

Written Testimony for the United States Senate

Committee on Finance

by

W. Erwin Diewert, April 6, 1995

I have been asked to present testimony on the following 3 questions:

1. Why is the Consumer Price Index (CPI) overstated?
2. What is your *aggregate* estimate of this overstatement?
3. What steps could be taken to rectify the overstatement in the CPI?

Answer to Question 1:

I will interpret question 1 to mean: what are possible reasons to believe that the US consumer price index may be overstating the degree of price inflation that US consumers have faced in recent years?

Before answering this question, it should be noted that the words "overstatement" or "bias" in the CPI implies that we have a concept of what the "true" or "unbiased" consumer price index is. My concept of the "true" index is what the economist Robert Pollak¹ has called the "social cost of living index". The difference between this concept of the index and the Bureau of Labor Statistics' concept of the CPI can be explained briefly as follows. In the BLS concept, a representative fixed basket of goods and services is priced out every month. The official CPI is proportional to the monthly total cost of this fixed basket of goods and services. This concept does not allow for the possibility that consumers will change their baskets in response to changes in relative prices; that is, normally consumers will purchase smaller quantities of goods whose prices have risen rapidly and they will purchase relatively greater quantities of goods whose prices have risen more slowly or have fallen. The social cost of living index allows for this consumer substitution of cheaper goods for more expensive goods while the current BLS CPI does not.

With the above proviso in mind, I believe that there are 5 possible sources of overstatement or upward bias in the US CPI:

¹ See Robert A. Pollak [1981].

- (i) substitution bias;
- (ii) elementary index bias;
- (iii) outlet substitution bias;
- (iv) quality adjustment bias or linking bias and
- (v) new goods bias.

A brief description of each of the sources of bias follows.

Substitution bias is the difference between a social cost of living index which allows the basket to change as prices change and the existing fixed basket CPI. However, numerical estimates of the magnitude of this substitution bias have been made at relatively high levels of aggregation.² All fixed basket CPI's suffer from this source of bias.

Elementary index bias arises from the use of an inappropriate method for aggregating price quotations at the very lowest level of aggregation. By inappropriate, I mean that there are methods of aggregation that have an upward bias built into them. Unfortunately, Reinsdorf and Moulton [1994] and Armknecht, Moulton and Stewart [1994] have demonstrated that the US CPI suffers from this source of upward bias.

Outlet substitution bias is the bias which occurs when consumers shift their purchases from high cost outlets to lower cost outlets for the same commodity. Reinsdorf [1993] found evidence that this source of bias has become important in the US during the 1980's and 1990's although it did not appear to be important in 1960's.

Quality adjustment bias or linking bias is the bias which can occur when a variety or model of a good is replaced by a new variety. Suppose that a new model appears which is more efficient in some dimension than an existing model. After two or more periods, the Statistical Agency places a price ratio for the new good into the relevant elementary price index, but the absolute decline in price going from the old to new variety is never reflected in the relevant elementary price index. This source of bias was recognized by Griliches [1979; 97] and Gordon [1981; 130-133] [1990] [1993].

Our final source of bias is *new goods bias*. During the past three decades, the number of commodities that consumers can purchase has increased enormously: supermarkets have steadily increased the number of products that they offer each year; large specialty warehouse stores have sprung up that offer tremendous numbers of related commodities for sale; video rental markets have sprung up; cablevision offers increased channels; etc. However, traditional index

² The most disaggregated estimates are due to Manser and McDonald [1988] who used 101 categories of goods and services and Aizcorbe and Jackman [1993] who used 207 categories of goods and services for 44 US regions or 9108 commodities.

number theory makes no allowance for this large expansion in consumers' choice sets.³

Of all the sources of bias listed above, I believe that the biases associated with the introduction of new goods are the most significant. In the past 15 years, we have seen a proliferation of new goods and services. Traditional economics, rooted in models which have only a fixed number of commodities, has, by and large, missed the significance of this phenomenon of an increasing dimension for the commodity space. Thus productivity improvements are no longer taking place only by production units achieving economies of scale, but also by the application of science and technology through the creation of new products and new processes. It seems likely that Statistical Agencies have simply missed the improvements in our standard of living that are due to the increased number of commodities that consumers now have in their choice sets.

Answer to Question 2:

The work of Manser and McDonald [1988], Balk [1990; 82] and Aizcorbe and Jackman [1993] suggests that *substitution bias* adds about .2% per year to the US CPI.

The work of Reinsdorf and Moulton [1994] and Armknecht, Moulton and Stewart [1994] suggests that *elementary index bias* added approximately .5% per year to the U.S. consumer price index for the years 1987-1994.

With respect to *outlet substitution bias*, the estimates of Reinsdorf [1993] and Saglio [1994] suggest that this bias might add something like .25% to .4% per year to a typical CPI in recent years.

With respect to the last two sources of bias, it is not possible to estimate their aggregate impact with any degree of precision at this stage. I believe that a conservative range of estimates for the *linking bias* and the *new goods bias* in the US CPI in recent years is .35% to .6% per year upward bias.⁴

It is likely that the above sources of bias are approximately additive. Thus adding up the above sources of bias, I believe that the US CPI overstates inflation by approximately 1.3% to 1.7% per year in recent years.

³ Griliches [1979; 97], Gordon [1981; 130] and Diewert [1987; 779] [1993; 59-63], suggested that this bias could be substantially reduced (but not eliminated) by simply introducing new goods into the pricing basket in a timely fashion. Triplett [1993; 200] termed the subset of the new goods bias caused by delays in introducing new products into the index the *new introduction bias*.

⁴ Evidence on the magnitude of these sources of bias is contained in Gordon [1990], Berndt, Griliches and Rosett [1993], Griliches and Cockburn [1994] and Hausman [1994]. For a more detailed discussion of this evidence, see Diewert [1995a] [1995b].

I would like to note one qualification to the above sources of bias. If the US CPI were to be adjusted downward due to an adequate treatment of the new goods bias, the resulting index would probably not be appropriate for adjusting transfer payments to the poor. The problem is that an increasing selection of commodities may not be relevant to the poor who are forced to spend the bulk of their income on a few essentials. Thus it may be necessary to have a separate CPI for low income consumers.

Answer to Question 3:

The overstatement in the CPI due to *elementary index bias* can be corrected fairly easily. The BLS would have to rework its computer programs (and its sampling methodology to a certain extent), but this could be done within a year.

The overstatement due to *substitution bias* could be corrected by dropping the current BLS fixed basket methodology and replacing it by either (i) updating the baskets much more frequently or (ii) using an index number formula that is consistent with consumer substitution. Unfortunately, the second alternative would involve updating the baskets on an annual basis and it would be necessary to increase the BLS budget considerably to accomplish this.

The overstatement due to *outlet substitution bias* could also be corrected but again it would be necessary for the BLS to rework its procedures.

To eliminate the overstatement due to *linking bias* and *new goods bias* would require a radical reworking of current BLS procedures. I believe that it would be necessary to have the BLS either buy scanner data from private companies that generate electronic point of scale data or to have the BLS compete with private companies in this area.

The bottom line on eliminating the above sources of bias is, that with the exception of elementary index bias, it cannot be done quickly or without a considerable expenditure of resources.

Finally, I would like to suggest that the current US Statistical System seems rather inefficient to an outsider from Canada, where virtually all national statistical functions are performed by a single agency, Statistics Canada. It seems to me that considerable resources could be freed up to attack the above measurement problems (and others) simply by combining many of the present independent US Statistical Agencies: Statistics USA has a nice ring to it.

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