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# An Evaluation of the Decline in Goods Inflation

*By Todd E. Clark*

Over the past decade, inflation around the globe has dropped—so much that the worldwide average has plummeted from 30 percent to 4 percent (Rogoff). For many countries, especially those starting out with high inflation rates, falling inflation has been desirable. But the experiences of other countries have raised the question of whether inflation can be too low. In some economies, inflation has dipped to levels that risk disruption of the normal functioning of the economy. At the extreme, Japan and Hong Kong have experienced deflation—a sustained decline in the aggregate price level, reflected in negative inflation rates. In countries such as the United States, goods prices have been falling, even though services prices continue to rise at a healthy pace, keeping overall inflation positive.

Many commentaries on the potential for deflation in the United States have noted the sharp contrast between goods and services prices. Excluding food and energy, goods prices as measured by the chain price index for personal consumption expenditures (PCE) dropped 2¼ percent in 2003. Yet nonenergy services prices rose nearly 2½ percent

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last year. Moreover, goods inflation has fallen sharply over the past decade or so, while services inflation has declined only modestly. In 1993, PCE inflation was about  $\frac{3}{4}$  percent for goods and  $3\frac{1}{4}$  percent for services.

This article assesses whether the decline in consumer goods inflation relative to services should be cause for concern in the United States. The analysis focuses on three interrelated questions about the decline in goods inflation relative to services: Was it unusual; what caused it; and is it likely to continue? The first section examines the extent to which the recent U.S. experience is unusual by historical and international standards. The potential explanations evaluated in the second section include: a deterioration in the accuracy of measured services inflation, an increase in productivity growth for the goods sector compared to services, rising demand for services relative to goods, and downward pressures on goods prices due to the rising value of the dollar or heightened global competition. The third section assesses whether the falloff in goods inflation relative to services is likely to persist. The article concludes that, at present, there is little cause for concern in the United States. The fall in goods inflation relative to services over the past decade is most likely a temporary phenomenon due to dollar appreciation and, to a lesser extent, increased global competition.

## **I. U.S. HISTORICAL AND INTERNATIONAL EVIDENCE**

Economists have long known that goods inflation is normally well below services inflation. In such historical context, the falloff in goods inflation relative to services over the past decade may not be unusual for the United States. Similarly, the recent U.S. experience may have been shared by other industrialized economies. After first reviewing the inflation measures used in the analysis, this section examines historical movements in U.S. goods inflation relative to services and more recent international evidence on the behavior of consumer goods and services inflation.<sup>1</sup>

Taken together, the historical U.S. and recent international evidence reveal the past decade's decline in core goods inflation relative to services to be somewhat unusual and perhaps temporary. In the United States, the differential between goods and services inflation has widened

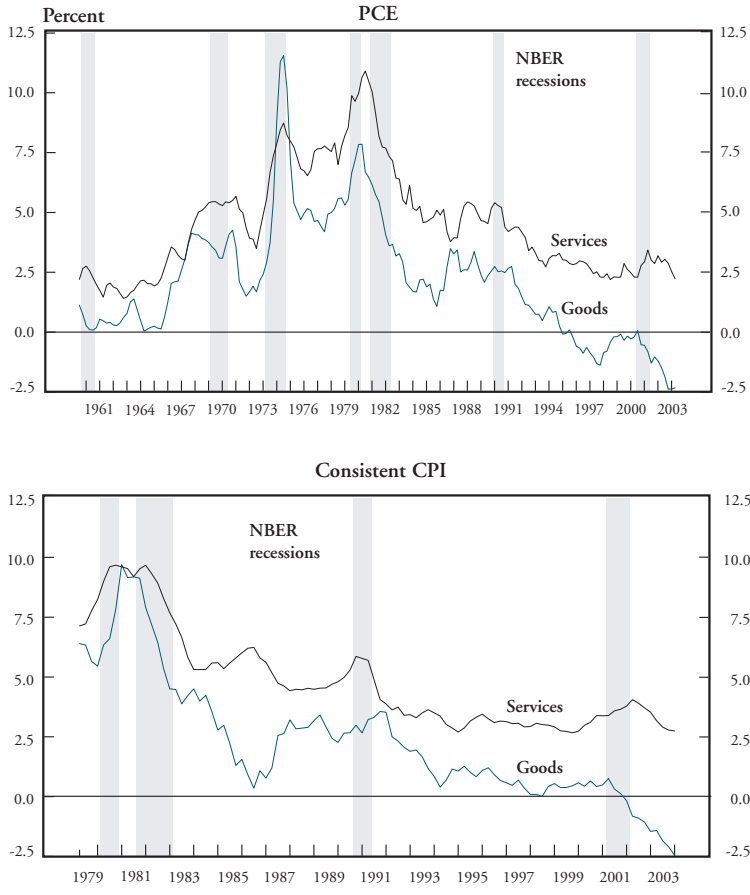
fairly persistently over the past decade, reaching record or near-record levels, depending on the measure of inflation. Some other industrialized countries, such as the United Kingdom and Canada, also experienced a significant falloff in goods inflation relative to services. In these foreign economies, however, goods inflation relative to services reversed course and rose in the last few years. Moreover, in Europe and Japan, goods inflation actually increased relative to services in all or part of the 1990s.

### *Measures of goods and services inflation*

Reliably evaluating whether the recent behavior of U.S. goods and services inflation is unusual compared to past behavior requires so-called *methodologically consistent* measures of inflation. Over time, the methods used to construct the published indexes of consumer prices—the PCE price index and CPI—have changed significantly, due mostly to improvements in measurement. For example, in 1983 the Bureau of Labor Statistics (BLS) switched the basis of the CPI’s owner-occupied housing index from the cost of purchasing a house to the implicit rental value of the shelter provided by a house. Comparing recent inflation data that reflect such measurement changes to historical data that do not would be tantamount to comparing apples to oranges. Making an apples-to-apples comparison requires the use of historical inflation data based on the measurement methods in use today—that is, *methodologically consistent* inflation data.

To ensure historical consistency, this article’s U.S. analysis relies on published PCE chain price indexes and specially constructed, consistent CPIs.<sup>2</sup> The published PCE price indexes for 1959-2003 are methodologically consistent. The historical data are constructed using the current, best-available methodology.<sup>3</sup> In contrast, published CPIs are not methodologically consistent, because the historical data are not revised when measurement changes are introduced into current data (in light of the CPI’s widespread use in many legal contracts and government programs involving indexation). For research purposes, though, the BLS has constructed methodologically consistent CPIs for 1978 to 2003.<sup>4</sup> These data, which reflect many of the methodological improve-

*Chart 1*  
**INFLATION IN CORE GOODS AND SERVICES**

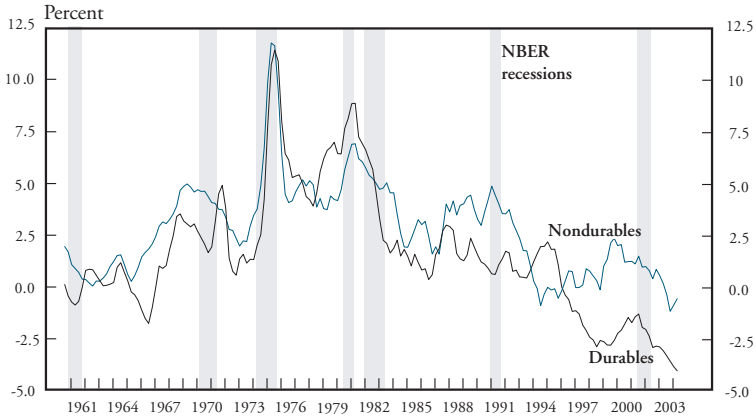


Notes: Data are four-quarter rates of change. The CPI figures are based on methodologically consistent, quarterly price indexes, formed as within-quarter averages of monthly, seasonally adjusted price indexes. The monthly adjusted data were constructed by applying the X-11 filter to the raw unadjusted CPI data.

Sources: Bureau of Economic Analysis, Steve Reed of the Bureau of Labor Statistics, and author's calculations

Chart 2

## CORE PCE INFLATION IN DURABLE AND NONDURABLE GOODS PRICES



Note: Data are four-quarter rates of change.

Sources: Bureau of Economic Analysis and author's calculations

ments made to the published CPI since 1978, are used in this article's historical comparisons of goods and services inflation.<sup>5</sup> In all cases, U.S. inflation is measured in so-called *core* terms—excluding food and energy.

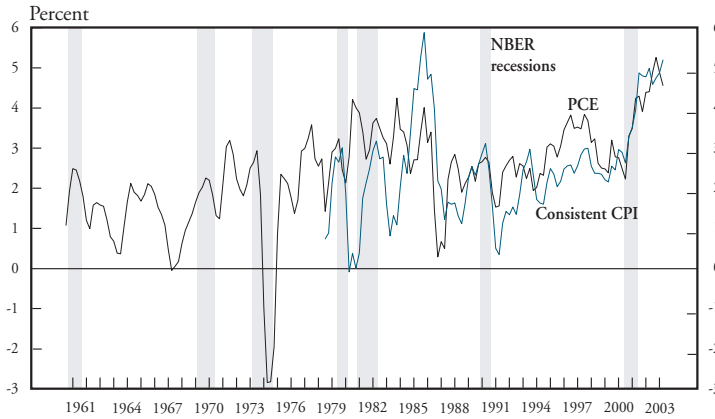
With methodological consistency less important for analysis of recent international developments and consistent data generally not available for other economies, goods and services prices in other industrialized countries are just measured by published CPIs. Methodological consistency is less important in the international data simply because the time span considered is shorter than in the historical U.S. analysis. The shorter time span means fewer methodological changes have occurred. The economies considered are those for which CPI data on goods and services are readily available: Australia, Canada, the Euro area, Japan, and the UK.<sup>6</sup>

### *Historical U.S. evidence*

Chart 1 dramatically illustrates why the recent falloff in core goods inflation relative to services often appears in discussions of the risk of deflation. Core goods inflation has, for the first time ever, been consis-

Chart 3

## SERVICES LESS GOODS INFLATION



Note: The plotted series measure core services inflation less core goods inflation, computed as four-quarter rates of change in PCE and methodologically consistent CPI series.

Sources: Bureau of Economic Analysis, Steve Reed of the Bureau of Labor Statistics, and author's calculations

tently negative. Although inflation rates for both durable and non-durable goods have declined sharply since the early 1990s, only durables inflation has been consistently and significantly negative (Chart 2). Thus, of those goods for which the price level (as opposed to inflation rate) is falling, most are durables. The slowing of overall goods inflation, of course, in part reflects the general downward inflation trend in the economy—a decline also reflected in core services inflation. Until overall inflation fell to its recent very low levels, the decline in inflation was associated with the Federal Reserve's gradual pursuit of price stability.

When judged against services inflation, the past decade's falloff in core goods inflation appears somewhat unique.<sup>7</sup> With goods inflation declining more than services, the past few years have seen the gap between goods and services inflation widen sharply, to record levels in the case of PCE inflation and near-record levels in the case of CPI inflation (Chart 3). Although the differential between core goods and services inflation has generally been trending up since the early 1990s, it did not become unusually large by historical standards until the late

1990s. Until that point, the gap between PCE goods and services inflation was in line with the average differential that prevailed from roughly the mid-1970s, when the gap markedly increased relative to past averages. According to methodologically consistent CPI data, the substantial widening of the gap between core goods and services inflation over the past decade was preceded by a larger, but temporary, surge in the mid-1980s.

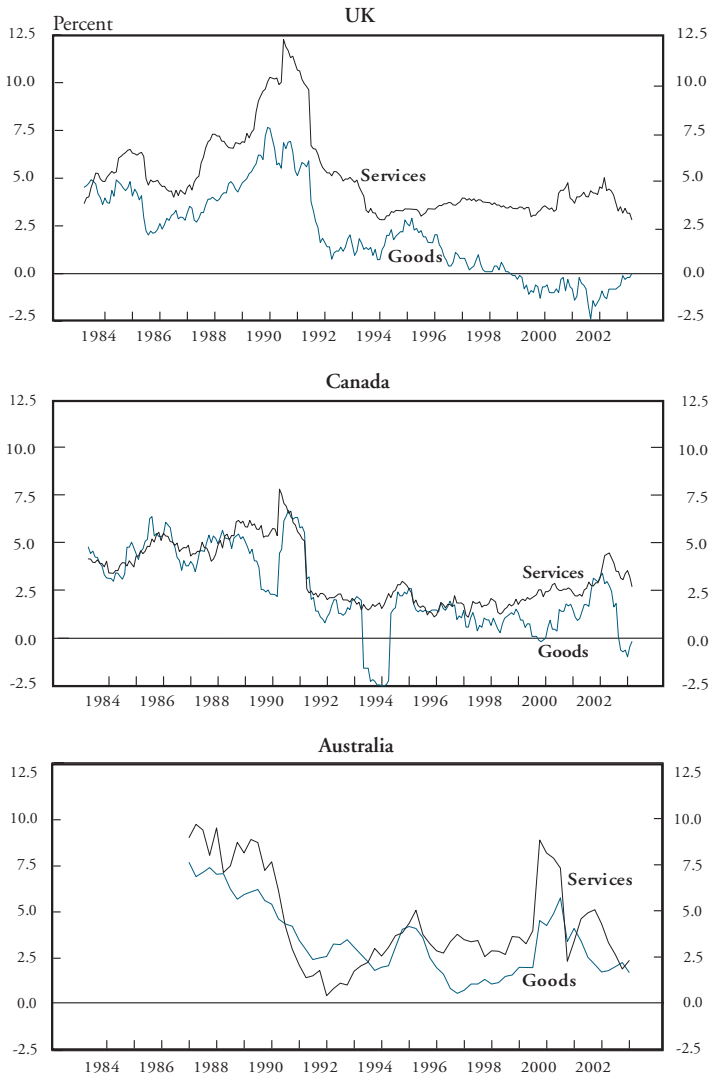
### *International evidence*

The available international evidence indicates the decline of goods inflation relative to services has been a partly global, although temporary, phenomenon. Along with the United States, the UK, Canada, and Australia experienced a fall in goods inflation relative to services (Charts 4-6). The inflation experience of the UK most closely resembles that of the United States. In the UK, as in the United States, goods inflation fell very sharply relative to services, from roughly mid-1996 to mid-2002.<sup>8</sup> As a result, the gap between UK goods and services inflation reached a roughly 20-year high in mid-2002. In Canada, too, core goods inflation declined relative to services over the second half of the 1990s (the sharp changes in inflation in 1991 and 1994 are due to tax changes). Similarly, in Australia, goods inflation generally declined relative to services in the second half of the 1990s, although, as in the United States, the goods-services differential temporarily narrowed in the late 1990s.

Notwithstanding the similarity in experiences over the second half of the 1990s, in no country has the falloff in goods inflation relative to services been as long-lasting as in the United States. To some degree, these foreign economies that experienced a falloff in goods inflation in the second half of the 1990s have since experienced a rise in goods inflation compared to services. In the UK, for example, goods inflation has increased significantly compared to services since mid-2002. Canada also experienced rising goods inflation from early 2000 through mid-2002, although goods inflation has since plummeted. The more recent experiences of

Chart 4

## GOODS AND SERVICES INFLATION IN THE UK, CANADA AND AUSTRALIA



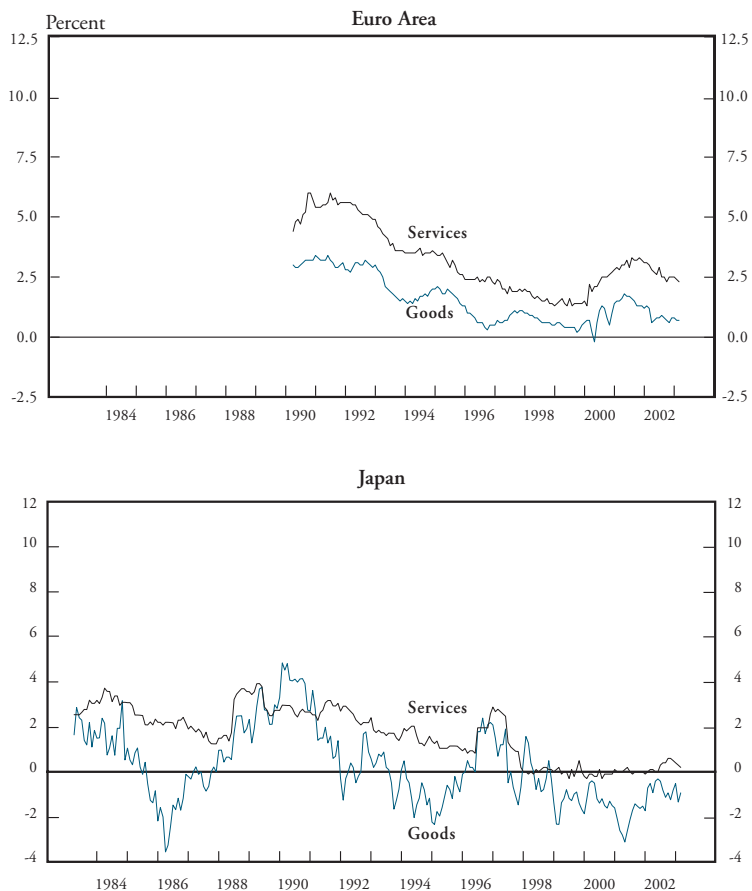
Notes: UK data are 12-month rates of change of RPIs (1984-88) and HICPs (1989-2003) for total (not core) goods and services. Data for Canada are 12-month rates of change for (1) goods excluding food purchased from stores and energy and (2) services. Data for Australia are four-quarter rates of change in CPIs excluding volatile items for (1) goods and (2) services.

Sources: Bank of England and the (UK) Office of National Statistics; Statistics Canada; and Australian Bureau of Statistics and Reserve Bank of Australia



Chart 5

GOODS AND SERVICES INFLATION IN THE EURO AREA AND JAPAN

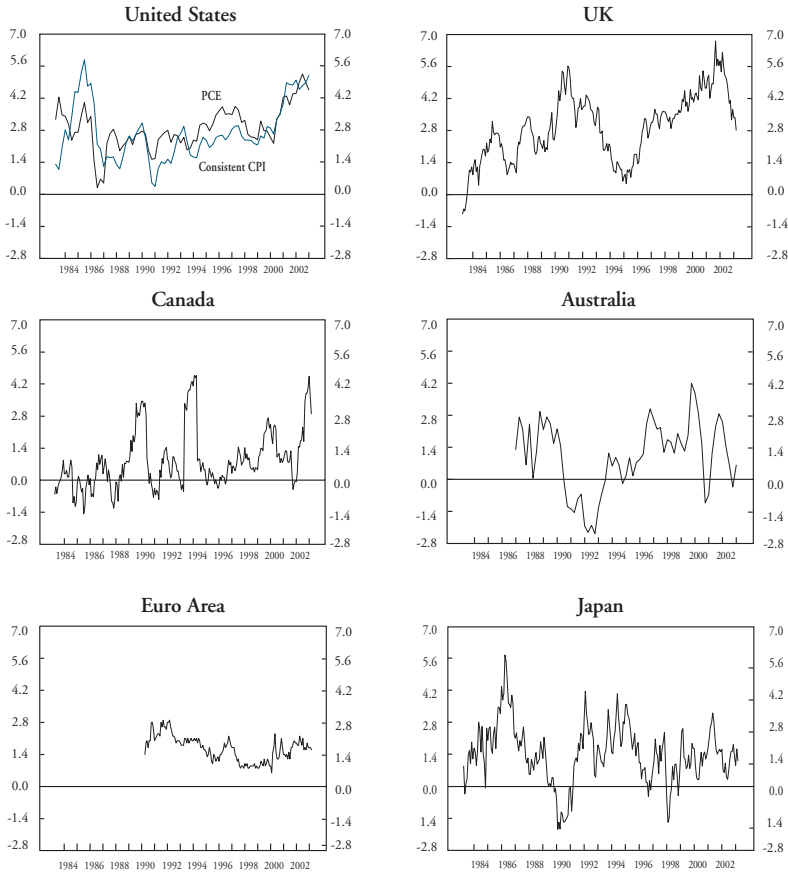


Notes: Euro area data are 12-month rates of change of HICPs for (1) industrial goods excluding energy and (2) services. Data for Japan are 12-month rates of change of CPIs for (1) goods and (2) services.

Sources: European Central Bank and the Statistics Bureau of Japan

## Chart 6

## INTERNATIONAL COMPARISON OF SERVICES LESS GOODS INFLATION



Notes: UK data are 12-month rates of change of RPIs (1984-88) and HICPs (1989-2003) for total (not core) goods and services. Data for Canada are 12-month rates of change for (1) goods excluding food purchased from stores and energy and (2) services. Data for Australia are four-quarter rates of change in CPIs excluding volatile items for (1) goods and (2) services. Euro area data are 12-month rates of change of HICPs for (1) industrial goods excluding energy and (2) services. Data for Japan are 12-month rates of change of CPIs for (1) goods and (2) services.

Sources: Bank of England and the (UK) Office of National Statistics; Statistics Canada; Australian Bureau of Statistics and Reserve Bank of Australia; European Central Bank; and the Statistics Bureau of Japan

Australia, Canada, and the UK all suggest the past decade's decline in goods inflation relative to services in the United States may prove to be temporary.

The experiences of Japan and Europe are even more at odds with developments in the United States. In Japan, goods inflation fell sharply relative to services in the first half of the 1990s, but then reversed course. As a result, in the second half of the 1990s, the differential between goods and services inflation fell in Japan even as it was rising sharply in the United States and some other countries. In the Euro area, goods inflation declined less than services inflation over the 1990s. As a result, the differential between goods and services inflation generally trended down during that period, although it was rising sharply for much of the period in the United States and other countries such as the UK. In the past few years, however, the goods-services differential for Europe has reversed course, rising modestly, even as the differential has declined in some other countries.

In light of such evidence showing the decline of goods inflation relative to services in the United States to be somewhat, although not entirely, unusual, the next section examines potential explanations for the falloff.

## **II. POTENTIAL EXPLANATIONS FOR THE WIDENING GAP**

Many different factors could have caused goods inflation relative to services to fall in the United States: a deterioration in the accuracy of measured services inflation, an increase in productivity growth for the goods sector compared to services, increasing demand for services relative to goods, or downward pressures on goods prices due to the rising value of the dollar or heightened global competition.<sup>9</sup> These explanations can be distinguished by their implications for the behavior of goods and services inflation and other economic variables. For example, if heightened global competition were a good explanation for the decline of goods inflation relative to services in the United States, other countries should have experienced a decline in goods inflation compared to services. In general, though, the combination of factors that

best explains inflation developments in the United States might differ from the combinations that best explain developments in other countries.

Focusing on accounting for developments in the United States, this section sifts through the implications of the potential explanations and their consistency with the available evidence.<sup>10</sup> Based on that analysis, the past decade's falloff of goods inflation relative to services in the United States appears to be explained by the international forces of dollar appreciation and, to a lesser extent, heightened global competition.

### *Changes in the accuracy of measured inflation*

The measurement of inflation is widely thought to be subject to biases attributable to difficulties in adjusting for changes in the quality of goods and services. For most goods and services, both the observed price and quality change over time. The price and quality of the typical car, for example, have increased significantly. Some of an observed price increase will reflect quality improvement, while some of it will represent true inflation. The available consumer price indexes use a variety of methods to measure quality and in turn separate the change in an item's price due to quality from the change that truly represents inflation. Many experts believe the methods for measuring quality generally understate those improvements, causing measured inflation to overstate true inflation (Advisory Commission; Lebow and Rudd; Shapiro and Wilcox). Moreover, many believe the measurement problem is considerably more severe for services than goods (Griliches 1994; Nordhaus).<sup>11</sup> For example, quality can probably be more readily measured for household furniture than for legal services. As a result, the overstatement of measured inflation, the so-called *quality bias*, is widely thought to be greater for services than goods.

In light of such general measurement problems, one potential explanation for the falloff of goods inflation relative to services is that indexes of services inflation became even less accurate over the past decade, due to an increase in the quality bias. For example, measured services inflation might have declined less than the true inflation rate for services, while measured goods inflation fell one-for-one with true goods inflation. Such a measurement explanation might be especially

plausible in light of the sharp rise in the 1990s in the pace of technological change. More rapid technological change often brings more rapid, harder-to-measure improvements in quality.<sup>12</sup> During the 1990s, sweeping technological changes were more evident in services such as banking, finance, and insurance than in goods (McGuckin and Stiroh; Triplett and Bosworth 2003a).

However, two pieces of evidence indicate changes in the accuracy of measured inflation are unlikely to explain the falloff in goods inflation relative to services. First, Triplett and Bosworth (2003a) argue that, although problems remain, measurement of price and quality in the U.S. services sector has improved dramatically over the past decade. Measurement of goods inflation has also improved over the past decade, but Triplett and Bosworth's dramatic improvement in services measurement would make a deterioration in services measurement relative to goods unlikely. Second, the past decade's widening of the gap between goods and services inflation is evident in both PCE and methodologically consistent CPI data, even though the CPI covers fewer hard-to-measure services than does the broader PCE price index (Clark).<sup>13</sup>

### *Changes in productivity growth*

Many experts now agree that overall trend productivity growth in the United States rose significantly starting in 1995 (Jorgenson, Ho, and Stiroh).<sup>14</sup> The surprising strength of productivity growth in the last few years has led some observers to wonder whether trend productivity may have accelerated yet again (Gordon 2003). Faster productivity growth is normally viewed as a positive factor for overall inflation—unless inflation is already too low—helping to reduce inflation pressures or inflation itself in the short run.

To the extent productivity growth rose more for the goods sector than services, productivity shifts might help explain the falloff of goods inflation relative to services in the United States. In the long run, as explained by Baumol, wages will grow at the same rate in the goods and services sectors, in order to attract workers to both sectors. But if productivity grows faster for goods than services, firms' costs of production will rise less rapidly in the goods sector than in services.<sup>15</sup> As a result,

*Table 1*  
**PRODUCTIVITY GROWTH, NONFARM BUSINESS AND  
 MANUFACTURING**

*Average growth in productivity (output per hour)*

	1973:Q1-94:Q4	1995:Q1-2003:Q4	1995-2003 less 1973-94
Nonfarm business	1.5	2.8	1.3
Manufacturing	2.7	4.2	1.5
Durable	3.0	5.4	2.4
Nondurable	2.0	2.7	0.7

Notes: Each average is estimated as the coefficient on the time trend variable in a regression of the log level of productivity on a constant and trend, using quarterly data over the indicated periods.

Sources: Bureau of Labor Statistics and author's calculations

prices of goods will rise less rapidly than prices of services. Economists have long believed there is more room for productivity growth in the production of a good such as a stereo than in an inherently labor-intensive service such as a haircut. Thus, historically, faster productivity growth in the goods sector compared to services has been thought to account for much of the observed gap between goods and services inflation.<sup>16</sup> A pickup in productivity growth for goods that outstripped any increase for services would cause goods inflation in the United States to fall even further below services inflation.<sup>17</sup> Such a change in productivity might also be expected to imply a falloff in goods inflation relative to services in some or most other industrialized countries, to the extent the technological forces driving the productivity change are global.

There is some evidence to suggest productivity could have played a modest role in the decline of goods inflation relative to services in the United States. In aggregate U.S. data, productivity growth has risen slightly more for the manufacturing sector than for the nonfarm business economy, indicating the growth pickup has been a little larger in the goods-producing manufacturing sector than in nonmanufacturing sectors such as services (Table 1; McGuckin and Stiroh; Gordon 2002).<sup>18</sup> Detailed industry results in such studies as Nordhaus and Stiroh also indicate the productivity growth pickup has been greater for goods, especially durable goods, than services. The modest acceleration

in goods relative to services shown in the aggregate productivity estimates could explain a modest portion of the considerable decline in goods inflation relative to services.

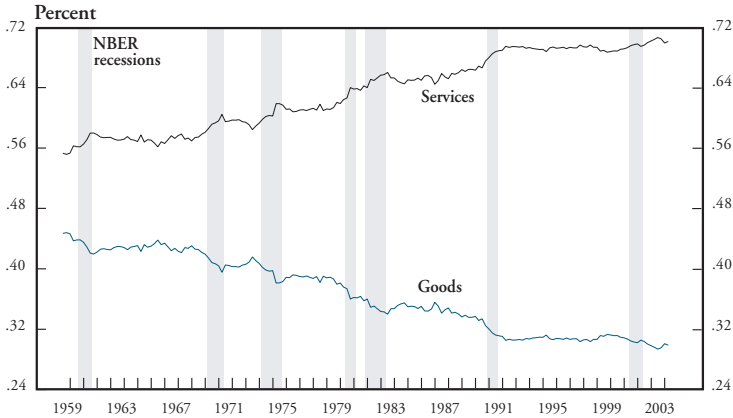
But other evidence indicates productivity to be an unlikely explanation for the past decade's decline of goods inflation relative to services. According to some estimates, productivity growth has risen equally for goods and services, implying equal effects of productivity on goods and services inflation. Triplett and Bosworth (2003a,b), in the most recent and detailed studies of the U.S. services sector, find that services industries have enjoyed a pickup in productivity growth equal to that of goods and the aggregate economy. Triplett and Bosworth argue that the improvement of productivity growth in services reflects the sector's relatively heavy dependence on rapidly advancing information technology.

Moreover, the decline in goods inflation occurred in only some industrialized economies.<sup>19</sup> While other countries such as the UK experienced some falloff in goods inflation during the 1990s, the Euro area experienced a rise in goods inflation relative to services. For such a contrast to be consistent with the productivity explanation, the acceleration in goods productivity would have to have been markedly greater in such countries as the United States and UK than in the Euro area. Some evidence on international productivity differences in the 1990s indicates overall productivity accelerated more in the United States than in some other countries (Gust and Marquez, for example).<sup>20</sup> Yet, with arguably better data, Jorgenson finds other countries shared in the productivity boom of the past decade. Although economists continue to debate whether technical innovation has spread through other industrialized countries as much as the United States, any fundamental technological changes would generally be expected to raise productivity in all industrialized countries, consistent with Jorgenson's evidence.

Ultimately, productivity growth in the United States has risen at most only modestly more for goods than services, and not all industrialized countries have experienced a U.S.-like falloff in goods inflation relative to services. Thus, productivity seems to be an unlikely explanation for the sharp falloff of goods inflation in the United States. To the extent productivity played a role, its contribution was probably small.

Chart 7

## SHARES OF GOODS AND SERVICES IN U.S. CONSUMER SPENDING



Note: Data are shares of spending on goods and services in total consumer spending, excluding food and energy.

Sources: Bureau of Economic Analysis and author's calculations

### *Rising demand for services*

The past decade's falloff in goods inflation relative to services might also be explained by an increase in the demand for services relative to goods. Over time, demand for consumer services such as medical care has grown more rapidly than demand for goods such as furniture. For example, in the United States, the share of nonfood and nonenergy consumer spending devoted to services rose from 56 percent in 1959 to 70 percent in 2003; core goods' share of spending declined from 44 percent to 30 percent over the same period. Basic economic theory predicts that such shifts in the composition of demand will raise the relative price of services and could, in the short run, cause the gap between goods and services inflation to widen.<sup>21</sup>

However, demand shifts seem unlikely to account for the decline in U.S. goods inflation relative to services over the past decade.<sup>22</sup> The falloff in goods inflation does not seem to correspond to any sharp shift in the demand for services. Instead, the relative demand for services has trended up steadily for the past 40 years, as reflected in the gradual rise in services' share of consumer spending and decline in goods' share



(Chart 7). In fact, the rate of increase in services' share of consumer spending slowed in the early 1990s, such that services' share of spending rose only slightly over the past decade.

### *Rising value of the dollar*

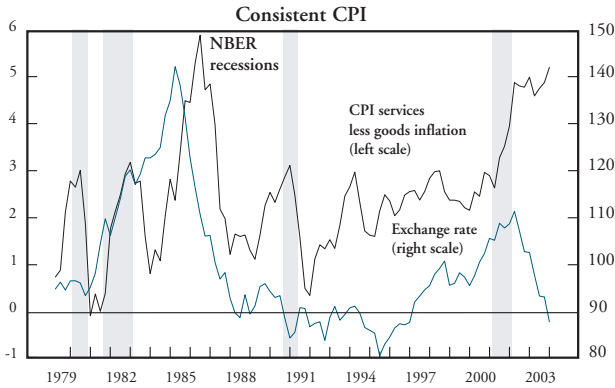
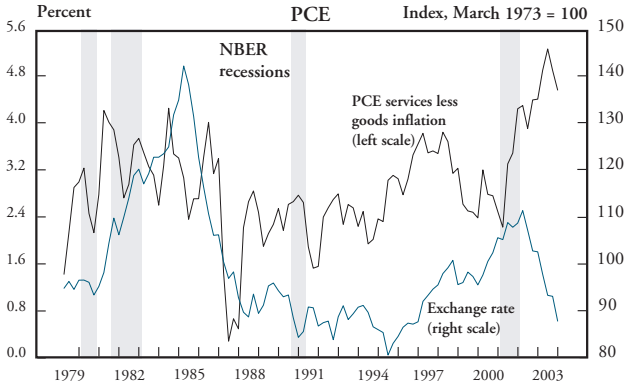
Another potential explanation for the falloff in goods inflation relative to services in the United States is that goods price inflation has been pushed down by the rise in the value of the dollar during much of the past decade. In principle, appreciation of the dollar contributes directly to lower overall consumer goods inflation by making imports cheaper, to the extent foreign producers pass the cost savings of the currency appreciation through to their U.S. prices. A rising value of the dollar also contributes indirectly to lower goods price inflation to the extent lower import prices and market competition push down the prices of U.S.-produced goods. Because international trade in goods is considerably greater than in services, a rising value of the dollar is likely to exert more downward pressure on goods prices than on services. As a result, increases in the value of the dollar could cause goods inflation to fall relative to services.

That said, exchange rate movements might not have large effects on the differential between goods and services inflation. Historically, the pass-through of exchange rates to goods prices has been somewhat modest (Goldberg and Knetter; Obstfeld and Rogoff).<sup>23</sup> And some research suggests pass-through has even declined in recent years (Bernanke; Campa and Goldberg; Taylor).<sup>24</sup> Of course, even if pass-through is limited, large movements in exchange rates could significantly affect the gap between goods and services inflation.

The collective evidence suggests the substantial appreciation of the dollar was a key force behind the growing divergence between goods and services inflation in the United States. The increasing inflation gap of the past decade corresponds closely to the sharp rise in the value of the dollar from 1995 through early 2002 (Chart 8).<sup>25</sup> Historically, a rising exchange rate has been associated with a growing gap between goods and services inflation.<sup>26</sup> Historical evidence for some other countries such as the UK suggests a similarly close relationship between the exchange rate and the differential between goods and services inflation

Chart 8

SERVICES LESS GOODS INFLATION AND THE EXCHANGE RATE FOR THE UNITED STATES

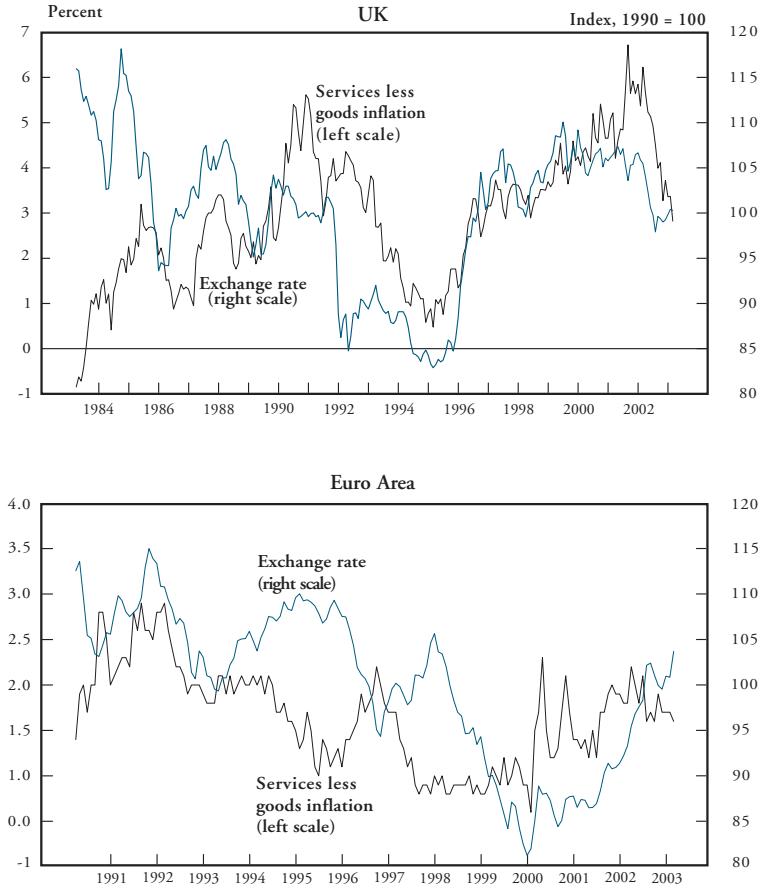


Notes: The services less goods inflation gap is calculated from four-quarter rates of change. The exchange rate series is an index (March 1973 = 100) of the nominal effective exchange rate based on 17 major currencies.

Sources: Bureau of Economic Analysis, Board of Governors of the Federal Reserve System, Steve Reed of the Bureau of Labor Statistics, and author's calculations

Chart 9

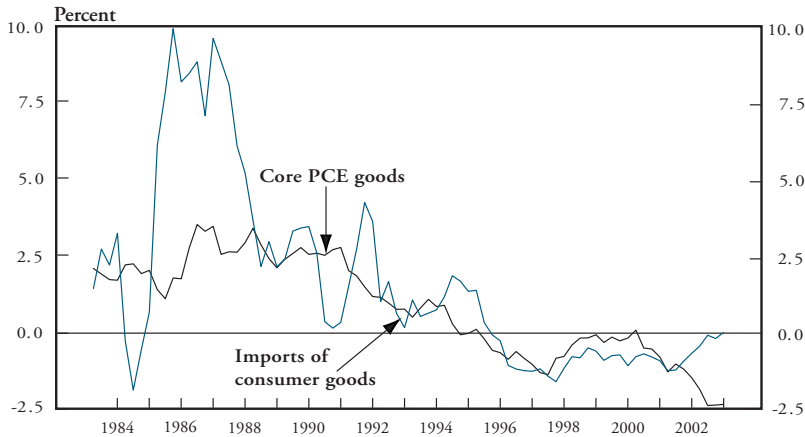
SERVICES LESS GOODS INFLATION AND THE EXCHANGE RATE: THE UK AND THE EURO AREA



Notes: For the UK, the services less goods inflation gap is calculated from 12-month rates of change in RPIs (1984-88) and HICPs (1989-2003) for total (not core) goods and services. The exchange rate series is an index (1990 = 100) of the nominal effective sterling exchange rate. For the Euro area, the services less goods inflation gap is calculated from 12-month rates of change of HICPs for (1) industrial goods excluding energy and (2) services. The exchange rate series is an index (1999:Q1 = 100) of the nominal effective rate for the EER core group of currencies.

Sources: Bank of England and the (UK) Office of National Statistics; and the European Central Bank

Chart 10  
CORE PCE GOODS AND IMPORT PRICE INFLATION



Notes: Data are four-quarter rates of change. Import prices are measured with the chain price index for imports of consumer goods excluding automobiles.

Sources: Bureau of Economic Analysis and author's calculations

(Chart 9; Bank of England). The past decade's slowing of inflation in the prices of U.S. imports of consumer goods provides yet more evidence of an important role of the appreciation of the dollar in the falloff of core goods inflation (Chart 10).

Finally, international differences in exchange rate behavior match up reasonably well with the differences in the behavior of goods inflation relative to services.<sup>27</sup> The countries with large appreciations during the past decade, the United States and UK, experienced the largest and most sustained declines in goods inflation relative to services. Various observers have at times pointed to the role of exchange rate appreciation in the fall of goods inflation in the United States (Board of Governors of the Federal Reserve System 1996,1997). Similarly, King cites currency appreciation as the cause of the late 1990s rise in the gap between goods and services inflation in the UK. Moreover, as the aggregate exchange rate for Euro area countries depreciated over most of the past decade, the Euro area experienced a rise in goods inflation relative to services (Chart 9). In still more evidence of the important role of exchange rates, as the pound has reversed course and depreciated over the last few years, goods inflation has risen sharply relative to services in

the UK. And, as the euro has appreciated since late 2000, the gap between goods and services inflation in the Euro area has declined modestly.

All that said, however, exchange rates alone cannot explain the inflation experiences of all countries. Canada's exchange rate depreciated over most of the 1990s, but the differential between goods and services inflation trended up in the second half of the decade.

### *Heightened global competition*

Some portion of the past decade's falloff in goods inflation relative to services might be due to heightened global competition. Increased competition reflecting sharp increases in world trade and market deregulation in many countries could put downward pressure on consumer prices. Many observers have pointed to a rising volume of imports from such developing countries as China as a key source of downward pressure on goods prices (Bank of Japan; Rogoff).<sup>28</sup> Developing economies tend to be able to produce goods at relatively low cost, in part due to their low labor costs, and thereby sell at relatively low prices. To remain competitive in a marketplace becoming more crowded with low-cost foreign producers, firms in industrialized economies such as the United States must find ways to cut their costs and prices. Both the low prices of goods produced in lower-cost countries and sold within the United States and the price responses of U.S. producers help to lower the level of overall U.S. consumer prices.

As is the case with a change in the exchange rate, greater competition would affect goods inflation more than services because international trade in goods is considerably greater. The global nature of the heightened competition would likely cause goods inflation to decline relative to services in a wide range of industrialized countries. However, evidence shows that the level of competition is generally greater in the United States than in most other countries (Baily). Thus, heightened global competition might not affect all countries to the same extent. For example, tight regulations in some countries might have prevented competition from rising as much as in other, less-regulated countries. For those countries in which global competition has impacted inflation, the effects should eventually run their course.

Increased competition should permanently lower *price levels* but only temporarily reduce *inflation rates*, with the reduction in inflation rates lasting only as long as necessary to lower the price level to the appropriate baseline.<sup>29</sup>

Although direct evidence is hard to identify, heightened global competition seems likely to have played some role in the decline of goods inflation in the United States. Inflation in the prices of imported consumer goods slowed in the 1990s (Chart 10). Some or perhaps much of the deceleration in prices, however, was probably due to the appreciation of the dollar. In general, with goods inflation declining relative to services in the mid-to-late 1990s in a number of industrialized countries, many economists have pointed to heightened competition as a primary cause (Bank of England; Bank of Japan; King; Rogoff).<sup>30</sup>

But, for several reasons, increased competition appears unlikely to be the best explanation for the sustained falloff in goods inflation relative to services in the United States.<sup>31</sup> First, not all economies—most notably, the Euro area—experienced a decline in goods inflation relative to services, although such variation across countries could be due to the differences in competitiveness highlighted by Baily. Second, for countries such as the UK or Canada, the falloff in goods inflation relative to services in the second half of the 1990s was followed by a sharp rise in goods inflation compared to services in the last few years. Eventually, to be sure, as competition's effects on inflation rates dissipate, goods inflation should rise relative to services, returning the differential to its baseline level. But, presumably, such a reversal would occur roughly simultaneously in the United States and other economies.

Finally, Bowman finds little evidence of higher competition in macroeconomic indicators of competition for a range of industrial economies. One indicator of the level of competition is the markup of price over the cost of producing a good. More competition results in thinner profit margins—that is, a smaller markup of price over cost. For industrialized countries, however, macroeconomic estimates of markups have failed to display the declines that would result from increased competition. By these measures, competition does not appear to have risen.

*Putting it all together*

Although few, if any, of the potential explanations for the past decade's falloff in U.S. goods inflation can be definitively ruled out, the most likely explanation would seem to be the rising value of the dollar, with heightened global competition next in line. For example, the historical evidence shows a clear link between the value of the dollar and the differential between goods and services inflation, suggesting much of the past decade's falloff in goods inflation relative to services is due to the sustained rise in the value of the dollar from 1995 to 2002. Moreover, the differential between goods and services inflation tended to rise in those countries with appreciating currencies and fall in those with depreciating currencies. Similarly, evidence of increased world trade and deregulation, along with the partly global aspects of the decline of goods inflation, suggests an important role for heightened global competition. But the rise in goods inflation relative to services in Europe over the 1990s and the more recent increases in goods inflation in countries that previously experienced sharp reductions suggest a secondary role of competition.

Other potential explanations for the falloff in goods inflation relative to services in the United States seem more at odds with the evidence. A deterioration in the accuracy of measured services inflation could in principle account for the increased differential between goods and services inflation, but measurement of services prices appears to have improved dramatically. Similarly, during the past decade the United States has not experienced the sharp rise in the relative demand for services that would be required to validate the demand explanation. Finally, an increase in productivity growth for goods relative to services could have contributed to the decline of goods inflation, but there does not appear to be much evidence of a large role. For example, some data suggest the pickup in productivity growth that began around 1995 has been slightly greater for goods than services, but other evidence indicates the increase in productivity growth has been similar across sectors.

### III. IMPLICATIONS FOR THE FUTURE

In light of the likely causes of the past decade's falloff in goods inflation relative to services in the United States, is the differential between goods and services inflation more likely to remain at an elevated level or decline in the period ahead? With dollar appreciation from 1995 to 2002 apparently the lead factor in the increase in the gap between goods and services inflation, the differential seems likely to decline to a level more in line with historical norms.<sup>32</sup> In particular, the sharp fall in the value of the dollar since early 2002 could be expected to yield some reduction in the differential between goods and services inflation.<sup>33</sup> Import price inflation has risen modestly since late 2001 and could eventually either prevent goods inflation from falling further or cause it to rise. Recently, the differential between goods and services inflation in the United States has showed signs of starting to level off or narrow a bit, even though core goods inflation has generally continued to decline. In the mid-1980s, a sharp fall in the value of the dollar produced a significant rise in goods inflation relative to services, pulling the differential down from then-record levels.

For these and other reasons, the risks of deflation appear to be very small. To be sure, core goods prices have fallen consistently for much of the past decade. But services prices have continued to rise at a healthy rate. Much of the falloff in goods inflation relative to services appears to be a temporary result of the rising value of the dollar during much of the past decade. Recent declines in the value of the dollar suggest goods inflation is likely to rise relative to services in the period ahead. Goods inflation has already turned up in some other countries, such as the UK, that experienced sharp falloffs in the second half of the 1990s. Moreover, for the United States, the average private sector forecaster anticipates modest increases in overall nonfood and nonenergy inflation in 2004 and 2005 (Blue Chip Economic Indicators).<sup>34</sup> In these circumstances, deflation in the United States seems highly unlikely. Of course, current circumstances reflect monetary policy's considerable efforts to provide enough stimulus to the economy to minimize the risk of deflation.



#### IV. CONCLUSIONS

Although services price inflation has historically outpaced goods price inflation in the United States, during the past decade goods inflation fell sharply relative to services. This article examines the extent to which the past decade's developments are unusual, what caused goods inflation to fall relative to services, and whether the wider differential is likely to persist. The article finds that, compared to historical U.S. and recent international experience, the past decade's decline in goods inflation appears to be somewhat unusual. For example, goods inflation relative to services fell in many countries, such as the UK, but rose in the Euro area. Although a number of causal forces could be at work, the past decade's fall in goods inflation in the United States is most likely due to dollar appreciation and, to a lesser extent, increased global competition. Accordingly, the differential between goods and services inflation seems likely to return to more normal levels in coming years.

## ENDNOTES

<sup>1</sup>Gagnon, Sabourin, and Lavoie, in a study published after this article was written, also provide historical and international evidence on differentials between goods and services inflation, focusing on the global rise in the differential in 2002.

<sup>2</sup>PCE indexes are the FOMC's preferred measures of consumer prices (Board of Governors of the Federal Reserve System 2000). Clark reviews the pros and cons of the PCE price index and CPI. The introduction of a chain index version of the CPI in 2002 has to some degree, although not entirely, narrowed the conceptual and quantitative differences between the measures (Wu).

<sup>3</sup>Because the Bureau of Economic Analysis does not report separate PCE price indexes for core goods and services, the series were constructed from the appropriate component price indexes using the chain index methodology recommended by Whelan. Various other PCE series considered in the article, such as inflation in core nondurables, were constructed with the same approach.

<sup>4</sup>The current-methods indexes incorporate most, although not all, of the improvements made to the published CPI since 1978 (Stewart and Reed). For example, the current-methods CPI adjusts historical computer prices to reflect current methods, but data limitations preclude incorporating any of the recent improvements to medical care prices into the historical price index. The methodologically consistent CPI series for core goods and services were constructed by Stephen Reed of the BLS, for use in this analysis. The monthly, seasonally unadjusted data for 1978-2002 provided by the BLS were spliced to the published CPI series for 2003.

<sup>5</sup>Although there are many differences in the behavior of the published and methodologically consistent CPI series, the most notable is associated with the 1983 change in the treatment of housing. Prior to 1983, but not from 1983 on, changes in interest rates cause significant movements in the housing component of the published CPI and, in turn, the published core services CPI. The methodologically consistent CPI for core services does not suffer such pre-1983 swings. Most notably, soaring interest rates in the late 1970s and early 1980s cause the published series for CPI services to be far higher than the methodologically consistent series.

<sup>6</sup>Technically, inflation in the UK and Euro area is measured with so-called harmonized indexes of consumer prices, or HICPs (although the data for the UK prior to 1989 are retail price indexes, or RPIs). As indicated in the notes to the charts, in several cases the data are for overall, rather than core, inflation.

<sup>7</sup>More formal statistical analysis—Andrews and Bai and Perron (1998, 2003) tests for shifts in the average gap between core goods and services inflation—yields mixed evidence of a permanent increase in the gap sometime during the past decade. There appears to be slightly stronger evidence of a shift in the mid-1970s. For example, Bai-Perron tests applied to 1959-2003 PCE data for core goods less services inflation yield a statistically significant shift in the mid-1970s, but none in the last decade. But as measured by methodologically consistent CPI data for 1978-2003, there appears to be a significant decline in goods inflation relative to services (in the form of an increase in the average differential) in 2000:Q1.

<sup>8</sup>Because of the more limited availability of core measures of goods and services inflation, the reported figures for the UK are based on overall rather than core measures of HICP inflation. In RPI measures of inflation, the 1994-2002 divergence between goods and services inflation is even sharper in core measures (provided by the Office of National Statistics) than in overall measures.

<sup>9</sup>Brauer examines three explanations for the gap between goods and services inflation over the period 1959 to 1993: measurement problems; higher productivity growth for the goods sector; and rising relative demand for services. Brauer concludes that while measurement problems are an important factor in the gap, the most important factor is the rising demand for services. Gagnon, Sabourin, and Lavoie argue the long-term difference between goods and services inflation is largely explained by faster productivity growth in the goods sector, although the rising openness of goods markets and rising demand for services also contribute.

<sup>10</sup>Another potential cause of the falloff in goods inflation relative to services—the business cycle—does not seem to have played much of a role. Because goods and services inflation tend to post similar increases during expansions and declines in recessions, the gap between goods and services inflation has little relationship to the business cycle (Chart 3). Most recently, for example, the differential generally rose during not only the expansion of 1991-2000 but also the recession of 2000-01. Statistical analyses based on the comovement metrics of Stock and Watson (1999) and simple inflation–output gap models confirm the weak correlation of relative goods inflation to the business cycle. Moreover, formal statistical tests yield little evidence of shifts in the business cycle behavior of the differential between goods and services inflation.

<sup>11</sup>See also the Griliches (1992) volume.

<sup>12</sup>Just as Griliches (1994) suggested for overall productivity, the rising relative importance of some especially hard-to-measure components such as medical care might result in a modestly greater quality bias in overall services inflation. But any changes in the quality bias of overall services inflation due to changes in the composition of services seem likely to be small. From a “cursory look” at PCE data, Griliches suggested the largest hard-to-measure components of services are those covering housing, medical, insurance, legal, entertainment, and education services. The share of core PCE services spending devoted to medical care rose from 23.3 percent in 1980 to 27.1 percent in 2000. The share of spending on personal business, which includes components such as legal services, also rose, from 12.1 percent in 1980 to 14.2 percent in 2000. But housing’s share of core services spending fell from 25.2 percent in 1980 to 22.8 percent in 2000. The effects of the decline in housing’s share probably largely offset the rising shares of other hard-to-measure components, resulting in little change in the quality bias in overall services inflation. Moreover, Gordon’s (2002) and Nordhaus’ findings of only minor composition effects on aggregate productivity growth suggest composition effects are likely to be small for inflation.

<sup>13</sup>While the CPI’s coverage is limited to those services sold to consumers, the PCE price index covers other services provided for free or by nonprofit institutions. For example, the PCE index includes estimates of prices of free checking services and religious services. Such considerations suggest the quality bias in the

CPI measure of services to be smaller. Yet there are some components included in both indexes, such as medical care, for which PCE price measurement is thought to be more accurate than the CPI's.

<sup>14</sup>The evolution of trend productivity growth since the early 1970s and the role of information technology has been the subject of an immense literature. Although a complete survey is beyond the scope of this article, some of the key studies include, in addition to those cited elsewhere in the article, Baily and Gordon, Council of Economic Advisors, Gordon (2000), Jorgenson and Stiroh, and Oliner and Sichel.

<sup>15</sup>The phenomenon of slower productivity growth in the services sector causing services' costs to rise more rapidly than goods' costs has been coined *Baumol's disease*.

<sup>16</sup>For example, King attributes the long-term gap between goods and services inflation observed across a range of countries to faster productivity growth for goods.

<sup>17</sup>A permanent increase in productivity growth for goods would result in a permanent increase in the gap between goods and services inflation. A temporary increase in productivity growth (reflecting a permanent increase in the level of productivity) would imply a temporary rise in the inflation differential.

<sup>18</sup>Some caution is warranted in drawing implications for consumer goods and services inflation from the available aggregate or industry productivity data. The available industry classifications of mining, manufacturing, wholesale and retail trade, services, etc., do not directly translate into consumer sectors. Moreover, the industry data often reflect the production of goods or services used as inputs in the production of other goods. As Triplett and Bosworth (2001) explain, understatement of productivity growth in an industry providing an intermediate good or service could lead to important differences across industries but have little impact on aggregate productivity growth.

<sup>19</sup>The productivity explanation also seems at odds with the temporary nature of the decline in goods inflation relative to services in some countries. Although goods inflation relative to services was generally declining in the United States from the early 1990s through 2003, the foreign economies that experienced a falloff in goods inflation in the second half of the 1990s have since experienced a rise in goods inflation compared to services. Yet if faster productivity growth in goods were a good explanation, a continued large differential in the United States should be accompanied by still-large differentials in the other countries for which goods inflation fell significantly relative to services in the latter 1990s.

<sup>20</sup>Some observers have suggested that, among industrialized countries, the productivity experience of Australia has most closely resembled that of the United States. In the 1990s, aggregate productivity growth rose even more in Australia than in the United States, in part due to deregulation of the Australian economy (Gruen; Gruen and Stevens). In light of the important contribution of deregulation to Australia's productivity acceleration and other differences in inflation and productivity experiences, it is difficult to assess whether the behavior of productivity and the differential between goods and services inflation in Australia versus the United States supports or weighs against the productivity explanation.

<sup>21</sup>However, the inflation effects of an increase in the relative demand for services would be short-lived. Theoretically, only differences in productivity growth (or the quality bias in measurement) can account for persistent or long-term differences between goods and services inflation. See, for example, the discussion in De Gregorio, Giovannini, and Wolf.

<sup>22</sup>A second problem for the demand explanation is that, even though the demand for services compared to goods has trended upward in most industrialized economies (see, for example, Gagnon, Sabourin, and Lavoie), the gap between goods and services rose in only some economies.

<sup>23</sup>More specifically, the pass-through of exchange rates to prices of imported goods is somewhat modest (Goldberg and Knetter; Obstfeld and Rogoff). And, the changes in import prices that do occur have limited effects on domestic prices (Obstfeld and Rogoff; Swagel).

<sup>24</sup>Pass-through appears to have declined in not only the United States but also many other countries.

<sup>25</sup>The significant difference in the timing of the decelerations in U.S. durables and nondurables prices over the past decade could be seen as posing a difficulty for the exchange rate explanation. Essentially, nondurables inflation fell sharply in the early 1990s and then remained roughly flat, while durables inflation only began to drop in the mid-1990s (Chart 3). The increase in the value of the dollar might be expected to affect durables and nondurables inflation at roughly the same time, to the extent international trade and market competitiveness are roughly the same for the durables and nondurables sectors.

<sup>26</sup>Estimates of simple models relating the gap between goods and services inflation to the lagged inflation gap, the output gap, and the percent change in the exchange rate confirm the relationship indicated in the chart.

<sup>27</sup>Gagnon, Sabourin, and Lavoie, in a study published after this article was written, make the same observation.

<sup>28</sup>Some observers have linked the beginning of increased competition to the so-called globalization that commenced with the fall of the Berlin Wall.

<sup>29</sup>Rogoff argues that heightened global competition will produce a permanent reduction in the rate of overall inflation, because the reduction in the markup of price over marginal cost driven by heightened competition will reduce the incentive for central banks to continually stimulate the economy to achieve higher levels of output and employment. But because the reduction in inflation stems from a change in monetary policy, the long-term differential between goods and services inflation would be unaffected. The heightened competition would lower the price level of goods relative to services, but not the long-term differential in inflation rates.

<sup>30</sup>See also Board of Governors of the Federal Reserve System (1996,1997) for discussions of the role of heightened global competition in the decline of goods inflation. Jenkins suggests the “recent divergence of inflation between goods and services in many industrialized countries” is partly due to heightened competition in goods markets and rising relative demand for services associated with rising productivity and income growth.

<sup>31</sup>What is more, although heightened global competition might be expected to affect durables and nondurables inflation at roughly the same time, the deceleration in durables and nondurables prices in the United States differed significantly in timing.

<sup>32</sup>Similarly, although global competition may continue to keep the levels of goods prices low, the recent increases in goods inflation relative to services observed in some industrialized countries suggest the waning of competition's effects on inflation rates.

<sup>33</sup>Over the past few years, exchange rate depreciation in other countries such as the UK has been accompanied by a rise in goods inflation relative to services, reversing declines that occurred during the second half of the 1990s.

<sup>34</sup>In a special question included in the February survey, the average Blue Chip respondent projected core CPI inflation of 1.5 percent in 2004 and 1.9 percent in 2005, up from 1.1 percent in 2003 (12-month percent changes).

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