Tracking Inflation in the Service Sector

by Eugene Kroch

Measured inflation rates for services have exceeded goods inflation rates in all but three years since 1949.[1] Some of these years saw goods prices declining, but at no time did service prices fall. Although the gap between these two rates of inflation has narrowed in recent years, service prices have continued to advance at a significantly faster pace than goods prices (Chart 1). One might seek an explanation for higher services inflation in demand pressures or slow productivity growth; this essay, however, focuses on the possible role of measurement bias.

The first section surveys the methodologies used to measure prices for various classes of services. It demonstrates how the design of these methods might contribute to the overstatement of price increases. The second section focuses on inflation measurement in three key service categories: housing, medical, and educational services. Evidence is presented that upward bias exists in the measurement of inflation rates for medical services and possibly for educational services. In addition, housing services inflation appears to have been overstated in the last year or two, but the extent is hard to judge because of the difficulties in separating the consumption and investment dimensions of home sale prices.

Measurement methods

Errors in measuring service sector inflation arise frequently because of the difficulty of identifying standard output units for many categories of personal services, such as medical care, entertainment, and education. As a consequence, quality and productivity improvements are often lumped into price changes, more often than not exaggerating price increases. By contrast, price

changes are easier to isolate in many services that distribute goods, such as transportation and utilities, because they have standard output units much like commodities. For transportation the units of service are either passenger-miles or ton-miles; for utilities they are volumes—gallons of water supplied, for example, or cubic feet of natural gas delivered. Nonetheless, some of the service categories that are distributive, such as communications and trade, still suffer from the type of measurement problem that affects personal services.[2]

Service inflation is monitored at two junctures: at the point of final demand, as reported in the consumer price index (CPI) and in the service components of the deflators for GNP expenditures; and at the point of production, as reported for each industry in the gross product originating (GPO) accounts.[3] In recent years, service inflation at the industry level has been about a percentage point lower than service inflation at the point of personal consumption (Chart 2), largely because a greater share of GPO consists of distributive services (whose inflation rates are lower and closer to those of goods than are the inflation rates of personal services). Still, the two inflation measures do move

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[1] The three exceptional years are 1973, 1974, and 1979, all of which are associated with oil price shocks

[2] Telephone communications can be measured in message units Broadcast communications, however, are measured by advertising revenue. This treatment of broadcasting makes sense in many ways, but it does not permit price and quantity to be disentangled

Retail and wholesale trade can be measured by the real value of the commodities sold, but this approach does not account for changes in the value to consumers of retail amenities and selection diversity See Martin N Bailey and Robert J Gordon, "The Productivity Slowdown, Measurement Issues, and the Explosion of Computer Power," *Brookings Papers on Economic Activity*, 1988:2, pp 347-420

[3] A description of the GPO accounts and their recent revision is given by Frank De Leeuw, Michael Mohr, and Robert Parker, "Gross Product by Industry, 1977-88: A Progress Report on Improving the Estimates," *Survey of Current Business*, January 1991, pp 23-37.

together.[4]

Techniques for measuring inflation in services take one of three forms: (1) recording charges per customer serviced or per specific unit of service, (2) using an index of employment earnings associated with the service, and (3) imputing output prices on the basis of employment extrapolation and other indicators.

The first of these approaches mimics the methodology used to compute the goods components of the CPI. In addition to the transportation and utility service measures already cited, examples include room rates for hotels, amusement admission prices, and fees for standard professional services such as routine doctor visits. A major problem with many of these measured prices is that the particular items priced are often too specialized to accurately represent price movements in the larger service category to which they belong. For example, the CPI uses the price charged for preparing a "short-form" last will and testament as an indicator of the price of legal services in general.
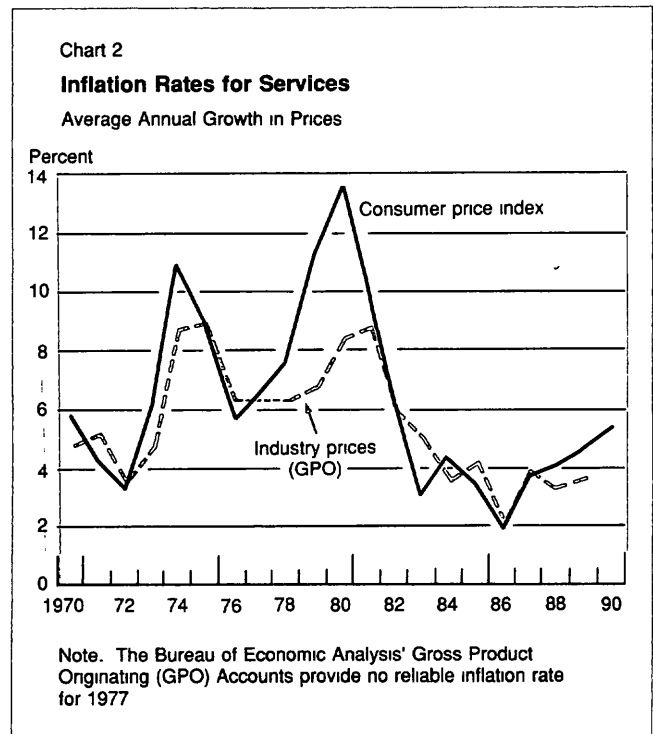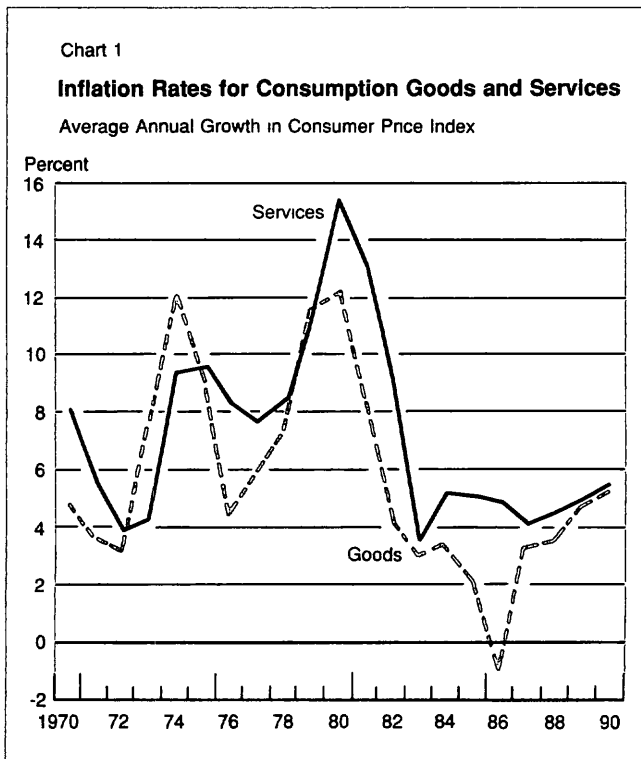
The second approach, inferring prices from an index of the earnings of workers providing the service, is used when no standard charge can be constructed, as is the

case for most professional, personal, and educational services The earnings index is also used to supplement direct price measurement, especially when the prices recorded represent only a small portion of the service category. Of course, earnings indexes will tend to exaggerate inflation by ignoring labor productivity gains.

The third approach includes a variety of strategies for imputing service output prices from nonwage indicators One such device, applied to a number of business services, is to infer the price of the service by dividing the industry's nominal gross product by a real value estimated from an index of employment. Like the use of an earnings index, however, this procedure does not account for labor productivity growth. Another strategy, used for certain financial services such as commercial banking, bases price movements on the differentials between bank lending and borrowing rates The disadvantage of this method of imputation is that the reported price of banking services increases whenever lending rates rise relative to borrowing rates.

Granting that each of the price-measurement methods described above is flawed does not necessarily lead to the conclusion that aggregate inflation measures such as the CPI and the GNP deflator are substantially biased Many services that are hard to price—financial, legal, and business services, as well as retail and

4During the 1980s, distributive services constituted more than 25 percent of GPO services but less than 10 percent of consumer services

Chart 1

Inflation Rates for Consumption Goods and Services

Average Annual Growth in Consumer Price Index

Chart 2

Inflation Rates for Services

Average Annual Growth in Prices

Note. The Bureau of Economic Analysis' Gross Product Originating (GPO) Accounts provide no reliable inflation rate for 1977

wholesale trade—are primarily intermediate inputs in the production of goods and other services. As long as final demand prices can be observed directly and independently, they are not biased by errors in measuring intermediate input prices. Nevertheless, errors in pricing those services that are elements of final demand, such as housing, medical, and educational services, may lead to errors in aggregate inflation measures

Examining specific service categories in the CPI
The table disaggregates CPI inflation rates by service category and compares them with overall goods inflation over the past two decades The first column gives the budget shares, based on the 1982-84 consumer survey, of each category used in constructing the CPI. By far the most important component is rent of shelter, which accounts for about half of all consumer services; not surprisingly, shelter inflation closely parallels overall services inflation. Medical care and education services show the highest inflation rates, price increases in these categories appear largely independent of movements in the overall CPI. Since the early 1980s, transportation and entertainment prices have also increased somewhat faster than the overall inflation rate, but their movements appear to follow the pattern of the CPI. These comparisons suggest that housing services are key to understanding consumer services inflation and that medical and educational services should be examined for upward bias.

Medical care services make up about 4 percent of

the consumer budget and are measured by private payments to physicians, dentists, and other medical professionals, and to hospitals and sanitariums.[5] Prices are based on physicians' fees, dental fees, and hospital daily service charges. The *Handbook of Methods* issued by the Bureau of Labor Statistics acknowledges that a major deficiency of the medical care component of the CPI is the difficulty of adjusting for quality improvements For example, hospital room modifications, changes in the nurse-to-patient ratio, and the introduction of new equipment are all likely to contribute to the price of a day's stay in a hospital Even though these changes in treatment affect both the quality and the quantity of medical service, the Bureau of Labor Statistics records the fee changes as pure price inflation Upward bias of this kind is surely part of reported medical care inflation, but its magnitude is difficult to gauge.

A significant degree of positive bias in reported medical service inflation is suggested by the much lower inflation rates for medical equipment, an input in the production of medical services One reason for this slower price increase is that the Bureau of Economic Analysis adjusts the equipment series for quality changes Hence, one way to adjust medical services inflation is to extend the Bureau of Economic Analysis' quality adjustment for medical equipment to the medical services that use the equipment The adjustment is based on the observation that if medical equipment prices were *not* quality adjusted, they might well rise at the same rate as prices of medical services.[6] The effect of the quality adjustment on equipment prices could be inferred as the difference between the two series. This difference when multiplied by the share of value added attributable to medical equipment would be a suitable adjuster for medical services inflation. Chart 3 shows such an adjusted series, together with CPI medical services inflation and medical equipment inflation. The consistently lower inflation rate for medical equipment throughout much of the 1980s implies that the upward bias in medical services inflation might have been as high as 1 percentage point per year during that period

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Consumer Inflation Rates
(Average Annual Percentages)

	Budget Shares	Inflation Rates		
	1982-84	1970-90	1982-86	1986-90
CPI		6 3	3 2	4 5
Goods	48 6	5 5	1 9	4 1
Services	51 4	7 1	4 7	4 8
Rent of shelter	25 7	—	4 7	4 9
Renters' cost	7 5	—	5 1	4 7
Owners' equivalent	18 2	—	4 5	4 9
Other household†	9 5	—	3 1	1 9
Transportation	6 2	6 8	4 9	5 5
Medical care	4 0	8 5	7 1	7 5
Entertainment	2 2	5 9	5 4	5 2
Education	1 6	9 1	9 3	7 3
Other personal‡	2 2	5 5	4 1	4 2

†Includes household utilities and public services, housekeeping services, maintenance, repairs, and insurance services

‡Includes personal care, legal, funeral, financial, and apparel services, each of which makes up less than one-half of 1 percent of the consumer budget

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[5] Almost two-thirds of health care services in the U S economy are not part of the consumer budget because they are provided through employer-paid health plans Hence, medical care prices are given only a 4 percent weight (including household payments for health insurance) in the CPI, even though household consumption of health services accounts for more than 12 percent of personal consumption in the National Income and Product Accounts

[6] Evidence from the CPI supports this supposition, since the CPI for medical goods (largely pharmaceuticals, which are also not adjusted for quality changes) has been rising about as fast as the CPI for medical services See Peter Rappoport, "Inflation in the Service Sector," *Federal Reserve Bank of New York Quarterly Review*, vol 11, no 4 (1987), pp 35-45

Educational service prices, consisting of private tuition and fees, have risen faster than any other category of services over the past two decades Although they represent only 1.6 percent of the 1982/84-based budget used to compute the CPI, educational services today account for more than 3 5 percent of (nominal) purchases in the current CPI budget. Almost two-thirds of these expenditures go to higher education Prices are based largely on the labor earnings index for educators They contain no adjustment for quantity and quality changes, reflecting the Bureau of Labor Statistics' view that education is labor intensive and that opportunities for labor productivity gains are limited.

The accuracy of the educational services inflation series can be assessed in at least two ways One is to compare the series with other price indexes for education. The other is to compare it with the growth rates of tuition and fees per student. Chart 4 compares the consumer price series for education services with the "Higher Education Price Index" compiled by Research Associates of Washington and with the U.S Department of Education's data on higher education tuition

payments per full-time-equivalent student. During the 1980s the first series shows lower inflation rates than the CPI series for educational services. The growth rates of tuition per student, however, closely track the CPI's inflation rate for education services Still, since tuition increases have outstripped the higher education price index, the growth in tuition costs may in part reflect higher levels of education services. On balance, the evidence supports the claim that in recent years the CPI's inflation rate for education services has been somewhat upwardly biased.

The single largest component of the CPI is *rent of shelter*, accounting for 26 percent of consumer expenditures. Most of this component (18 of the 26 percent) represents imputed rent of homeowners, which by definition is not observed directly Hence, CPI movements are strongly influenced by the procedure for estimating prices for housing services. Under current procedures, little of the leveling-off or decline in housing prices over the past two years has been reflected in the CPI

Before 1983, the CPI used data on housing prices and mortgage interest costs to calculate homeowners' shelter costs [7] This "asset price" approach to homeowner
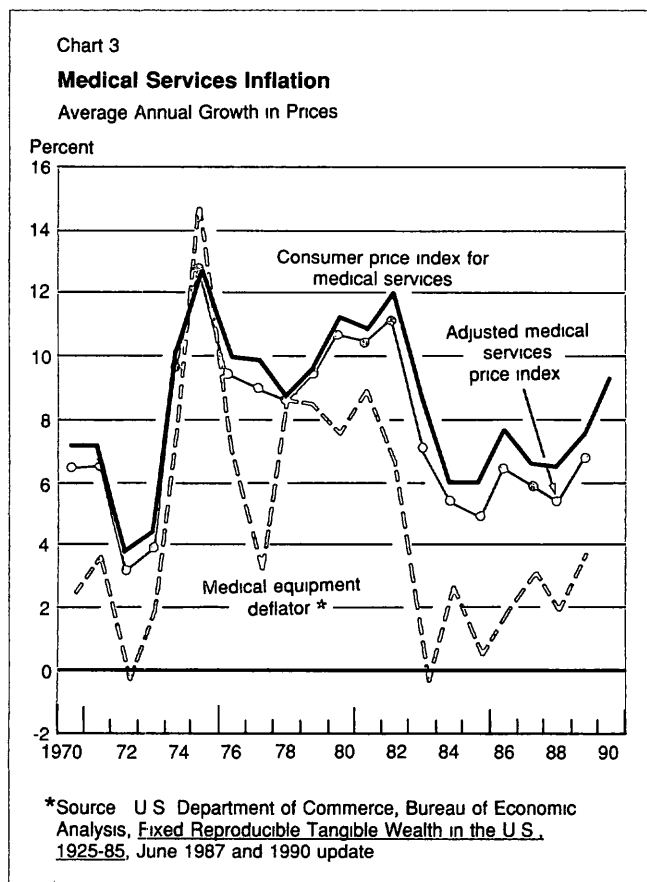
[7]The precise technique can be found in *CPI History and Techniques*, U S Department of Labor, Bulletin no 1517, 1966
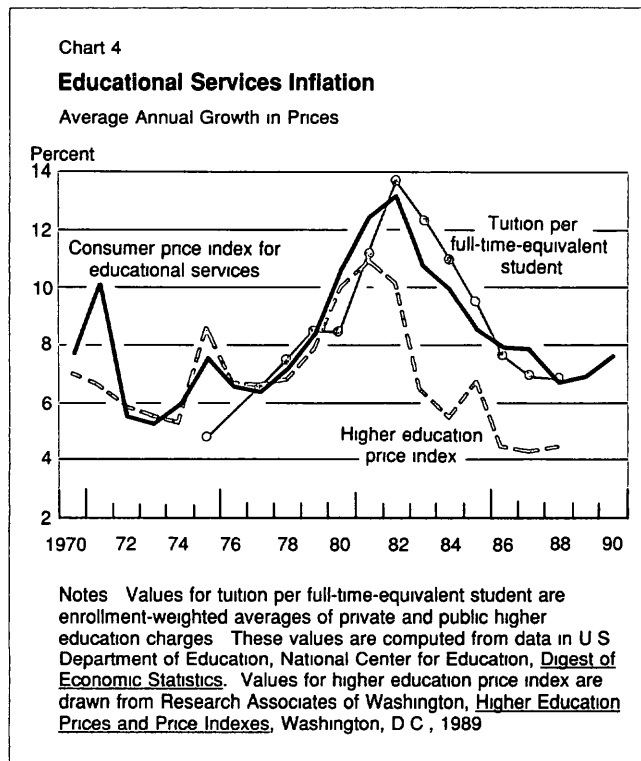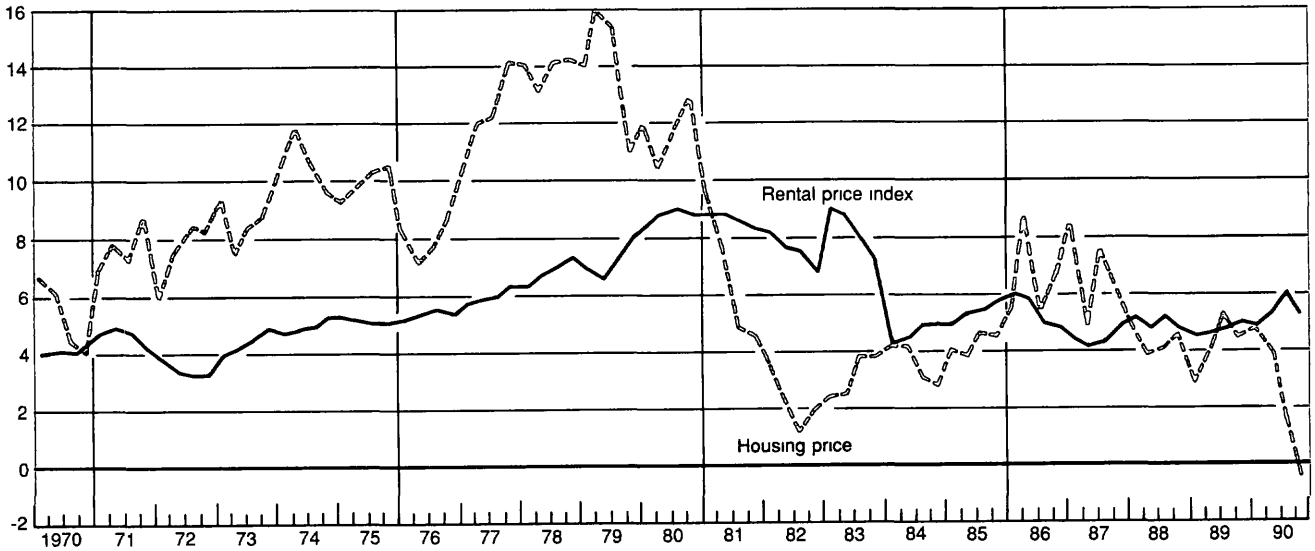
Chart 3

Medical Services Inflation

Average Annual Growth in Prices

*Source U S Department of Commerce, Bureau of Economic Analysis, Fixed Reproducible Tangible Wealth in the U S, 1925-85, June 1987 and 1990 update

Chart 4

Educational Services Inflation

Average Annual Growth in Prices

Notes Values for tuition per full-time-equivalent student are enrollment-weighted averages of private and public higher education charges These values are computed from data in U S Department of Education, National Center for Education, Digest of Economic Statistics. Values for higher education price index are drawn from Research Associates of Washington, Higher Education Prices and Price Indexes, Washington, D C, 1989

Chart 5

Housing Price Inflation

Growth from Four Quarters Earlier
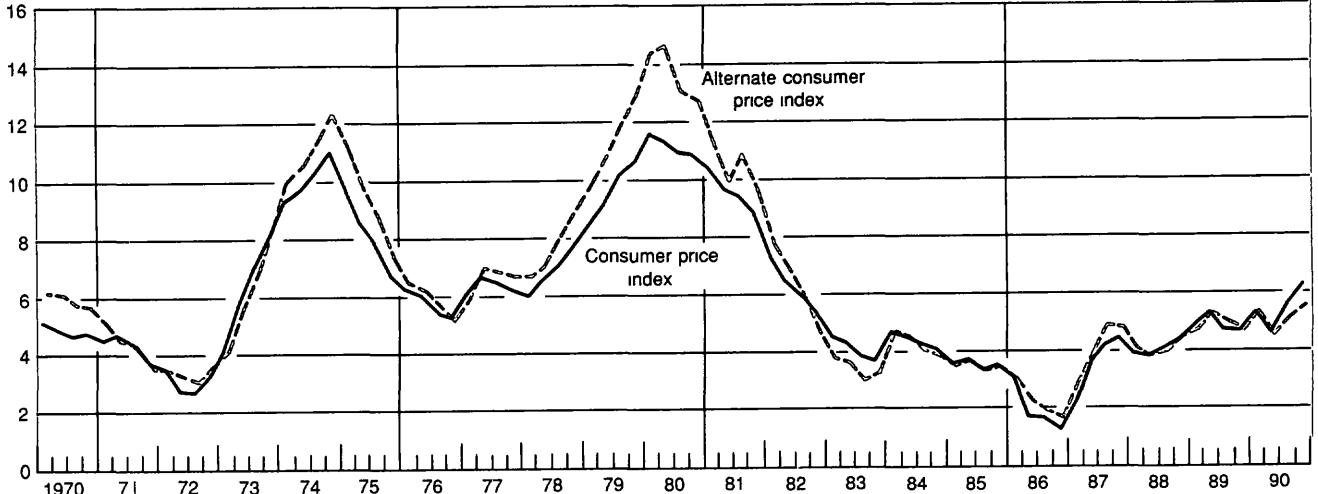
Percent

Rental price index

Housing price

Note   Housing price movements are based on the median sales price of existing single-family homes reported in National Association of Realtors, <u>Homes Sales</u>

Chart 6

Consumer Price Inflation

Growth from Four Quarters Earlier

Percent

Alternate consumer price index

Consumer price index

costs was criticized for failing to distinguish the investment element of homeownership from the consumption value of dwelling in the home. Because the CPI is designed to measure the average change in prices paid for consumption goods and services, investment purchases should be outside its scope. A house is a long-lived asset, but it also provides the owner with a flow of services over time. The cost of the shelter service provided by the asset is the conceptually correct measure for the CPI.

In 1983 the homeownership component was replaced with "owners' equivalent rent." The idea is to attribute to homeowners the rental income they forgo by occupying the units themselves rather than renting them out. The estimates of owners' equivalent rent used in the CPI are calculated by asking homeowners how much their houses would rent for and adjusting the responses to data on actual rental rates[8] The problem with this procedure is that the rental market is small relative to the sales market for single family homes, hence, it does not provide a reliable way to separate the consumption element from the investment element of owning a home An alternative approach is to use home sale prices as an indicator of the cost of housing services, on the grounds that these prices are driven, at least in part over the medium term, by the demand for shelter services

Chart 5 compares movements in the CPI's rental price index for housing services with movements in an index of housing prices, the median sales price of existing single family homes. As the chart shows, the asset price series is more volatile. The correlation between the two series is essentially zero, suggesting that the rental price index reflects little or nothing of the contemporaneous movement in housing prices. Before 1980, housing prices rose consistently faster than rents; during the past decade both indexes rose and fell, but frequently in direct opposition to each other. More important, the decline in housing prices since 1987 appears to have had little effect on rental prices, implying that rental price movements only weakly reflect changes in the demand for housing.

To see how much of a difference changing the treatment of housing makes in the CPI, we can compare two versions of the CPI· one using housing prices and the other using owners' equivalent rent. For the period 1967 to 1983 the Bureau of Labor Statistics offers both series· the CPI-U, using housing prices, and the experi-

mental CPI-U-X1, using rental rates For the period since 1983 we construct an alternative index to the official CPI, replacing the owners' equivalent rent by a housing price measure [9]

Chart 6 shows the results of this exercise In general, the alternative measure of consumer prices (using housing prices) tracks the CPI fairly well, but there are significant exceptions. For the most part these exceptions occur when housing prices exhibit sharp and sustained movements in one direction or the other, increasing the amplitude of the inflation cycle

The comparison between the standard and alternative CPI measures shows that at times the cost of housing services reported in the official CPI does not reflect movements in house prices. Rental rate inflation fluctuates less than home price inflation, and rents tend to lag behind sales prices. In recent years the failure of rental inflation to reflect the softening in the housing market might indicate that the housing component of the CPI is overstating the inflation rate of housing services. But such an inference ignores the possibility that recent declines in home sale prices are purely the consequence of those changes in the asset value of housing that follow, say, the breaking of a speculative bubble. Of course, if part of the housing price decline does reflect changes in the value of the shelter services provided by the asset, then CPI housing services inflation could be said to be exaggerated. Still, this upward bias would be hard to quantify, since it depends on the extent to which the changes in home sales prices reflect shifts in the value of housing services as opposed to changes in the perceived value of holding wealth in the form of housing assets.

Conclusions
Some methodologies for inferring prices of consumer services tend to overstate price increases. This tendency is seen in the measurement of prices in three key categories of consumer services Medical services inflation appears to be exaggerated; so too is educational services inflation, although the evidence is weaker. In the last year or two housing services inflation appears to have been overstated, although the magnitude of the bias is uncertain. These observations together suggest that consumer services inflation may in reality be significantly lower than the measured rate and somewhat closer to consumer goods inflation.

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[8]For a detailed discussion, see U S Department of Labor, "Changing the Homeownership Component of the Consumer Price Index to Rental Equivalence," *CPI Detailed Report*, January 1983, pp 7-13

[9]The alternative CPI that we construct for the period starting in 1983 includes housing prices, as does the official CPI for the preceding period, but not mortgage interest rates