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Commentary

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In "Measuring Consumption: The Post-1973 Slowdown and the Research Issues," Jack E. Triplett has made many interesting observations. I will focus on two. First, Triplett notes that U.S. statistical agencies already incorporate a positive rate of quality change for many items in the Consumer Price Index (CPI) and the consumption deflator. Quality improvements are therefore not being ignored entirely, and could actually be overstated. Second, Triplett voices skepticism about the hypothesis that the slowdown in the growth rate of consumption, which began in the mid 1970s, reflects greater understatement of the growth rate rather than a real slowdown. He observes that growth in food consumption has slowed along with growth in other consumption. Because real food consumption is measured more accurately than nonfood consumption, he reasons, the growth rate of real food consumption should closely resemble the true growth rate.

ARE QUALITY IMPROVE-MENTS UNDERSTATED?

On the issue of understated quality improvements, I will first discuss the most difficult category for which to make the case, namely cars. I will then discuss services, where the case seems much easier. Triplett notes that the typical new car price has risen from about $3,000 in 1966 to about $17,000 today. Without any quality adjustments, the auto portion of the CPI would therefore have registered roughly 6 percent annual inflation from 1966 to 1996. The CPI for autos, however, has risen only about 3.5 percent per year during this period, the difference being measured quality improvements of 2.5 per-cent per year. So the Bureau of Labor

Statistics is saying that a typical 1996 car is better than a typical 1966 car. Indeed, 2.5 percent quality change for 30 years would mean today's cars are twice as good as 1966 cars. As Triplett emphasizes, the real question is whether 1996 cars are more than twice as good as 1966 cars. Equivalently, would the typical person prefer a 1996 model for $17,000 to a 1966 model for $8,500?

Not being an expert on car models of any vintage, I checked *Consumer Reports* (May 1996, p. 9). It compares 1966 and 1996 car models and reports the following: Mileage has more than doubled, from 13 miles per gallon (mpg) to 27.5 mpg. Whereas bodies had previously rusted in two years to three years, current models resist rust for 100,000 miles. Tires last more than three times as long as they used to (about 12,000 miles in 1966 vs. about 40,000 in 1996). The 1966 models featured little safety equipment; whereas antilock brakes and dual air bags are near standard in 1996 cars. In 1966 engines had trouble starting in cold weather; in 1996 engines do not. Finally, major mechanical problems often surfaced in 1966 models at about 50,000 miles vs. about 100,000 miles for 1996 models. *Consumer Reports* concludes, "You should be glad they don't make cars like they used to. You probably wouldn't want one."

Consistent with the *Consumer Reports* conclusion, Gordon (1990) estimates that the official consumption deflator overstated 1947-83 inflation for motor vehicles and parts by 1.7 percent per year. For durable consumption goods as a whole, including household appliances and consumer electronics, Gordon estimates an annual bias of 1.5 percent.

HAS SERVICE QUALITY DECLINED?

How about quality change in services? Hornstein and Krusell (1996) report *falling* total factor productivity (TFP) at

the rate of 1.8 percent per year during 1954-93 in finance, insurance, and real estate (FIRE) and 0.6 percent per year in other services (which includes health care). Once Hornstein and Krusell incorporate Gordon's (1990) adjustments for unmeasured quality improvements in producer's durable equipment (e.g., better computers), inputs into these sectors rise more quickly: TFP falls at 2.3 percent and 1.0 percent per year in FIRE and other services, respectively.

New regulations and possibly deteriorating schools notwithstanding, I cannot imagine that these service industries can provide only 40 percent and 68 percent as much service in 1993 as in 1954, with comparable inputs. More plausibly, TFP has not declined in these sectors and quality has improved more than is being measured. A recent study provides some corroboration for this hypothesis. Cutler, McCellan, Newhouse, and Remler (1996) estimate improvements in heart attack treatment between 1983 and 1994. Whereas the CPI for such treatment rose 3.4 percent per year more quickly than the overall CPI, Cutler et al. estimate that the real cost of living (quite literally, in terms of years of life gained through treating a heart problem) *fell* 1.1 percent per year, relative to the overall CPI.

A related piece of evidence is the rising share of services in consumption and in gross domestic product (GDP). Between 1963 and 1993 the share of FIRE in GDP (in current dollars) rose from 14 percent to 19 percent, and the share in other services rose from 10 percent to 20 percent (NIPA data, Citibase). Why are we shifting toward services if they are becoming relatively more expensive? Price-inelastic demand is one possibility, but the shift has occurred even in constant dollars. Many services are luxuries (i.e., consumption elasticities above one), but the shift toward services has accelerated since the mid 1970s, while the measured aggregate growth rate has declined.[1] Changing demographics could be part of the story; one could investigate this hypothesis using the Consumer Expenditure Survey. These alternatives cannot explain why the shift has also

occurred for *producer* services.

A possibility worth entertaining is that services have been improving in quality, especially since the mid 1970s. As with heart attack treatment, the quality-adjusted price of services may be declining rather than rising relative to the prices of other goods. To make things concrete, consider the following example (from my preliminary work with Mark Bils of the University of Rochester). Consumers choose quantities of food (Y_F) and services (Y_S), taking prices (P_F and P_S) and the quality of services (Q) as given. Consistent with Triplett's argument, treat food as the well-measured comparison good. Utility takes the form

$$(1) \quad Utility = \frac{Q * Y_s^{1-1/\sigma} + Y_F^{1-1/\sigma}}{1-1/\sigma},$$

where $\sigma > 1$ is the elasticity of substitution between food and services. (This specification would not make sense if $\sigma < 1$, because then higher quality reduces utility. To entertain inelastic demand, a different functional form would have to be used.) This single parameter formulation imposes equal income elasticities for services and food, but the results are reinforced if the Engel curve is steeper for services since the growth rate of total consumption fell after the mid 1970s. Utility maximization requires that the ratio of marginal utilities be equated to the ratio of marginal products, or

$$(2) \quad \frac{Q * Y_s^{-1/\sigma}}{Y_F^{-1/\sigma}} = \frac{P_s}{P_F}.$$

Taking log first differences and rearranging yields

$$(3) \quad \Delta \ln Q = \frac{1}{\sigma} \left(\Delta \ln Y_S - \Delta \ln Y_F \right) + \left(\Delta \ln P_S - \Delta \ln P_F \right).$$

In the data, quantities are shifting toward services ($\Delta \ln Y_S > \Delta \ln Y_F$) even though services are becoming more expensive ($\Delta \ln P_S > \Delta \ln P_F$). As Equation 3 indicates, this can be rational behavior if

[1] See Nakamura (1996).

the quality of services is improving ($\Delta \ln Q > 0$).

To give quantitative life to this example, I use data from the 1996 *Economic Report of the President* (Tables B-12 and B-13) on the levels of nominal and real (1992 dollars, chain-weighted) consumption of services and food in 1960, 1975, and 1990 and suppose that $\sigma = 1.5$. Plugging in the relevant number yields

$$(4) \quad 1960 - 1975 \quad \Delta \ln Q = 1\%$$
$$= (4.4 - 2.2)/1.5 + (3.9 - 4.4),$$

and

$$(5) \quad 1975 - 1990 \quad \Delta \ln Q = 2.6\%$$
$$= (3.4 - 1.8)/1.5 + (6.6 - 5.1).$$

In this example the "Quality Residual" rose 1 percent per year from 1960 to 1975 and accelerated to a 2.6 percent annual clip from 1975 to 1990. The rate of quality improvements accelerates to explain why relative quantities kept shifting smartly toward services when relative price trends moved against them. So, in the same way that inputs are pouring into services with little measured output gain (falling TFP), consumers are pouring into services with little measured utility gain. Just as the TFP puzzle could be explained by rising quality, the utility puzzle could be explained by rising quality. These calculations are robust to substituting gasoline for food, as well as substituting nonfood (or nongasoline) consumption for services. Such calculations are also robust to using the CPI rather than the consumption deflator. Of course, it is hazardous to label a residual. The Solow residual, for example, does not solely reflect technology. But this example illustrates that consumer behavior might suggest substantial quality improvements.

IS CONSUMPTION GROWTH SLOWING?

This discussion brings me back to Triplett's contention that the slowdown in consumption growth is likely to be real rather than imaginary, given the almost commensurate slowdown in well-measured food consumption. As the preceding illustrates, the slowdown in food consumption should be commensurate only if the trend in relative food prices did not change (ignoring differing consumption elasticities). In fact, food went from rising 0.5 percent annually in price, relative to services, during 1960-75, to falling at a 1.5 percent rate during 1975-90. So if a substantial growth slowdown occurred, we would not expect it to hit food as hard as services. (This point is reinforced if the consumption Engel curve is steeper for services than for food.) That is, taking substitution effects into consideration, a puzzle arises as to why food consumption growth slowed down so much. If the solution to the puzzle is that services improved in quality 1.6 percent faster after 1975, then part (but not all) of the slowdown would be a figment of growing mismeasurement. Relatedly, Hornstein and Krusell (1996) document a steady increase in the GDP share of "unmeasurables," such as services, and argue that the increase would directly contribute to growing understatement of real growth.

I end my comments by noting that a greater variety of goods from which to choose is much like higher quality. Consumers can choose their "ideal" variety (e.g., a minivan if they have a lot of children) or rotate varieties (e.g., breakfast cereals), thereby receiving more utility from a given expenditure than if fewer varieties were available from which to choose. Quantifying variety gains is very difficult. It requires detailed data on the degree of substitutability between new and existing varieties, but some successful attempts have been made. Berry, Levinsohn, and Pakes (1995) estimate the substitutability of different U.S. car models, and could quantify variety gains from the growing number of models available. Hausman (1997), after estimating the consumer surplus created by the introduction of Apple Cinnamon Cheerios, conjectures that the growth rate of the CPI's cereal component may be overstated by about 2 percent per year

because it neglects the variety benefits from new cereal brands. With growing availability of scanner data, variety gains may become quantifiable for many more goods.

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