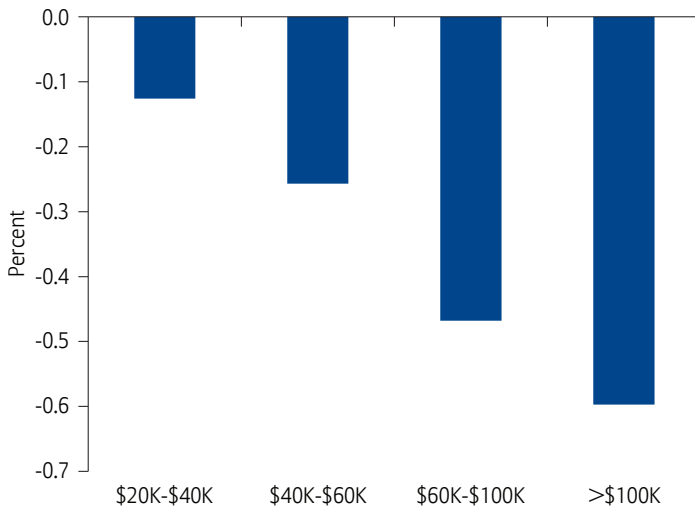
Source: Allianz Global Investors, American Institute for Economic Research. Data as at August 2017.

### CPI is an incomplete cost-of-living measure – not a true fixed basket

CPI aims to capture the market-based cost for a basket of goods and services needed to maintain a constant utility level or standard of living. However, the underlying basket of items and their respective weightings are not fixed; instead, they change with underlying shifts in consumer preferences – a phenomenon known as the “substitution effect”.<sup>2</sup> While this adjustment is made to reflect changing consumer situations, it results in inconsistency in the index over time.

### CPI covers goods and services, but excludes asset prices

With a focus on consumers' day-to-day living expenses, CPI excludes

**Figure 3: Median- and Lower-Income Households Face Higher Inflation Rates**

Source: Kaplan/Schulhofer-Wohl (2016) "Inflation at the Household Level". Data as at 2016. Chart shows inflation differential vs. households with income lower than \$20K (average p.a., 2004-2013). Chart is in USD, based on median household-level prices in the United States.

intermediate goods and asset prices. Theoretically, excluding asset prices seems justified, but it creates at least two major problems. First, some assets like owner-occupied housing represent a grey zone, since they are very long-lived assets but also provide immediate shelter service, which costs are not readily observable. Second, central-bank mandates are too narrowly focused when goods and service prices diverge widely from asset prices. This is the case today: since the global financial crisis, asset prices have experienced an inordinate amount of inflation.

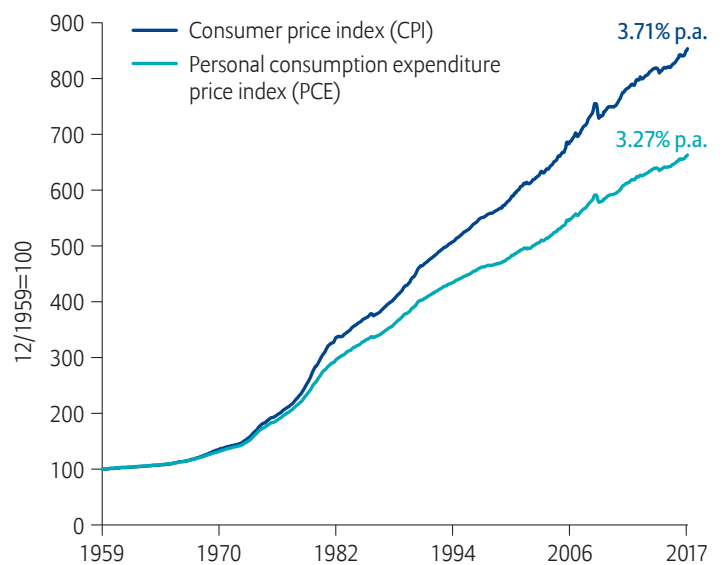
#### CPI isn't representative of median- or lower-income households

The relative weights of CPI basket items are based on a survey of aggregated consumer expenditures, which makes CPI mostly representative of the upper third of the income spectrum. The median- and lower-income households that are underrepresented by CPI tend to have different consumption patterns – as do older people. For example, lower-income households spend a higher income share on "frequently purchased items" that tend to be subject to stronger price increases (see Figures 2 and 3) – items such as food and beverages, fuel and energy, and prescription drugs. As a result, these groups often suffer from higher inflation than the level indicated by official CPI data. Given these measurable divergences, it's obvious that inflation is in the eye of the beholder.

**Median- and lower-income households can suffer from higher inflation than indicated by official CPI**

### Inherent differences in widely used inflation measurements

The two most widely used measures of consumer-price inflation in the United States are the Consumer Price Index (CPI),<sup>3</sup> published by the Bureau of Labor Statistics, and the personal consumption expenditure deflator (PCE), published by the Bureau of Economic Analysis.

**Figure 4: Best-Known US Inflation Measures Show Very Different Results**

Source: Allianz Global Investors, Bloomberg. Data as at 30 November 2017. Chart shows 1959 to 2017.

A comparison of the two (see Figure 4) shows that even though these inflation approaches serve a similar purpose, they often yield vastly different results for methodological reasons. The material deviation between CPI and PCE (see Figure 5) – which has amounted, on average, to more than 0.4 per cent each year since the late 1950s – is primarily caused by three inherent effects:

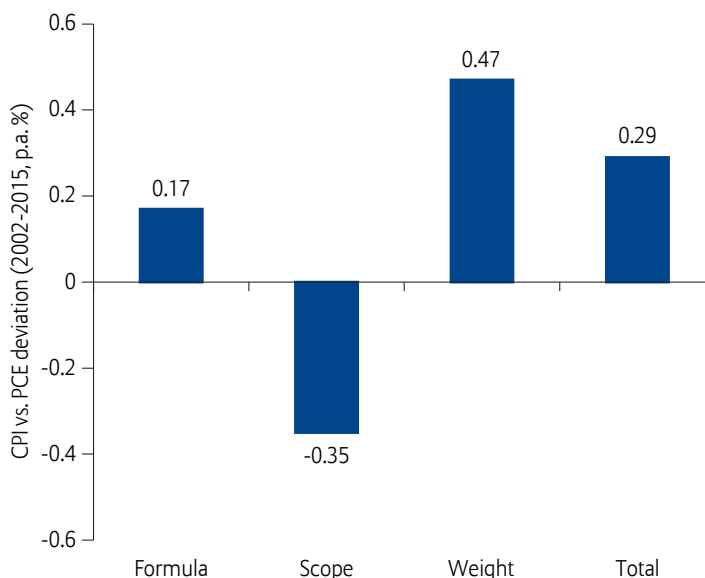
- **Relative importance of components.** The weight of individual categories differs significantly, with the CPI skewed to housing items, whereas the PCE basket has a disproportionate share in medical care (see Figure 6).
- **Formula.** While the CPI calculation is based on a Laspeyres-type formula with fixed upper-level weights, the PCE index uses a so-called chain-type Fisher-Ideal formula. Intricate technical details aside, the main difference is the degree of substitution assumed by both methods between similar items with relative price changes. The more pronounced substitution effect has consistently put more downward pressure on PCE versus CPI.
- **Scope.** In contrast to the PCE deflator, CPI only accounts for direct purchases ("out of pocket") by consumers and ignores third-party ("on-behalf") purchases – such as medical-care expenses paid for by employer-provided insurance or public programmes.

### Qualitative sources of inflation mismeasurement

While these quantitative technical details have a meaningful impact on published inflation numbers, the mismeasurement problem is further aggravated by a range of qualitative issues.

#### An array of upside and downside biases

The most important upside bias to consumer-price indices derives from the lack of appropriate quality adjustments and the belated introduction of new goods and services into the inflation basket.

**Figure 5: CPI-U and PCE Inflation Rates Differ Materially**

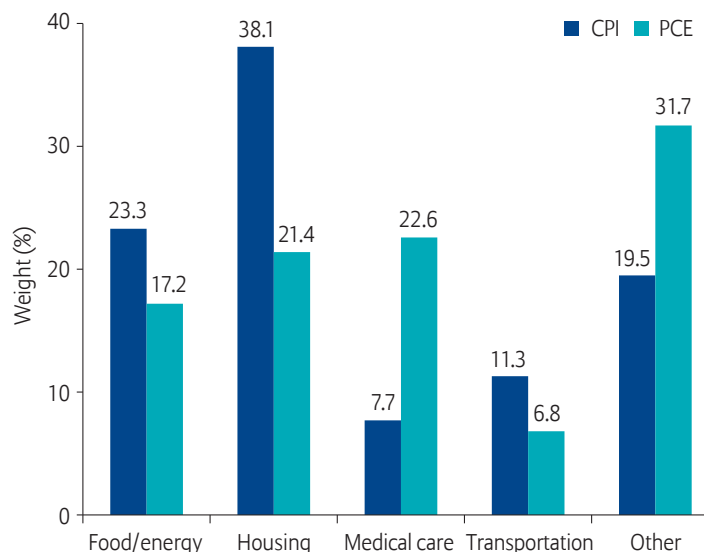
Source: Allianz Global Investors, Chicago Fed Letter (No. 347, 2015): "How to measure inflation?" Data as at 30 September 2015. Chart shows Q1 2002 to Q3 2015.

(Today's flat-screen high-definition TV, for example, is not comparable with its 1980s predecessors.) Consequently, statisticians treat a quality improvement that is not reflected by higher prices as a disinflationary phenomenon.

But what is reasonable in theory often proves difficult to implement in practice. Accounting for quality changes as part of the inflation calculation is by no means a straightforward process. Moreover, it often relies on auxiliary methods like so-called "hedonic" techniques, which adjust prices based on the estimated utility of the decomposed characteristics of an item. As roughly 33 per cent of the CPI basket is eligible for hedonic-quality adjustments, this procedure alone leaves plenty of room for potential mismeasurements.

Critics complain that the current approach insufficiently accounts for qualitative leaps in information and communications technology – an issue that not only affects consumer inflation measurement but also the broader framework of economic data in the National Income and Product Accounts (NIPA).<sup>4</sup> Furthermore, new goods and services regularly enter the inflation basket with a considerable lag, leaving unrecognized the common disinflationary effect at the early stage of a product cycle. For example, cellular phones were introduced to the marketplace in 1983 but were not included in CPI until 1998 – by which point about 55 million of those devices were already in use in the United States.<sup>5</sup>

Another reason why official indices might overstate actual inflation is the so-called "outlet bias", which refers to the change in shopping patterns over time. Initially, the availability of discount stores offered consumers the opportunity to shop at reduced prices. The growing shift towards online spending has reinforced this effect, which is still not fully captured by today's inflation-measurement approach. But it is necessary to stress that some of the innovations and services offered

**Figure 6: Notable Differences in Component Weightings of CPI-U and PCE**

Source: Allianz Global Investors, Bloomberg. Data as at 31 December 2015.

by the information-technology sector are beyond the scope of the official consumer-price index. "Free" digital services such as internet search engines or social media sites are conceptually non-market items – and are not included in the inflation basket.

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### Official indices might overstate actual inflation due to the "outlet bias" – a change in shopping patterns over time

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#### Ongoing disagreement about whether inflation is over- or underestimated

On balance, the majority of academic research studies published over the past 20 years came to the conclusion that consumer-price indices in the United States have overestimated inflation to the tune of at least 0.25 per cent to 0.5 per cent every year.

However, these conclusions have been by no means unequivocal; there are in fact numerous reasons that official figures may underestimate inflation.

For example, housing and the treatment of homeowners' shelter costs are the most prominent suspects. In the light of the double-digit housing inflation at work in the US in the late 1970s and early 1980s, the Bureau of Labor Statistics decided to relinquish its widely criticized asset-price approach for measuring owners' occupied-shelter inflation, which was predicated on house prices and mortgage rates that were rising rapidly. In 1983, the BLS transitioned towards a rental-equivalence approach instead – a method that is based on an estimation of the imputed costs homeowners would pay to rent, or would earn from renting, their homes in a competitive market.

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### Housing and the treatment of homeowners' shelter costs are key reasons why official figures may underestimate inflation

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The issue with this approach is that while the focus on shelter service instead of asset prices certainly makes sense from a theoretical standpoint, it remains unclear whether the new procedure has yielded more representative results.

For example, the constantly rising expenditure share that US households have spent on housing since the 1980s is a strong indication that shelter costs not only have outpaced income growth, but may also have been understated by official inflation measures.<sup>6</sup> Given the huge weighting for shelter costs in the CPI basket, a mismeasurement of these costs would have a meaningful impact on the accuracy of CPI.

## Significant methodological changes have contributed to lower official inflation figures

Beginning in the 1990s, many US policymakers – led by Alan Greenspan, the then-Chair of the US Federal Reserve – began to grow increasingly concerned about potential upside biases in CPI. In response, the US Senate appointed an advisory panel of economists – the so-called Boskin commission – which estimated in 1996 that the then-current CPI approach would overstate the “true” inflation rate by roughly 1.1 per cent each year.

The call to reduce published inflation figures was very good news politically, and the US Senate and the Fed both became strong advocates for many of the measurement changes suggested by the Boskin commission. In the end, the Bureau of Labor Statistics made a range of adjustments<sup>7</sup> to its inflation measures that reduced the assumed upward bias, and therefore dampened inflation by up to 0.5 per cent per annum.<sup>8</sup>

Leaving aside the ongoing debate about the validity and sense of individual measures, it is clear that the implemented methodological tweaks have helped to significantly reduce official inflation numbers over the past 30 years.

## What happens if CPI is inaccurate?

While the battle in academia over the question whether inflation is overestimated or underestimated by official indices rages on, an understatement would have far-reaching consequences not only for consumers themselves, but for the broader economy, monetary policy, fiscal policy and financial markets:

- **Real GDP and productivity growth figures could be too high.** Important macroeconomic indicators that factor in the rate of inflation could be inaccurate if inflation itself is being underestimated.
- **Public spending could be suppressed.** Social security and other spending measures indexed to inflation would be too low if “true” inflation were higher than what the official numbers reported.
- **Monetary policy may be more expansive than assumed.** If inflation were being underestimated, not only would effective real policy rates be lower than conceived, but central banks could be inclined to implement highly accommodative policy measures if they were misled by a supposed undershooting of their inflation target.

- **Inequality could rise.** Income inequality is already pronounced in several countries. It could get worse if lower-income households continue paying real-world costs that are not reflected in the official data, and if social security and other spending measures stay linked to faulty inflation rates.
- **Businesses could be watching faulty signals.** Corporate decision-makers depend on accurate inflation numbers to formulate valid long-term business plans and take appropriate shorter-term operational business decisions.

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An understatement of CPI would have far-reaching consequences for consumers, the economy, monetary policy, fiscal policy and financial markets

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## Stability risks emanating from inadequate central bank mandates

Despite applying record amounts of stimulus in the aftermath of the great financial crisis, many central banks have had a difficult time raising inflation to their desired target levels. This indicates that monetary authorities may have finally become victims of their previous success.

In 2000, the Federal Reserve shifted to the PCE price index as its preferred inflation measure, and this certainly helped the central bank to accomplish the long-term disinflationary mission that started under the helm of former Fed Chair Paul Volcker in the late 1970s. But in recent years, the use of PCE instead of CPI has become an additional obstacle to containing disinflationary risks and achieving a gradual reflation of the real economy in ways that are reflected by official inflation numbers.

The absence of stronger goods and services price inflation in an environment of ongoing above-potential GDP growth and increasingly tight labour markets has convinced not only the Fed but other major central banks to maintain their overly accommodative policy stances. While we believe their extraordinary doses of monetary stimulus were necessary in the post-Lehman era, they have also contributed to a material rise in asset valuations that, in some cases, are not fully backed by fundamentals.

The issue with this approach, in our view, is that in times of normalization, propping up asset prices as an unconventional policy tool to overcome the effective lower-interest-rate bound is no longer a necessary monetary-policy strategy. Central banks should recognize a major lesson from the crisis years: that they can no longer afford a “benign neglect” attitude towards the potential creation of asset bubbles.<sup>9</sup>

## How should policy makers and investors respond?

While financial-stability risks have recently been monitored more closely, they are primarily addressed by macro-prudential measures that reside outside the monetary policy toolkit. But we believe this should change. It is risky to have a too narrowly defined target function for monetary policy. Governments and policy makers should consider broadening the central banks’ official target functions beyond their current prime focus on goods and services prices to include a focus on

asset prices. Aligning monetary policy with the financial cycle rather than predominantly with the business and inflation cycle may help prevent a build-up towards a financial crisis – or at least mitigate its negative consequences if another one were to erupt.

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**Central banks' official target functions should be broadened to include a focus on asset prices**

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If official price data is indeed understating the loss of purchasing power, investors should prepare for a “stealth devaluation” of nominal (or intangible) assets such as bonds or money market instruments. Accordingly, investors should consider making an appropriate strategic allocation to real assets such as equities, real estate and commodities, which may be able to provide a proper inflation hedge and a means of diversification.

1. While this research note primarily refers to inflation measurement in the United States, many of the conclusions can also be applied to other countries.
2. The substitution effect, which has a price-dampening impact on inflation indices, accounts for the fact that consumers tend to change their spending patterns in response to relative price changes between certain items. For example, a rise in beef prices may lead people to buy chicken instead in order to keep their overall food expenses down. By considering substitution effects, inflation indices turn from pure price measures to utility-based cost-of-living gauges.
3. In this research note, we refer to the CPI-U Index, which examines the changes in the price of a basket of goods and services purchased by urban consumers.
4. Byrne, Fernald and Reinsdorf (2016): “Does the United States have a productivity slowdown or a measurement problem?” This research presents alternative price measures that indicate a potential overestimation of inflation in the IT segment of roughly 5 percent per annum relative to the official NIPA data.
5. See Hausman (1999): “Cellular Telephone, New Products, and the CPI”.
6. See, for example, Albouy, Ehrlich and Liu (2016) “Housing Demand, Cost-of-Living Inequality, and the Affordability Crisis.”
7. For example, a shift to geometric weighting within categories (1999), adjustment of basket weights every two years (2002), improved pricing for hospital services (1997), hedonic adjustment for personal computer and television prices (1998).
8. See Gordon (2000): “The Boskin Commission and its Aftermath”; Gordon (2016): “The Boskin Commission Report: A Retrospective One Decade Later”.
9. According to the increasingly contested “Jackson Hole consensus”, central banks tend to follow an asymmetric approach to asset bubbles. Instead of targeting asset prices and trying to “pop” potential bubbles, which are difficult to identify anyway, they instead used to restrict themselves to “mopping up” after a bubble bursts.

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