Public Policy Brief

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Targeting Inflation

The Effects of Monetary Policy on the CPI and Its Housing Component

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Summary

Most observers of the Federal Reserve are willing to credit it with success at achieving low and stable rates of inflation. Many do not even question that the Fed's primary concern should be fighting inflation. However, the targets for monetary policy adopted by the Fed in recent years have not proven to be closely correlated with inflation, and commentators criticize the Fed's apparent predilection to choose whichever target appears to be pointing in the "right" direction. In the search for a target that seems to be closely correlated with inflation, some theorists and policymakers have advocated the use of a price index—most notably the consumer price index (CPI)—as both the target and the goal of monetary policy.

Executive Director Dimitri B. Papadimitriou and Research Associate L. Randall Wray argue in this *Public Policy Brief* that the CPI deviates in several important respects from an ideal theoretical measure of inflation. An ideal measure would, first, accurately reflect market-caused price increases and, second, potentially be under the control of monetary policy. The authors show that the CPI fails in both respects. Papadimitriou and Wray attempt to determine which components of the CPI have tended to pull up the index and to analyze the avenues through which monetary policy might attenuate the rate of price increase of these individual components. Their investigation is consistent with recent concerns over apparent biases in the CPI when used as a cost-of-living index, but their analysis extends beyond such concerns; they also focus on how and why the CPI is not appropriate as a target or goal of monetary policy because the transmission mechanisms through which monetary policy is thought to affect the CPI are tenuous at best. The authors argue that this is due in part to the fact that components of the CPI involve "imputed" values that are largely unconnected with those fundamental market forces likely to be influenced by Fed policy.

Papadimitriou and Wray select the housing component of the CPI to examine because it is an important source of CPI-measured inflation. This allows them to assess the contention that the housing sector is important to include in any measure of inflation because of the direct influence monetary policy supposedly has on housing costs. They use in their assessment two measures of price changes: relative importance, which tells which items in the consumer basket are increasing at above-average and below-average rates, and weighted contribution, which is a gauge of how much each item in the consumer basket contributes to overall inflation. Their analysis of the relative importance and weighted

contribution of the housing component leads Papadimitriou and Wray to question whether a monetary transmission mechanism operates through the housing sector and, by extension, whether any measure of cost of living can be used as an effective target of monetary policy.

The authors also conclude that those components of the CPI that monetary policy *is* likely to affect have been declining in importance. A given reduction of the overall rate of inflation, then, will require that monetary policy have an increasingly larger impact on an ever-diminishing portion of the consumer basket. If price stability is defined as a constant CPI, such stability can be achieved only if monetary policy is so tight as to cause the decline of prices of that continuously diminishing portion of the consumer basket. The problem of conducting effective monetary policy is magnified if a large part of the basket consists of items whose prices (or imputed prices) are rising and are little affected by monetary policy. This situation can be avoided only if the acceleration of those prices falls fortuitously. Papadimitriou and Wray believe that such fortuitous circumstances largely explain the recent low and stable inflation rates and that such rates had little to do with inflation fighting by the Fed.

Papadimitriou and Wray note that although "it is beyond the scope of this *Public Policy Brief* to examine all of the components of the CPI, we are convinced that use of any index of price changes will be fraught with difficulties similar to those outlined here." The anomalies they find in the CPI's housing component data are not unique; rather, they "suspect there are other important anomalies reflected in the CPI that make it a poor measure of inflation to be used in monetary policy formation." Therefore, careful reconsideration of an alternative ultimate target, such as the rate of economic growth or the unemployment rate, is warranted. However, given the uncertainties involved in the choice of such ultimate targets, the authors think it would be premature for the Fed to commit to any particular goal, especially one of "price stability." Moreover, because the evidence presented here sheds doubt on how central banks might fight inflation or if they can reduce it, and because there is no credible evidence that a moderate rise in interest rates causes smooth curtailment of spending plans, the authors conclude that this is an inappropriate time to amend the Employment Act of 1946 and the Humphrey-Hawkins Act of 1978 and to require the Fed to focus on price stability and to ignore other important economic indicators of our nation's well-being.

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Preface

Since the 1970s monetary policy has increasingly focused on one goal: price stability. Although some have criticized the Fed for its ever-changing choices of monetary targets, observers generally have not questioned exactly what price stability is (some define it as zero inflation and others as a constant rate of inflation) or, more importantly, whether the Fed has the wherewithal to achieve such a goal. Rather, the Fed has been given an increasing amount of credit for steering the U.S. economy in the "right direction." So noncontroversial is the idea that the Fed has the capability to control inflation that some are calling for making price stability the sole ambition of monetary policy. For example, legislation introduced by Senator Connie Mack (Senate Bill 1266) would repeal the Humphrey-Hawkins Act of 1978 and redefine the role of monetary policy as including only price stability, not, as currently, price stability *and* full employment and balanced growth.

Not everyone agrees with Senator Mack's point of view; some argue for a change in monetary targets and others for a more balanced approach to monetary policy. But few question whether price stability is an achievable goal of the Fed. Such thinking is based on assumptions about the transmission mechanism of monetary policy, that is, how the tools used by the Fed to implement monetary policy (such as open market operations, the discount rate, and the reserve ratio) influence targets (such as monetary reserves and aggregates) to achieve stated goals (such as price stability). For example, raising interest rates is thought to increase construction finance costs and reduce housing supply; at the same time higher mortgage rates are thought to dampen overall housing demand. Tight monetary policy, then, is thought to have its desired effect by working through the housing sector to slow the economy as a whole.

In this *Public Policy Brief*, Research Associate L. Randall Wray and I dispute the ability of monetary policy to affect inflation as measured by the consumer price index (CPI). We base our conclusions on an examination of the housing component of the CPI. (We chose to analyze the housing component because the transmission mechanism of monetary policy is thought to be especially strong in the housing sector.) Rather than confirming conventional expectations, our findings indicate that the effect of monetary policy on the housing component is tenuous at best. For example, we found that the portion of the consumer basket actually affected by monetary policy has declined over time, meaning that the size of monetary changes must be increasingly large to produce a given economic result. We also found that because of the manner in which various items within the housing component are measured, the CPI can give incorrect signals about the direction of actual inflation, and such signals would lead the Fed to adopt incorrect policy.

These findings, and the fact that it is likely that other components of the CPI suffer from the same drawbacks as the housing component, call into question the use of the CPI as either a target or a goal of monetary policy. Moreover, even if changes were made to the CPI to remove the biases discussed and quantified in the study popularly known as the Boskin report, the problems we have outlined with respect to the effectiveness of monetary policy at hitting indexed inflation targets such as the CPI would still exist.

Our findings raise several questions, including

- Should monetary policy aim at affecting an aggregate price index such as the CPI?
- Is the success or failure of monetary policy appropriately measured by the rate of change of the CPI?
- Has monetary policy over the past 15 years been the primary cause of declining inflation rates as measured by the CPI?

We hope that our research stimulates and contributes to the ongoing debate about the direction of monetary policy.

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Executive Director
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The Effects of Monetary Policy on the CPI and Its Housing Component

In recent years the Federal Reserve adopted a number of targets for monetary policy, all of which were purported to be linked to the rate of inflation. Many commentators have criticized the Fed's choice of targets and its apparent predilection to choose whichever target appears to be pointing in the "right" direction. We examined this issue in a previous Levy Institute *Public Policy Brief* (Papadimitriou and Wray 1994) and concluded that Fed policy is increasingly rudderless, driven as much by intuition as by solid evidence that inflation is on the verge of accelerating. In spite of concerns shared by many observers that the Fed's choice of targets may be problematic, most are willing to credit the Fed with success at achieving low and stable rates of inflation in recent years.

Further, the proposition that the Fed should fight inflation is seemingly noncontroversial. The Fed has time and again stated its belief that the most important role it plays is fighting inflation and has repeatedly asserted that its ultimate goal is and must be price stability. Many theorists and policymakers have also adopted this view, with a few going so far as to assert that zero inflation should be the only goal of monetary policy.[1] Finally, given that none of the traditional targets of monetary policy seems to be closely correlated with inflation, some theorists and policymakers have advocated the use of a price index as both the target and the goal of monetary policy.

In this *Public Policy Brief* we examine the most frequently cited index used to measure inflation—the consumer price index (CPI). We argue that this measure deviates in several important respects from an ideal theoretical measure of inflation, one that, first, would accurately reflect market-caused price increases and, second, would potentially be under

the control of monetary policy. We attempt to determine which components of the CPI have tended to pull up the overall rate of inflation as measured by the CPI and then analyze the avenues through which monetary policy might attenuate the rate of price increase of these individual components. We conclude that changes in the CPI do not reflect market conditions, nor are the components that have caused the CPI to rise likely to be directly affected by monetary policy. This leads us to question whether the rate of increase of the CPI is, indeed, an appropriate ultimate goal of monetary policy. That is, leaving aside the difficult question of which economic data should be chosen as operating targets for the day-to-day operations of the Fed (such as monetary aggregates, interest rates, and reserves), we ask whether the Fed should be setting its sights on an aggregate price index such as the CPI. We also question whether Fed success or failure is appropriately measured by the rate of change of the CPI. Indeed, we doubt that monetary policy over the past decade and a half has been the primary cause of declining inflation rates as measured by the CPI.

To some extent, our analysis is consistent with recent concerns over apparent biases of the CPI when used as a cost-of-living index. Our purposes here are different, however. Although we are concerned with the extent to which the CPI may mismeasure an inflation rate, our primary concern is that the CPI may not be an appropriate target or goal of monetary policy. Two types of problems occur if monetary policy is based on an overstated CPI. The first involves various biases as discussed in the Interim Report to the Senate Finance Committee, known as the Boskin report (Boskin et al. 1995), and elsewhere. However, we argue that even with the adjustments recommended by the Boskin report, the CPI is not an appropriate measure of inflation to conduct or evaluate monetary policy. This is because the CPI is merely an index that attempts to provide an empirical measure of inflation; it is used by the Fed, however, as a target or goal of monetary policy. We will show that the impact of monetary policy on important components of the CPI is tenuous at best, calling into question the use of the CPI in such a way. Further, we will argue that any measure of inflation that is used in the formation of monetary policy should substantially reflect domestic market forces. It would make little sense to adopt tight money policy to fight inflation that was due to transitory external shocks, measurement errors, or other quirks that do not reflect fundamental market interactions. We will argue that increases in the CPI in recent years

have been driven to a great extent by such nonmarket influences. This is due in part to the fact that a large portion of the CPI is composed of "imputed" values that are largely unconnected with fundamental market forces likely to be influenced by Fed policy. We suspect there are other important anomalies reflected in the CPI that make it a poor measure of inflation to be used in monetary policy formation.

We have chosen to focus our analysis on the housing sector because it is an important source of CPI-measured inflation and to assess the contention that the housing sector is one of the most important sectors to include in any measure of inflation because of the direct influence that monetary policy has on housing costs. For example, tight policy is thought to raise interest rates, which increases construction finance costs and reduces housing supply, while higher mortgage rates dampen overall housing demand. Tight monetary policy, then, is thought to have its desired effect by working through the housing sector to slow the economy as a whole. This assumed mechanism is used to justify the presence of the housing sector in any index measuring inflation that is to be used as a target for monetary policy. We base our assessment on two measures of price changes in the housing sector: the "relative importance" measure, as defined by the Bureau of Labor Statistics (BLS), which tells us which items in the consumer basket are increasing at above-average and below-average rates, and our own estimate of the housing sector's "weighted contribution" to inflation, which provides a gauge of how much each item in the consumer basket contributes to overall inflation. Our analysis of the relative importance and weighted contribution measures of the housing sector leads us to question that such a transmission mechanism exists and, therefore, that any measure of the cost of living can be used as an effective target of monetary policy.

We also conclude that those components of the CPI that monetary policy is likely to affect have been declining in importance. A given reduction of the overall rate of inflation, then, requires that monetary policy have an increasingly larger impact on an ever-diminishing portion of the consumer basket. If price stability is defined as a constant CPI, this can be achieved only if monetary policy is so tight as to cause prices of a continuously falling portion of the consumer basket to decline. The problem of conducting effective monetary policy is magnified if a large part of the basket consists of items whose prices (or imputed prices) are rising and are little affected by

monetary policy. This situation can be avoided only if the acceleration of those prices falls fortuitously. We believe that such fortuitous circumstances largely explain the recent low and stable inflation rates and that such rates had little to do with Fed inflation fighting.[2]

While it is beyond the scope of this *Public Policy Brief* to examine all of the components of the CPI, we are convinced that use of any index of price changes will be fraught with difficulties similar to those outlined here. In our view, this warrants careful reconsideration of an alternative ultimate target, such as the rate of economic growth or the unemployment rate. Given the uncertainties involved in the choice of such ultimate targets, we think it would be premature for the Fed to commit to any particular goal, especially one of "price stability." The closer one gets to price stability, the greater are the problems associated with use of a price index as a target or goal of policy. Therefore, we believe that this is an inappropriate time to change the guidelines of the Employment Act of 1946 and the Humphrey-Hawkins Act of 1978 and to require the Fed to focus on price stability and to ignore other important economic indicators of our nation's well-being.

Recent Targets and Goals of Monetary Policy

Traditionally, economists have thought that monetary policy involves the use of tools (open market operations, discount rates, required reserve ratios) to hit operating targets (the federal funds rate, reserve aggregates)—believed to be closely related to intermediate targets (short-term market interest rates, monetary aggregates)—to achieve longer-run or ultimate goals (low inflation, high employment, sufficient economic growth) (see Figure 1). According to the traditional view, only the goals are important; an operating or intermediate target is of consequence only in terms of its effect on ultimate goals. If a target does not prove to be reliably linked to goals, it should be dropped in favor of another target. On the other hand, if a goal proves to be outside the reach of the Fed because monetary policy appears to be unable to reliably influence performance of the economy in that respect, then the goal should be dropped.

It is possible that monetary policy might be used to achieve one or more of the ultimate goals listed in Figure 1. It would make little sense to

Figure 1 **Tools, Targets, and Goals of Monetary Policy**

Tools	Operating Targets	Intermediate Targets	Ultimate Goals
Open market operations	Federal funds rate	Short-term market interest rates	Inflation rate
Discount rates	Borrowed reserves	M1	Unemployment rate
Required reserve ratios	Nonborrowed reserves	M2	Economic growth rate

define a goal in such a manner as to preclude monetary policy effectiveness. However, many observers question the ability of monetary policy to reliably affect ultimate goals such as unemployment and economic growth. Even Federal Reserve Chairman Alan Greenspan and Bundesbank President Hans Tietmeyer have openly questioned whether monetary policy is effective in influencing unemployment rates and rates of economic growth other than in the short period. There appears, then, to be a growing consensus that the central bank can affect only the rate of inflation[3] and that the Fed is responsible for recent low inflation rates. In the July 19, 1995, midyear review to Congress, Chairman Greenspan said that "the Federal Reserve believes that the main contribution it can make to enhancing the long-run health of the American economy is to promote price stability over time. Our short-run policy adjustments . . . must be consistent with moving toward the long-run goal of price stability" (Greenspan 1995, 7).

There has been little discussion, however, of the transmission mechanism through which monetary policy is supposed to affect the rate of inflation. It is not at all clear how monetary policy operates now that we no longer accept the traditional explanation that "too much money causes inflation." Indeed, we will argue that the empirical evidence is not consistent with the belief that central bank policy has been a primary determinant of inflation rates.

Not only does monetary policy suffer from an inability to affect chosen goals, it also suffers from problems of how those goals are measured. Many economists doubt the usefulness of official unemployment rates in describing labor market conditions, while others call into question the accuracy of the estimates of various indicators of economic growth, such as the real rate of GDP growth and productivity growth. Most notably,

however, many, including Chairman Greenspan, agree that the CPI seriously overstates inflation of the cost of living.[4] Although we might agree with Chairman Greenspan on this point, we still do not agree that the CPI is an appropriate measure of inflation for policy purposes, even if it measured the cost of living perfectly.

Ideally, the measure of inflation on which the Fed should set its sights would reflect market conditions that could be affected by monetary policy. If a chosen index reflected conditions over which monetary policy had no control, it would be a useless measure of the Fed's ultimate goal. Even worse, if the Fed's attempts to lower inflation only caused the index to increase, it is easy to see how a vicious cycle of perverse policy would be induced by the choice of an inappropriate measure. Suppose inflationary pressures arise from components of a chosen index over which the Fed has no control and the Fed is able to offset these inflationary pressures by causing deflation of prices of components of that index over which it does have control. It is obvious that such a policy could cause substantial disruptions and even long-run harm to the economy. We think many economists would agree that in this case the Fed should ignore inflationary pressures; this could be done by constructing an alternative index that would exclude the components over which the Fed has no control.

The BLS has taken such a step by excluding the prices of food and energy components from the CPI to create an estimate of "core inflation." This seems to have been done based on the belief that food and energy prices are subject to "external shocks," or nonmarket forces. In the case of food such shocks arise from poor weather in the United States or from abnormal foreign demand (which might also result from poor weather); in the case of energy the problem is that the price and quantity of imported petroleum, which constitutes a large part of U.S. supply, can be affected by political matters in the Middle East. Since Fed policy is unlikely to exert control over either the weather or political factors in foreign countries, it makes sense to exclude these items from that part of the CPI used to evaluate and form monetary policy.[5]

In recent congressional testimony representatives of the Fed seem to have recognized many of the questions we have posed here. They seem to have recognized that the links between traditional operating targets and

intermediate targets have become imprecise and that the links between monetary aggregates and inflation have broken down; these recognitions were part of the reason for the Fed's proposal to use a real interest rate as the intermediate target of policy in summer of 1993.[6] Moreover, in a number of reports the Fed has emphasized that no single economic variable nor any combination of variables can reliably indicate when the economy has reached a rate of capacity at which inflation is likely to accelerate (Greenspan 1993, 1995). Many economists, Chairman Greenspan included, note that modern economies can stretch capacity without inducing inflation much more than economies could a decade or so ago. Further, with greater volumes of international trade, the links among capacity utilization, employment, and inflation are far less rigid.

We are in a situation, then, in which the Fed has no reliable targets, we are uncertain about which market conditions are likely to generate inflation, and we are uncertain about the transmission mechanism through which monetary policy is supposed to affect inflation. Despite these problems, because inflation (as measured by the CPI) has remained low, most observers have credited Fed policy with success and, further, have come to doubt the Fed's ability to affect any important economic variable other than inflation in any desirable manner. Chairman Greenspan argues that the current low inflation rates "should be regarded only as a milepost along the path toward the long-term goal of price stability" (Greenspan 1995, 13). Recent low and stable inflation rates are not, according to the Fed, evidence of price stability. Although it is not clear what it is meant by "price stability," it has been argued that continued vigilance will be required to bring down inflation more to achieve "price stability."[7] It is presumed, then, that low and stable inflation rates imply that the Fed has demonstrated its ability to hit inflation targets. Indeed, some claim that a comparison of the inflation experience of the last few years and that of the late 1970s "proves" that when the Fed switched to an inflation goal, inflation was reduced. On this basis, the Fed can claim at least partial victory in recent years as the inflation rate was brought down and has remained at a low level.

We will argue that, in at least some situations, monetary policy perversely affects the CPI (that is, tight policy would increase the measured rate of inflation), a problem that increases in seriousness secularly as well as over the course of each BLS cycle (that is, before the usual and periodic

revisions are made to the CPI base). These perverse effects will not disappear by making the adjustments advocated in the Boskin report or by dropping a few items (as is currently done to obtain the core inflation rate) or by elaborate smoothing of the index (as proposed by Bryan and Cecchetti [1993]). If monetary policy is to be geared to fighting inflation, much greater revisions will be required before an index is obtained that could be useful in forming and evaluating monetary policy. We are skeptical that an aggregate index can be devised to serve such purposes. In concert with our analysis of the CPI, we doubt that monetary policy deserves much credit for the recent low inflation, and we do not believe that reduced Fed diligence would lead to higher inflation.

A Detailed Look at the CPI

The CPI tracks the prices of a market basket of consumer goods and services that is designed to reflect the spending habits of consumers. Because baskets change over time, the BLS, based on the results of their *Consumer Expenditure Survey*, periodically establishes a benchmark basket to assign weights to various components that will be used to calculate the CPI in coming years. Survey data collected over a three-year period are used to calculate this benchmark; given the effort involved, the benchmark cannot be revised frequently. The benchmark we use here was established based on surveys conducted between 1982 and 1984. The weights established in the 1982–1984 survey period could still be appropriate today if the prices of all components of the consumer basket increased at the same rate. But because prices grow at different rates and because consumers' buying habits change, component weights are changed periodically. New weights are currently being established based on surveys conducted between 1993 and 1995 and will be used in the calculation of the CPI beginning in 1998. The BLS does not release data on component weights—apparently out of fear that CPI inflation data could be anticipated before data are officially released. However, in reality, the BLS does not use fixed component weights because revisions are continually made to account for the changing consumer basket over time.[8]

Many recent studies, including the Boskin report, have focused on various measurement errors involved in calculating the CPI. For example, if

consumers increase the percent of purchases they make at discount outlets, the CPI will overstate the actual rate of inflation experienced by the typical consumer. This could be called the "outlet substitution bias." Additionally, over time consumers change the composition of the basket of consumer goods that they purchase. Since the composition of the goods in the basket used to calculate the price index is revised only once per decade and changes in buying habits occur within that period, a bias results.[9]

Economists identify three kinds of bias to the CPI associated with changing baskets: substitution, quality change, and new product. Substitution bias refers to the impact that a change in relative prices might have on changing baskets. For example, if the price of tea rises relative to that of coffee, economic theory suggests that consumers will substitute coffee for tea. However, as the CPI basket is changed only once per decade, the index is calculated as if no substitution has occurred (that is, as if consumers are paying the higher price for tea), leading to overstatement of inflation.

Sometimes a price increase reflects an improvement in the quality of a product. In most cases it is difficult to calculate what portion of a price increase should be attributed to quality change, and the BLS does not even attempt to do so for many products. Thus, inaccurate measures of quality change introduce a quality change bias.

Finally, new products are introduced all the time, but the BLS includes them in the basket only with long and variable lags. The lags introduce a new product bias into the CPI, and it may be substantial. For example, many high-technology consumer goods follow a price cycle that begins with very high prices for goods sold to high-income consumers. Prices then fall rapidly as the goods are introduced to lower-income consumers. Finally, prices rise gradually as the market matures. The effect on the CPI will depend on what phase of the price cycle the good is in when it is introduced into the CPI. If, for example, the BLS introduces the new good into the basket when prices have reached their minimum, the CPI will not capture the period during which prices fell, but will include the mature period during which prices rise. The new product bias is suspected of being quite important in recent years.

The Boskin report identifies yet another source of bias called "formula bias." Formula bias results because price data are collected on a disaggregated basis and then aggregated in a complex manner that can introduce anomalies. For example, the calculation method used in recent years gives too much weight to sale items; this generates formula-induced inflation as the items go off-sale. The degree of formula bias can increase with how often the rotation of outlets included in the survey is changed because the bias results from short-run price variability and a method that gives greater weight to lower-than-average prices. Researchers have noticed that surveys of average prices actually paid by consumers showed rates of inflation well below the rates of inflation reported by the CPI for relatively disaggregated components of the consumer basket, and only a small part of the discrepancy could be attributed to outlet substitution bias. Estimates of formula bias run as high as 0.6 of a percentage point for owner-occupied housing and 1.0 percentage point for apparel—an item often on sale (Moulton and Smedley 1995). Table 1 shows estimates of the various sources of bias as calculated in the Boskin report.

Our concern here, however, is with a different issue, namely, one that results from differential rates of increase in the price of the components in the basket. Even if consumer behavior regarding the composition of baskets, or outlet used, does not change over time, the contribution of items in the basket to measured CPI inflation will change because

Table 1 Boskin Report Estimates of Recent Biases in the CPI (percent per year)

Source of Bias	Point Estimate	Range
Substitution bias	0.3	0.2 to 0.4
Outlet bias	0.2	0.1 to 0.3
Formula bias	0.5	0.3 to 0.7
Quality change bias	0.2	0.2 to 0.6
New product bias	0.3	0.2 to 0.7
Total	1.5	1.0 to 2.7

Note: The Boskin report emphasizes that it has conservatively estimated biases, with the upper end of the range meant to err on the side of underestimating potential bias.

Source: Michael J. Boskin, Ellen R. Dulberger, Robert J. Gordon, Zvi Griliches, and Dale Jorgenson, "Toward a More Accurate Measure of the Cost of Living," Interim Report to the Senate Finance Committee by the Advisory Commission to Study the Consumer Price Index, September 15, 1995, 27.

of differential rates of inflation of those items. To analyze the extent of this effect, we develop a measure of the contribution of each item to overall inflation. *Component weight* refers to the benchmark or base-year shares of those components of the CPI that are the real (inflation-adjusted) quantities in the consumer basket; the component weight will not change until the next survey establishes a new benchmark basket. The *relative importance* of each component reflects the nominal (actual price) portion of expenditure devoted to that component in the consumer basket, assuming the component weights do not change. The relative importance of any item that experiences an above-average rate of inflation will rise, while the relative importance of items with a below-average inflation rate will fall. Finally, the *weighted contribution* of each item in the basket provides an estimate of the contribution of the price of that item to the overall measured CPI inflation rate. We will examine the relative importance and weighted contribution of each item to inflation in the CPI. However, it will be instructive first to examine a simulation to show how these figures are constructed.

A Simulation: Relative Importance and Weighted Contribution

We can demonstrate the concepts of relative importance and weighted contribution using a simple hypothetical example. Assume a CPI constructed on the basis of a fixed-weight basket that is changed only once per decade. Assume that the base year is 1985 with component weights calculated on the basis of surveys taken between 1983 and 1984. Divide the components into two categories: housing (with a component weight of 41.5 percent) and other (with a component weight of 58.5 percent). Further assume that both components experience a constant and uniform annual rate of inflation of 2.5 percent until 1987, after which the inflation rate of the housing component rises to 10.0 percent per year. The component weights will not be adjusted until 1998.

The index for each component is equal to 100.0 in the base year. In each succeeding year the index is equal to the index in the previous year multiplied by the rate of inflation in the current year with the total added to the previous year's index (see Table 2). The CPI is calculated by multiplying the index for each component by its weight and summing the results for all components. For example, to obtain the 1990 other index

Table 2 **Simulation of Relative Importance and Weighted Contribution with Differential Inflation Rates**

Year	Index			Annual Inflation (%)			Relative Importance (%)		Weighted Contribution (%)	
	Other	House	CPI	Other	House	CPI	Other	House	Other	House
1985	100.0	100.0	100.0	2.5	2.5	2.5	58.5	41.5	58.5	41.5
1986	102.5	102.5	102.5	2.5	2.5	2.5	58.5	41.5	58.5	41.5
1987	105.1	105.1	105.1	2.5	2.5	2.5	58.5	41.5	58.5	41.5
1988	107.7	115.6	111.0	2.5	10.0	5.6	56.8	43.2	26.1	73.9
1989	110.4	127.2	117.4	2.5	10.0	5.9	55.0	45.0	24.7	75.3
1990	113.2	139.9	124.3	2.5	10.0	5.9	53.3	46.7	23.6	76.4
1991	116.0	153.9	131.7	2.5	10.0	6.0	51.5	48.5	22.0	78.0
1992	118.9	169.3	139.8	2.5	10.0	6.1	49.8	50.2	21.0	79.0
1993	121.9	186.2	148.6	2.5	10.0	6.3	48.0	52.0	20.0	80.0
1994	124.9	204.8	158.1	2.5	10.0	6.4	46.2	53.8	18.5	81.5
1995	128.1	225.3	168.4	2.5	10.0	6.5	44.5	55.5	18.0	82.0
1996	131.3	247.8	179.6	2.5	10.0	6.7	42.8	57.3	16.7	83.4
1997	134.6	272.6	191.9	2.5	10.0	6.8	41.0	59.0	15.7	83.7

Source: Authors' calculations.

of 113.2, multiply the 1989 other index (110.4) by the rate of inflation for other (0.025) and add the total (2.76) to the 1989 other index. The same process is followed to obtain the 1990 house index. To obtain the 1990 CPI index, the index for other in 1990 is multiplied by 0.585 (66.22) and added to the product of the index for housing in 1990 multiplied by 0.415 (58.06) to give a CPI of 124.28.

The relative importance to inflation of a component in any one year is calculated by multiplying the component's weight by its index for that year and dividing by the CPI for that year. The result provides an idea of the relative importance of each sector to calculation of the CPI; relative importance increases for items that experience higher-than-average inflation rates.

The weighted contribution of each component is found by multiplying the one-year change in the index of that component by its component weight and dividing by the change in the overall CPI. For example, to calculate the weighted contribution of the other component in 1990, 2.8 (other index in 1990 minus other index in 1989) is multiplied by 0.585 (component weight) and then divided by 6.9 (CPI index in 1990 minus CPI index in 1989). Weighted contributions provide a measure of the

contribution that changes in the price of individual components make to changes in the overall index, weighted by the 1985 component weights.

Table 2 shows relative importances and weighted contributions based on the assumptions given for our hypothetical example. The increase in the rate of inflation of the housing component quickly raises its relative importance and weighted contribution. In the limit, the housing component would account for a relative importance that would eventually approach 100 percent. Admittedly, this would take a long time and, by our assumptions, the component weights would be recalculated in 1998. In the real world substitution out of those components with relatively high inflation rates would reduce the actual component weights that should be used to calculate the CPI; such a change would be captured by a change in the base weights. But if base weights are changed only once per decade, substantial upward bias is imparted to the CPI to the extent that the true component weight of housing (in our example) is below the fixed component weight used in the actual calculation of the CPI. Thus, a change in relative importance provides some idea of the bias introduced into the CPI because a fixed consumption basket is assumed to exist over periods of ten years (and longer). As would be expected, the sector with the higher inflation rate very quickly dominates increases in the CPI; weighted contribution is a measure of the degree to which the rate of increase in the price of individual components causes increases in the CPI. In our example, growth of the housing sector index will soon dominate growth of the overall CPI. Note that even if the housing sector is substantially smaller than the other sector, its weighted contribution quickly approaches 100 percent simply due to its higher rate of inflation.

Data on relative importance are regularly published by the BLS, and it is widely accepted that these data provide some information regarding the bias introduced into the CPI because the component weights are not changed more frequently. To some extent, however, the relative importance concept understates the degree to which high inflation in some sectors translates into high inflation of the CPI; even if relative importance grows fairly slowly over the course of a decade, the weighted contribution of those items with higher-than-average inflation rates will grow quickly. In our example, the CPI inflation rate reached 6.8 percent in 1997;

although the relative importance of the housing sector is still less than 60 percent, it is clear that the "contribution" of housing to the measured inflation rate is much larger than that—after all, prices of all items except housing are growing at a rate of only 2.5 percent per year. Thus, the weighted contribution of the housing component in 1997, 83.7 percent, more accurately reflects the true impact that housing sector inflation has on CPI inflation. Note, also, that if component weights were recalculated every year there would be no difference between relative importance and component weight (this bias is eliminated); however, such a recalculation would not eliminate the growth of the weighted contribution of those items experiencing higher-than-average rates of inflation (unless the component weights of those items fell rapidly toward zero). In other words, the problem outlined in our example of the concept of the weighted contribution is not an artifact of the method used to calculate the CPI; rather, it reflects the commonsense reality that if some items tend to have inflation rates that are substantially above average, those items will come to dominate overall inflation as measured by the rate of growth of an aggregative index.

If the "acceptable" inflation rate were 2.5 percent as measured by the CPI, in our hypothetical example the central bank would begin intervention in 1988. If we assume for the moment that monetary policy has no effect on the housing component, but can lower the rate of increase of prices of the other component, the central bank will not be able to achieve its inflation target over the long run. That is, even if the rate of price increase of the other component is reduced to zero (or even less), the CPI will still grow at a rate above 2.5 percent because the contribution of the housing component rises toward 100 percent. (This would be true except in the unlikely case that deflation of the other component could approach a large number.) Ironically, this result would hold even if consumers bought no housing services after 1988. Thus, in the extreme case in which housing is eliminated from the basket actually purchased, the measured excess rate of inflation (above 2.5 percent) could be entirely the result of measurement error due to the use of fixed component weights (substitution bias). This bias will be eliminated only when the next base-year component weights are established. As soon as the new component weights are used, we might find that the CPI inflation rate drops. This decline cannot be attributed to monetary policy since (by our assumption) it has no impact on housing sector prices.

Recent Experience: Relative Importance and Weighted Contribution to Inflation

We will now use the concepts developed in the previous section to examine the recent inflation experience in the United States. Identifying items with high relative importance will allow us to say something regarding the potential impact that monetary policy might have on items that have tended to experience higher-than-average inflation rates. Examining the weighted contribution of various components to the CPI will help to identify the items responsible for the high inflation of the 1970s and early 1980s and for recent inflation.

Table 3 shows estimates of the inflation rates of the major components of the CPI for 1968 through 1993. Figure 2 shows the relative importance of seven components of the CPI, and Figure 3 shows the relative importance of all commodities versus all services, with services broken down into five items, in 1994. Note that during the high inflation of the mid 1970s, the inflation rate of all commodities was similar to that of all services; during the high-inflation years of the late 1970s and early 1980s, however, service inflation was typically above commodity inflation and above that of the overall CPI. Further, each recent high-inflation period can be characterized as one during which the food, housing, and transportation components experienced high inflation. Finally, medical care typically experienced higher-than-average inflation, although the differential has diminished somewhat in the most recent years.

Figure 2 **Relative Importance to CPI Inflation of Various Components, 1994**
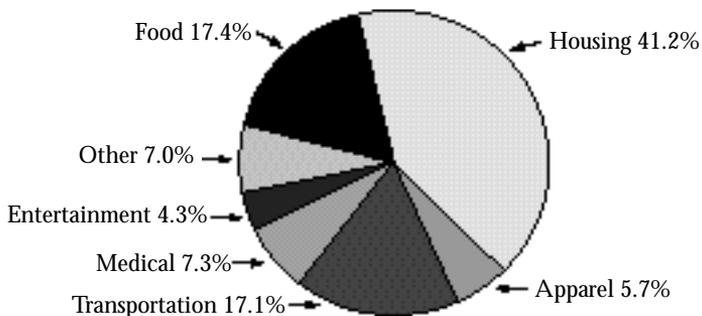
Source: U.S. Department of Labor, Bureau of Labor Statistics, *Relative Importance of Components in the Consumer Price Index*, annual, various years.
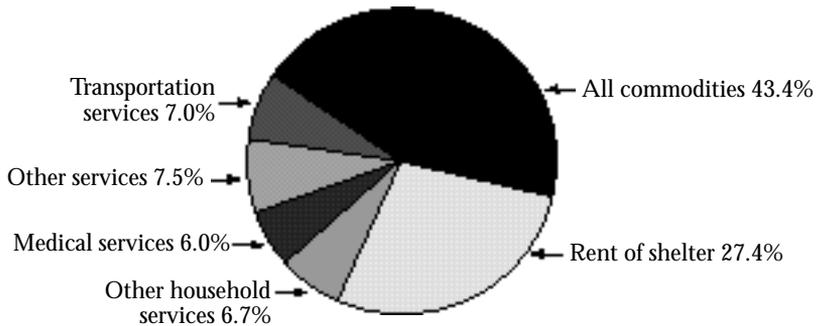
Table 3 Inflation Rates of Major Components of the CPI, 1968–1993 (percent)

Year	CPI	All Commodities	All Services	Food	Housing	Apparel	Transportation	Medical	Other	Shelter	Renters' Costs	Home Owners' Costs	Fuel and Utilities
1968	4.7	3.7	6.1	4.2	5.5	6.4	1.8	6.2	5.0	6.5	NA	NA	2.2
1969	5.9	5.2	7.4	6.8	6.4	5.1	4.9	5.8	5.6	8.6	NA	NA	2.5
1970	5.6	4.2	8.1	2.5	6.9	4.0	7.5	7.7	5.3	8.9	NA	NA	6.0
1971	3.3	3.1	4.1	4.4	3.5	2.2	1.3	4.6	4.3	2.7	NA	NA	6.0
1972	3.4	3.2	3.5	4.3	3.6	2.6	2.5	3.3	3.7	4.0	NA	NA	3.5
1973	8.9	10.4	6.4	18.6	6.7	4.4	4.5	5.3	4.9	7.1	NA	NA	11.2
1974	12.1	12.8	11.3	12.1	13.6	8.6	13.5	12.3	10.1	11.4	NA	NA	16.6
1975	7.1	6.4	8.0	6.3	7.6	2.4	9.8	10.0	5.7	7.2	NA	NA	11.5
1976	5.0	3.5	7.6	1.0	5.4	4.6	8.9	9.9	5.8	4.2	NA	NA	9.6
1977	6.7	6.0	7.8	7.3	7.8	4.3	4.4	8.9	6.3	8.8	NA	NA	8.6
1978	9.0	9.0	9.3	11.4	9.8	3.1	7.9	8.6	6.4	11.4	NA	NA	5.6
1979	13.3	12.9	13.7	10.1	15.3	5.7	17.5	10.4	7.7	17.5	NA	NA	16.0
1980	12.4	11.0	14.2	10.1	13.7	6.9	14.5	10.2	10.2	15.0	NA	NA	13.8
1981	8.9	6.0	13.0	4.1	10.1	3.6	11.1	12.5	9.8	9.9	NA	NA	14.14
1982	3.8	3.4	4.2	3.0	3.6	1.6	1.3	11.1	12.1	2.3	NA	NA	9.4
1983	3.8	3.0	4.9	2.5	3.6	3.0	3.9	6.4	8.0	4.8	5.2	NA	2.3
1984	4.0	2.7	5.4	3.8	4.3	2.0	3.2	6.2	6.1	5.2	5.8	5.1	4.2
1985	3.8	2.6	5.0	2.8	4.3	2.9	2.7	6.6	6.3	5.9	6.5	5.9	2.2
1986	1.2	-2.0	4.4	3.7	1.9	1.0	-6.0	7.8	5.5	4.8	5.1	4.6	-5.5
1987	4.4	4.6	4.3	3.5	3.7	5.1	6.1	5.9	6.7	4.9	4.4	5.2	1.6
1988	4.4	3.0	4.8	5.0	3.9	4.8	2.9	7.0	6.8	4.4	3.8	4.7	2.7
1989	4.6	4.2	5.0	5.5	4.0	1.4	4.0	8.5	8.3	4.9	4.5	5.2	3.0
1990	6.3	6.8	5.9	5.2	4.5	5.3	10.5	9.6	7.6	5.4	6.8	4.8	3.8
1991	3.0	1.2	4.5	2.5	3.5	3.6	-1.6	7.9	7.9	3.8	4.3	3.7	2.9
1992	3.0	2.0	3.7	1.6	2.6	1.5	3.0	6.7	6.5	3.0	2.9	3.1	2.2
1993	2.7	1.5	3.7	2.8	2.7	1.0	2.4	5.4	2.7	3.0	2.7	3.2	2.5

Note: Shelter and fuel and utilities are subcomponents of housing; renters' and home owners' costs are subcomponenets of shelter.

Source: Authors' calculations based on data from the Levy Institute Forecasting Center based on data from U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Price Index*, various years.

Figure 3 **Relative Importance to CPI Inflation of Commodities and Services, 1994**

- Transportation services 7.0%
- All commodities 43.4%
- Other services 7.5%
- Medical services 6.0%
- Other household services 6.7%
- Rent of shelter 27.4%

Source: U.S. Department of Labor, Bureau of Labor Statistics, *Relative Importance of Components in the Consumer Price Index,* annual, various years.

Differential inflation rates alone, however, cannot provide much information about the contribution of each component to the overall rate of inflation because the share of the basket devoted to each component must also be taken into account. As Figure 3 shows, the relative importance of the service sector is now more than 50 percent; as we will show, most recent inflation of the overall basket is caused by the service sector.

Table 4 shows estimates of the weighted contributions to the overall inflation rate of major components of the CPI.[10] We found that three components—food, energy, and housing—accounted for most of the inflationary pressures experienced during the 1970s and early 1980s (see Figures 4 and 5); reduced inflation in these three sectors also accounts for most of the disinflation since the mid 1980s. During peak inflationary periods these sectors had a combined weighted contribution that approached 90 percent; housing alone accounted for half of the increase (see Figure 6). Excluding food and petroleum price shocks, the source of most recent inflation was the service sector, whose relative importance has increased each decade. (Commodities typically have had well-below-average inflation rates.)

This general picture is not consistent with the conventional wisdom, according to which tight policy raises finance costs, thereby reducing demand. One would expect that tight money policy would have its biggest impact on prices of commodities, rather than on prices of
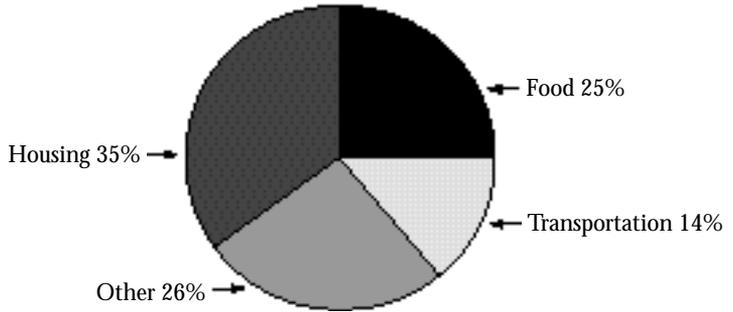
Table 4 Weighted Contribution to CPI Inflation of Major Components of the CPI, 1968–1993 (percent)

Year	All Commodities	All Services	Food	Housing	Apparel	Transportation	Medical	Shelter	Renters' Costs	Home Owners' Costs	Fuel and Utilities
1968	55	42	21	36	22	5	7	26	NA	NA	1
1969	60	41	26	34	14	11	6	28	NA	NA	1
1970	51	48	11	39	11	17	8	31	NA	NA	2
1971	63	43	31	34	10	5	8	17	NA	NA	4
1972	63	35	29	34	12	10	6	23	NA	NA	2
1973	77	25	48	24	8	6	3	16	NA	NA	3
1974	72	31	25	35	11	14	6	19	NA	NA	3
1975	62	37	25	34	4	17	8	20	NA	NA	7
1976	48	50	5	34	11	22	11	16	NA	NA	9
1977	60	39	29	38	8	8	8	25	NA	NA	6
1978	67	35	34	35	4	11	6	25	NA	NA	3
1979	65	35	21	38	5	16	5	26	NA	NA	6
1980	55	45	16	49	3	22	4	37	NA	NA	7
1981	41	58	10	51	2	24	6	35	NA	NA	10
1982	52	45	15	43	2	7	13	19	NA	NA	16
1983	46	53	12	43	4	20	8	39	8	NA	4
1984	39	56	17	48	2	15	7	41	9	29	7
1985	35	67	14	43	4	15	12	35	13	23	5
1986	-83	192	60	61	4	-105	45	92	34	59	-37
1987	50	52	16	32	6	27	10	26	8	19	3
1988	43	58	22	33	6	13	12	24	7	1	4
1989	44	57	24	33	1	17	14	25	8	18	5
1990	46	55	15	27	5	27	12	26	10	17	4
1991	17	88	15	48	7	-9	21	38	13	26	6
1992	29	73	10	35	3	16	19	30	9	22	5
1993	22	81	18	40	2	14	17	33	9	25	6

Note: Columns do not add to 100 percent due to rounding and omission of some components.
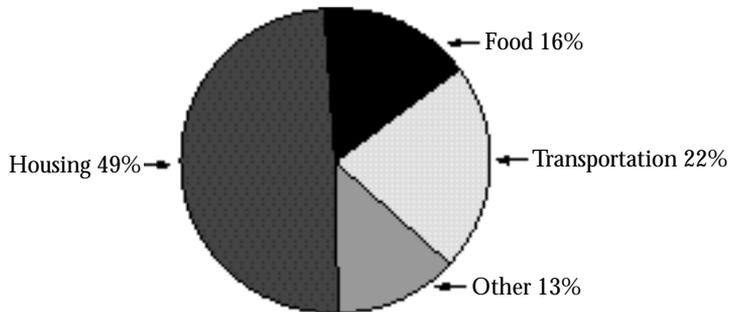
Source: Authors' calculations based on data from U.S. Department of Labor, Bureau of Labor Statistics, *Relative Importance of Components in the Consumer Price Index*, annual, various years.

Figure 4 **Weighted Contribution to CPI Inflation of Housing, Food, Transportation, and All Other Components, 1974**

Food 25%

Housing 35%

Transportation 14%

Other 26%

Source: Authors' calculations based on data from U.S. Department of Labor, Bureau of Labor Statistics, *Relative Importance of Components in the Consumer Price Index,* annual, various years.

Figure 5 **Weighted Contribution to CPI Inflation of Housing, Food, Transportation, and Other Components, 1980**

Food 16%

Housing 49%

Transportation 22%

Other 13%

Source: Authors' calculations based on data from U.S. Department of Labor, Bureau of Labor Statistics, *Relative Importance of Components in the Consumer Price Index,* annual, various years.

services, because interest rates have a greater impact on commodities. For example, high interest rates would depress consumer demand for financed commodities (such as durable goods); on the supply side, high interest rates would raise the cost of financing inventories (which should have a smaller impact on services). In reality, inflation rose and then fell primarily because inflation in the service sector rose and then fell. Since

Figure 6 **Weighted Contribution to CPI Inflation of Food, Housing, and Transportation, 1968–1993**
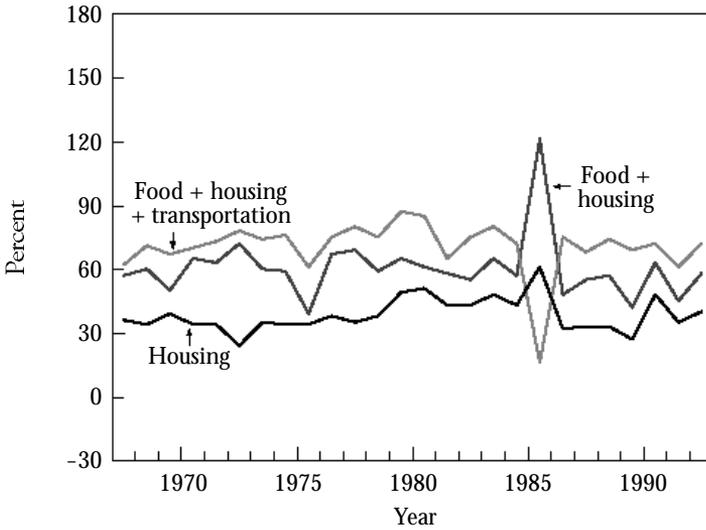
Source: Authors' calculations based on data from U.S. Department of Labor, Bureau of Labor Statistics, *Relative Importance of Components in the Consumer Price Index,* annual, various years.

the commodities sector declined in importance in the measurement of the CPI, monetary policy must have an increasingly large impact on it to reduce inflation originating in the service sector.

By far the most important component of the service sector (in terms of the component's contribution to inflation in that sector) was housing; its relative importance in the CPI is currently above 40 percent and its weighted contribution was 50 percent when inflation was high. Thus, housing warrants closer examination as it is possible that Fed policy worked primarily by affecting inflation in that component; indeed, many would list the interest-rate-sensitive housing sector as among the most sensitive to the transmission mechanism of monetary policy. We, however, feel that this conclusion is based on a misunderstanding of the way in which the housing component index is calculated. Given the large relative importance of the housing sector and the fact that it has been the primary contributor to past high inflation, it is important to determine whether monetary policy operates through this sector to lower inflation.

Detailed Analysis of the Housing Component

Housing is a major component in the CPI and thus merits detailed analysis. There are two ways to calculate the contributions of the housing sector to a price index: the consumption flow approach and the home owner, or user cost, approach. The method that has been in place since 1983 is a version of the consumption flow method, an imputed rental cost approach. Previously, the BLS had used a user cost approach, but it was believed that this older method mixed investment and consumption features of home ownership (Gillingham 1980). To some extent the older method resulted in a measure of inflation that was more appropriate for the purposes of monetary policy formation. However, since higher interest rates increase mortgage service costs, tight money policy would have perversely affected housing inflation even in the pre-1983 period. We will argue that the imputed rental, or consumption flow, approach gives incorrect signals and can lead the Fed to adopt perverse policy.

Two papers (Pollin and Stone 1991, Gillingham 1980) analyzing the two methods for incorporating the housing sector into the CPI came to opposite conclusions. Our purpose here is not to advocate one approach over the other, but rather to point out that both face measurement problems that can lead to wide differences in measured CPI inflation rates. Table 5 has been adapted from a table included in Pollin and Stone's paper. The table compares the inflation rate of home ownership as measured by the old CPI (pre-1983, user cost approach) and the new CPI (post-1983, consumption flow approach).

As Pollin and Stone argue, it is "remarkable, in short, how much hinges on a technical argument as to the relative merits of rental equivalence rather than current purchase prices for deriving the costs of home ownership" (Pollin and Stone 1991, 55). Given that home ownership costs play a major role in the calculation of the CPI, it is not surprising that the two methods can generate very different estimates of inflation of the CPI. For example, as reported in Pollin and Stone, with the old method of calculation[11] the overall CPI inflation rate reached 7.7 percent in 1973, while under the new method it would have been only 4.9 percent; in 1974 and 1975 the old method overstated inflation by one percentage

Table 5 **Alternative Measures of Inflation of Home Ownership Costs Using Two Methods of Calculating the CPI, 1968–1982**

Year	Old Method	New Method
1968	5.7	2.6
1969	9.7	3.2
1970	10.8	4.0
1971	4.0	4.7
1972	4.8	3.5
1973	4.7	4.2
1974	11.2	5.1
1975	11.3	5.1
1976	5.5	5.3
1977	6.9	6.1
1978	10.9	6.9
1979	15.5	7.2
1980	19.7	8.9
1981	12.3	8.7
1982	6.8	7.6

Source: Adapted from Robert Pollin and Michael Stone, "The Illusion of an Improved CPI," *Challenge* 38 (January-February 1991): 55.

point relative to the new method. Much, but not all of the difference can be attributed to the differing methods of calculating home ownership costs. Since the old method was used in 1973, the rate of inflation appeared at the time to be unbearably high and led to attempts by workers and others to obtain cost-of-living increases related to perceived inflation rates and eventually to tight money policy that resulted in a deep recession. In retrospect, and using the new method of calculation, we might say that the inflation rate was not nearly so high as it was believed to be at the time, and a lower official inflation rate might have actually reduced inflation pressures at the time (by reducing the pressures that led to the so-called wage-price spiral).

While such matters surely warrant greater attention, our concerns are more fundamental. We recognize that any index will carry some advantages and disadvantages and that no index can be perfect. We have singled out the housing component because we believe it is one of the components of the CPI that is problematic with regard to monetary policy. Detailed analysis of other components might also raise questions about their inclusion in any index of inflation that is used as a basis of monetary policy.

We focus on the housing sector for several reasons. First, it accounts for much of measured inflation: housing accounts for more than 40 percent of the CPI, the housing sector has generally experienced above-average inflation rates, the relative importance of housing tends to rise over the course of each decade, and the weighted contribution of housing to inflation has typically been near 50 percent whenever overall inflation has been high.

Second, many observers argue that the transmission mechanism of monetary policy operates to a great extent through the housing sector: higher interest rates raise construction finance costs and reduce supply, while higher mortgage rates discourage demand. As the housing sector slows, so does the economy as a whole. It is then logical to assume that because monetary policy operates through the housing sector, inflation in the housing sector should certainly be incorporated into any overall inflation index to be used as a target of monetary policy. We question this argument because the housing component of the CPI does not capture actual inflation in the housing sector nor is monetary policy able to exert direct pressure on inflation of the housing component.

We will first examine briefly the method used to calculate the contribution of the housing component to the new CPI (see Table 6). We focus on the shelter component, which accounted for 28.0 percent of the 1994 CPI (of which renters' costs accounted for 8.0 percent and home owners' costs for 19.9 percent) and more than two-thirds of the relative importance of the housing sector. A residential rent component accounts for a large portion of renters' costs (5.8 percent out of a total of 8.0 percent), while owners' equivalent rent accounts for almost all of home owners' costs (19.5 percent out of 19.9 percent). The BLS uses a survey of rental units to obtain data about changes in rental prices; the results are adjusted through a weighted average process and quality adjustments are made to deal with aging and improvements. The method used to calculate owners' equivalent rent (OER) is more complicated. Field agents ask owners the price at which they believe the house could rent; agents may adjust this estimate if they believe the owners' estimates are unreasonable. These survey data are used to establish imputed rent for the base year. "Subsequent values of [imputed] rent for a given unit are derived by using changes in rent that occur in a specific subsample of the residential rent units used for the residential rent unit" (Rogers, Henderson, and Ginsburg 1993, 34). In other

Table 6 **Expenditure Groups and Relative Importance of the Housing Component to CPInflation, December 1994**

Expenditure Group	Relative Importance			
CPI (total)	100.0			
Housing		41.2		
Shelter			28.0	
Renters' costs				8.0
Residential rent					5.8
Other renters' costs					2.2
Home owners' costs				19.9
Owners' equivalent rent					19.5
Household insurance					0.4
Maintenance and repairs					0.2
Fuels and other utilities			7.1	
Household furnishings and operations			6.1	

Source: U.S Department of Labor, Bureau of Labor Statistics, *Relative Importance of Components in the Consumer Price Indexes*, 1994.

words, the rate of increase of OER is obtained by applying the rate of increase of prices of rental units that are thought to be similar in certain respects (such as location, structure type, and quality).

Some observers have criticized the method by which OER is calculated, noting that rental units are generally not comparable to owner-occupied houses, even in the same neighborhoods; for example, rental units initially used for comparison tended to be smaller. The BLS has reacted to such complaints by attempting to obtain better matching. More fundamentally, other critics have argued that rentals and owner-occupied units are not comparable for a variety of other reasons (for a summary, see Pollin and Stone 1991). One important observation is that the rental market for single-family, detached housing is small and distinct from that for owner-occupied, single-family, detached housing. In particular, 85 percent of single-family, detached houses are owner occupied. The BLS method uses the rate of increase of the rental portion of the market—a portion that is small (only 15 percent of the market) and that may not represent a good substitute for the large part of the market—to obtain estimates of the rate of increase of the owner-occupied portion of the market. Again, this would not be important if OER were a small part of the CPI, but its relative importance to CPI is 19.9 percent and it accounts for two-thirds of the shelter component, whose weighted contribution has reached nearly 40

percent when inflation was high. As Figure 7 shows, the shelter component drives the weighted contribution of the housing component.

The problems of measuring housing costs raise several questions about the use of the CPI as a target of monetary policy. For instance, assume that due to a limited supply of rentals relative to demand, the rental price of single-family, detached houses rises rapidly. This would lead to a high rate of inflation for residential rent and imputed OER. Such an increase can occur independently of changes in the prices of owner-occupied, single-family, detached housing (new or used) and of the quantity or cost of current construction of such housing. Given the 1994 relative importance of shelter (28.0 percent) in the calculation of the CPI, inflation of rentals translates into a significant increase in the CPI. The Fed observes the rise in the CPI and adopts tight money policy. Those who might have been considering the purchase of detached, single-family homes decide to postpone purchase because of the higher interest rates and choose instead to rent such a dwelling. This increases the demand for such units, raises the rate of inflation of rentals and of the imputed OER, and further increases the rate of inflation as measured by the CPI. Tight policy, then, raises inflation rates and could lead to a

Figure 7 Weighted Contribution to CPI Inflation of the Housing Sector, 1968–1993
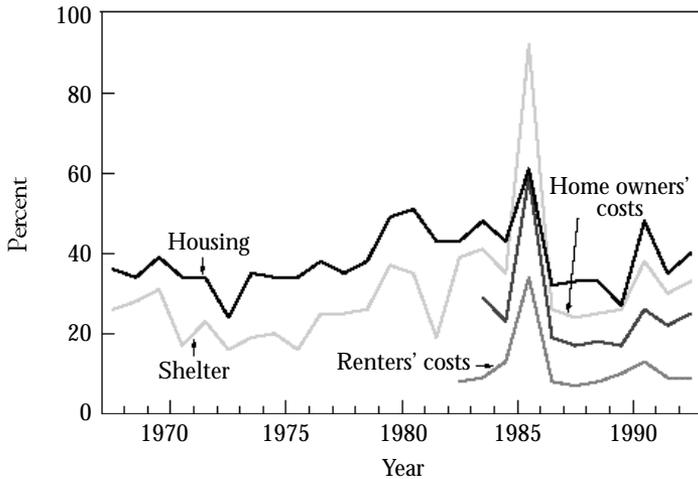
Source: Authors' calculations based on data from U.S. Department of Labor, Bureau of Labor Statistics, *Relative Importance of Components in the Consumer Price Index,* annual, various years.

vicious cycle of interest rate hikes, depression of the market for single-family, detached homes, and increases in rents and imputed rents (OER). Furthermore, the costs associated with higher interest rates could be passed along by landlords to renters in the form of higher rents, further exacerbating the measured inflation problem. Although this is not a sustainable situation, we make the point to illustrate how the transmission mechanism of monetary policy fails to have its desired effect in a small part of the market for single-family, detached homes and thereby transmits imputed price increases to a large part of the market for such dwellings. Further, the central bank obtains incorrect signals regarding inflation by focusing on the CPI and reacts with monetary policy that results in inappropriate market reactions (since another solution could be to lower interest rates in order to encourage home purchases and thereby relieve congestion in the rental market).

The method of calculating OER results in an inappropriate monetary policy response; it is possible to conceive of other situations in which the housing component of the CPI sends the wrong signal to the central bank. For example, suppose that the rental market is not congested, but a speculative boom has caused rapid increase in the price of owner-occupied housing (new and used). This would apparently warrant tighter monetary policy to raise mortgage rates so as to reduce demand. However, actual inflationary pressures in the owner-occupied housing market may not be captured at all in the CPI until the normal rate of transition of detached housing from owner-occupancy to rental plus the normal rate of turnover in the rental market (due to construction of new units and razing of old units) led to higher rental prices or until bottlenecks force prospective home owners into the rental market. There is ample reason to suppose this transition would not be a timely process, given lags and the methodology used in constructing the CPI. While it is true that higher prices for owner-occupied, detached housing will be reflected in higher base prices in the subsequent survey, it will take some time for the rate of turnover of the sample to fully reflect new, higher prices in the base.

Conventional analysis of the transmission mechanism of monetary policy would emphasize the link between interest rates and demand and supply in the housing, investment, and consumer durables sectors. A study by Steven Fazzari (1993), however, has cast doubt on the relationship between interest rates and investment in plant and equipment. Our

analysis has cast doubt on the relationship between monetary policy and inflation of the housing component of the CPI. While there may still remain a link between monetary policy and the housing sector—for example, due to the impact of interest rates on new construction or of mortgage rates on housing demand—we have shown that this link is such that actual cost increases will translate into rises in measured inflation rates in an indirect manner. Indeed, we have argued that the result of monetary policy could be to raise inflation further. Finally, there is no reason to suppose that inflation as measured by the CPI accurately reflects market conditions for owner-occupied housing. Thus, housing inflation as measured by the CPI is both a poor indicator to be used in policy formation and is unlikely to be affected in the desired manner by monetary policy.

Is Inflation around the Corner?

The period between 1973 and 1981, during which inflation accelerated and led to the current preoccupation with inflation, can be characterized as follows. First, there was a rather rapid growth of housing services prices and an increase in the share of the contribution of housing services to the total inflation rate over the 1970s; by 1980 and 1981 housing accounted for 50 percent of the much-above-average inflation rate. Second, gasoline prices increased by 41 percent between July 1973 and July 1974, raising the transportation share of inflation to about 20 percent during 1975 and 1976; another oil price shock in 1979 and 1980 again raised the gasoline inflation rate above 40 percent and raised transportation's share of CPI inflation to nearly 25 percent. In 1981 transportation and housing accounted for 75 percent of total inflation. Finally, rapid inflation of food prices in 1973 and 1974 and 1978 and 1979 compounded the problem as the contribution of food to inflation rose to around 25 percent in the first peak inflation period and to 20 percent in the second. The attribution of both "great inflations" (1973 to 1975, 1979 to 1981) to food and energy shocks will come as no surprise, but it may be surprising to find that housing services played a much larger role, accounting for as much as 50 percent of the measured CPI inflation rate. Few would argue that monetary policy should be credited for the eventual reduction of inflation of energy and food prices; we have also argued that tight money policy could have had perverse impacts on housing inflation, but in any case would not generally have had a direct and predictable effect on housing price inflation
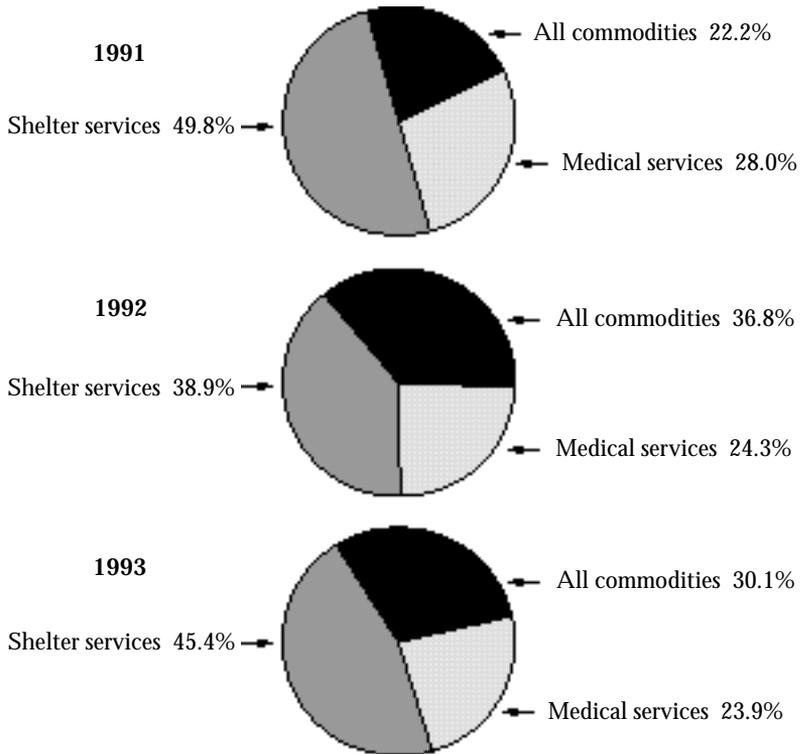
as measured by the CPI. Thus, those components that accounted for up to 90 percent of the "great inflations" are substantially outside the control of the Fed.

The institutional environment of the late 1980s and 1990s is much different from that of the 1970s and early 1980s. Recent inflation has been the result of measurement problems and of fairly unique and, presumably, short-lived rapid price increases in certain items in the consumer basket, particularly services and more specifically housing, medical costs, and, to a lesser extent, education costs.[12] Figure 8 shows the weighted contributions of the relative shares of all commodities, medical services, and shelter services for 1991, 1992, and 1993. Most inflation in the early 1990s came not from commodities, but from services, in particular, from shelter and medical services. In the case of commodities, there is little evidence that reinflation is imminent; food and apparel prices are nearly stagnant, gasoline prices have fallen nearly as often as they have risen, and transportation prices are just keeping pace with the CPI growth. In the case of services, housing prices now are actually rising at a rate below that of the CPI as the real estate boom is finished in most of the country, and in late 1994 and early 1995 medical care prices, which had been increasing twice as fast as the CPI, were rising at a rate just above that of the overall inflation rate.[13] Moreover, we are convinced that these price movements are not substantially affected by the Fed's fine-tuning of interest rates.

In sum, it can be seen that the facts presented here do not justify the Fed's concern with present inflationary pressures. Moreover, there is no danger of rapid inflation of manufactured goods prices because worldwide excess capacity and capital movements to low-wage economies help counteract such inflation. Evidence of these counteracting effects can be seen in the facts that nominal wages and labor costs in the United States have not kept pace with inflation and unions have become a less significant force in the American economy. Indeed, unit labor costs are falling. The only danger of inflationary pressures, then, comes from rising interest costs and possibly from tax increases should Congress use such measures in a serious attempt to balance the federal budget or out of concern about the Social Security system (which could lead to rising payroll taxes).

It is hard to see how monetary policy can be used to fight inflation that results from increasing medical care costs, oil price shocks, rising rents,

Figure 8 Weighted Contribution of Relative Shares of All Commodities, Medical Services, and Shelter Services to CPI Inflation, 1991, 1992, 1993

1991

Shelter services 49.8%

All commodities 22.2%

Medical services 28.0%

1992

Shelter services 38.9%

All commodities 36.8%

Medical services 24.3%

1993

Shelter services 45.4%

All commodities 30.1%

Medical services 23.9%

Source: Authors' calculations based on Table 4 above; data from U.S. Department of Labor, Bureau of Labor Statistics, *Relative Importance of Components in the Consumer Price Index,* annual, various years.

imputed rents, education, interest costs, or tax hikes. It is unlikely that such policy would diminish inflationary pressures initiating in any of these areas, areas that are so significant in terms of their contribution to the CPI measure of inflation. If monetary policy is to be successful in reducing overall inflation, it must be severe enough to dampen inflation in other sectors, sectors that do not contribute much to measured CPI inflation.

Conclusions

We have argued elsewhere (Papadimitriou and Wray 1995) that current Fed intervention should be reduced in light of its new-found realization

that central banking is an art, not a science. In this *Public Policy Brief*, we have extended this argument by showing that the CPI is not a good guide for monetary policy. Moreover, there is no reason to believe that a constant CPI is a reasonable goal of monetary policy. Further, the Fed should not focus on the single goal of price stability.

First, biases in the calculation of the CPI leave us unsure about what "price stability" means. The Bundesbank argues that the CPI overstates inflation by 2.0 percentage points, the Fed has admitted the bias could be up to 1.8 percentage points, and the Boskin report sets a conservative estimate of the upper end of the bias at 2.7 percentage points (Tietmeyer 1994, Schulkin 1993, Boskin et al. 1995). Even these estimates may substantially understate the bias, particularly in the case of the service sector, given measurement problems. Moreover, rapid technological change in the medical part and other parts of the service sector (such as for secretarial services, education, computing, and financial services) makes it difficult to account for price changes stemming from quality improvements. Given the small margin for error admitted by central bankers (usually 1.0 to 2.0 percentage points), the United States was already at zero inflation—and perhaps even experiencing deflation—even before monetary policy was tightened in the spring of 1994.

Second, no one knows whether a benefit-cost ratio of higher versus lower inflation rates, say, 4 percent inflation versus 2 percent inflation, is positive or negative. We don't know the costs of 4 percent inflation or the costs of lowering inflation. All will agree that when inflation hits double digits, costs are high, but what about inflation of 3 percent? Assuming no further losses from the recent tightening, was the loss of $1.5 trillion of financial wealth (that occurred during the fall of 1994 due to the Fed's tightening [Muehring 1995]) justified to fight imaginary inflationary pressures when the actual inflation rate less measurement bias may have been just above zero?

Third, we do not know how central banks might fight inflation or if they can reduce it. This conclusion is probably more controversial than the previous two, as almost everyone is willing to credit central banks for falling inflation nearly worldwide during the past decade. We hope this *Public Policy Brief* has cast some doubt on whether central bankers were

responsible for recent low inflation. Of greater importance for the low inflation has been the opening of U.S. markets (particularly to low-wage imports), the decline of U.S. trade unions, stable energy prices, rapid advance (and falling prices) of high-technology output, and the collapse of real estate markets.[14]

Fourth, there is simply no credible evidence that moderately rising interest rates cause smooth curtailment of spending plans. Indeed, the current market wisdom is that at least a 450-basis-point increase in interest rates is required to slow the economy (Muehring 1995). Moreover, Fazzari (1993) has cast doubt on the supposed negative relationship between interest rates and investment spending, and, as discussed above, there is no reason to expect a smooth inverse relation between interest rates and housing services prices. Further, there is no evidence that monetary policy can slow inflation merely by reducing money growth rates; it appears that tight money policy works only when it causes massive and widespread insolvency of financial institutions—reducing credit supply—and greatly increases the portion of income flows devoted to paying interest—reducing credit demand.

At a time when economists are questioning the reliability of data purported to measure inflation, when economists are unsure of the appropriate targets to be used by the Fed to achieve the goal of price stability, and, indeed, when it is not at all clear that the Fed has much impact on the performance of a given aggregative index such as the CPI, it is myopic to focus monetary policy on price stability.

Acknowledgments

Notes

1. Jordan (1993), president of the Cleveland Fed, has explicitly advocated use of a CPI target. According to his proposal, the Fed would, after a brief implementation period, announce a specific target for the level of the CPI and then hold it there forever. Thornton (1988), an economist at the St. Louis Fed, was among the first to urge the Fed to abandon traditional policy formation and to adopt inflation as both the target and ultimate goal of policy. There is an effort afoot led by Senator Connie Mack (current chairman of the Joint Economic Committee) to repeal the Humphrey-Hawkins Act of 1978 and to charge the Fed with the single goal of price stability. A notable dissenter from such proposals is Alan Blinder (1996), who supports the dual mandate provided in the Federal Reserve Act, which directs the Fed to pursue stable prices and maximum employment.

2. The dangers of adopting erroneous policy increase as the average rate of inflation falls. When inflation is, say, 15 percent or more, most observers would support tight monetary policy because the social and private costs of inflation are significant; the benefits from a given reduction in inflation would exceed the costs of fighting that inflation; problems of measurement error involved in calculating a CPI would be of secondary importance; and it is likely that all, or nearly all, of the components of the consumer basket would be experiencing substantial inflation (so that even if policy could affect only a portion of the consumer basket, there would be little danger of causing deflation of prices of any portion of the basket).

   However, if inflation is low, say, 2.5 to 3.0 percent, it is unclear whether a consensus could be reached regarding further tightening as none of the conditions listed above would be met. That is, at low levels of inflation it is not at all clear that the costs of inflation are high; that the benefits of further reducing inflation would exceed the costs of such reductions; that small measurement errors would remain unimportant; and that many items in the consumer basket might be experiencing any inflation. Therefore, if monetary policy works primarily on those items that are not contributing to inflation, then there is great danger that the policy will work only by causing deflation of the prices of some items. Our results lead us to conclude that if inflationary pressures should be fought through the use of monetary policy, the CPI is not a good measure of inflation for this purpose. Most importantly, at low rates of inflation, the dangers of choosing an inappropriate measure increase.

3. As noted above, Alan Blinder rejects the notion that the Fed should abandon all goals but price stability; in addition, he examines and rejects the claim that the Fed can affect only nominal values (Blinder 1996).

4. However, in a detailed examination of the literature on possible biases of the CPI, Wynne and Sigalla (1996, 55) found that "there is very little scientific basis for the commonly accepted notion that measured inflation at 2 to 3 percent a year is consistent with price stability." They concluded that previous studies had not been able to make a strong case as to the likely direction of bias; it is about as likely that the CPI understates inflation.

5. It should be noted that it is impossible to exclude these factors completely since the prices of energy and food enter into the determination of the prices of most other consumer items (few consumer items are free of the price effects of corn or petroleum derivatives). Thus, even if the only inflationary pressures initially came from politically induced increases in the price of oil, a Fed policy focused on core inflation would still force deflationary pressures on other components of the CPI in order to offset the secondary inflationary pressures imparted by oil prices.

6. We examined this proposal in a previous *Public Policy Brief* (Papadimitriou and Wray 1994); the proposal seems to have been abandoned because of the negative response it received.

7. Most economists would define price stability as a situation in which the overall price level is not rising; if the CPI were a good measure of the rate of inflation, then price stability would be associated with a constant CPI. However, if the CPI is biased, then price stability is achieved with a rising (or falling) CPI. If, as many observers believe, the CPI overstates inflation by as much as two percentage points, then stable prices are associated with a measured CPI inflation rate of 2 percent. Chairman Greenspan has not explicitly endorsed such a definition, but "price stability" appears to indicate a situation in which the CPI would be increasing only due to measurement error.

8. The relative importance data released closest to the benchmark surveys (usually with a lag of a couple of years) give the best approximation of the benchyear component weights. The component weights actually used in any given year cannot be obtained, but would be something between the most current relative importance weights and the relative importance weights from the year closest to the benchmark year.

9. Actually, adjustments are made during the intervening period as the BLS obtains new data on products and consumer spending habits; however, long lags can occur.

10. We calculated weighted contribution as described in the previous section. However, because, as noted above, the BLS does not release data on component weights, we used data on relative importance to calculate weighted contributions. We chose to use "fixed weights" based on relative importance over five-year periods. This choice was something of a compromise—use of actual (unavailable) fixed weight components would lead to lower weighted contributions for items experiencing above-average inflation rates; use of actual annual relative importance data would lead to higher weighted contributions. Thus, using relative importance data that is updated every five years provides an estimate between the two extremes. For the component

weight, we used a constant relative importance weight for each five-year period, updated for the subsequent five-year period. Thus, the periods and year from which relative importance was obtained (in brackets) are 1968–1974 [1971], 1975–1979 [1975], 1980–1984 [1980], 1985–1989 [1985], and 1990–1994 [1990].

11. The CPI for 1973 is now estimated to have been 8.9 percent rather than the 7.7 percent as reported in Pollin and Stone (using the old method for calculating owners' equivalent rent).

12. It is often claimed that the early concern of President and Hillary Clinton with the U.S. health care system helped to dampen medical cost increases due to a focus on what was perceived to be excessive inflation in this sector.

13. The lack of inflationary pressure is also apparent in the low rate of increase in the producer price indexes since the early 1990s. Finished goods prices rose at a rate of less than 0.5 percent, finished consumer goods prices actually fell in 1994, and the inflation rate for finished goods less energy and food was only 0.3 percent in 1993 and 0.5 percent in 1994. In short, the producer price indexes showed no evidence of acceleration of inflation and give a much different picture than they did just before the "great inflations" of the 1970s.

14. This is especially true for home prices and can be partly attributed to the collapse of thrifts and to the loss of some tax shelters. This is the one area in which we would give the Fed some credit/blame for inflation fighting—by crippling thrifts it was able to cause a temporary credit crunch in housing finance. As depressed real estate markets can eventually affect base-year imputed rents, they can reduce imputed inflation of the owners' equivalent rent, but only with a long lag (since units remain in the base for up to 10 years).

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