

Identifying Important Areas for Future Price Work at the International Level¹

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June 22, 2005

1. Introduction

The final session of this OECD meeting on inflation measures and price index problems is devoted to asking whether there is a possible role for the OECD (and other international organizations) in providing some additional information in the prices area (in addition to the information that national statistical agencies already provide). My tentative answer to this line of inquiry is: *yes, there is a role for the OECD in the prices area.*

Before we address the issue raised in the previous paragraph, it is worth noting what some of the main functions of the OECD are. The OECD is primarily an international organization that tries to help its member countries *improve their economic performance*. But in order to improve economic performance, it is first necessary to *measure* economic performance. Thus the OECD has historically been very interested in measuring member country outputs and inputs on a harmonized basis and then comparing relative outputs, inputs and productivities across countries.² The OECD has also been interested in measuring various variables that might help to explain the growth of productivity across time and across regions, such as R&D investments, educational attainments and health status of the workforce and the level of taxation by commodity.³

Since the OECD is already involved in harmonizing the System of National Accounts data for member countries,⁴ a natural outgrowth of this program could be some attempt to harmonize (to the extent possible) member country's practices with respect to the *construction of price indexes*, which are used to deflate the nominal components of GDP into real components. Obviously, if different member countries are using very different methods of price index construction, then the real growth rates that result from using these very different methods of deflation are inherently noncomparable.⁵

¹ This is the written text of a talk presented at the OECD Meeting on *Inflation Measures: Too High—Too Low—Internationally Comparable?*, Paris, June 21-22, 2005.

² See for example the OECD Manuals on capital measurement and productivity measurement written by Blades (2001) and Schreyer (2001) respectively.

³ The most authoritative source on comparative levels of taxation in OECD countries is the OECD's publication *Revenue Statistics*.

⁴ See OECD (1999).

⁵ Thus some countries (the United States) have used hedonic adjustment of prices for some components of investment and other countries (Germany) have not (until very recently), leading to noncomparabilities in their growth rates.

Recently, two new international Manuals on measuring price change have been prepared by a group of international experts. The lead agency for the new Consumer Price Index Manual was the ILO (2004) and the lead agency for the new Producer Price Index Manual was the IMF (2004). With the advent of these Manuals, it might be thought that the problems of incomparability of price index methods would gradually be reduced over time as national statistical agencies adopted the “best practice” methods that are suggested in these Manuals. However, these Manuals were deliberately written in a “nonprescriptive” manner; i.e., the Manuals outlined what were thought to be best practice methods, but often, more than one alternative method was described. Hence, these Manuals will not entirely solve the problem that national statistical agencies may use very different methodologies in producing their national price indexes, leading to real growth rates and relative output and input levels that are not really comparable across countries.

In the following section, I will draw on a talk I gave two years ago (Diewert 2003) that outlined *six problem areas in CPI methodology*.⁶ I will then look at each of these problem areas and make an evaluation as to whether the OECD could make a useful harmonization intervention in each of these areas. A final section will discuss a few other issues that surfaced during the Conference.

2. Six Problem Areas with CPI Methodology

There are at least *6 main problem areas* with the standard CPI methodology.

Problem Area 1

At the final stage of aggregation, a standard CPI index is *not* a true Laspeyres index since the expenditure weights pertain to a base *year* which is different from the base *month* (or quarter) for prices. Thus the expenditure weights are chosen at an annual frequency whereas the prices are collected at a monthly frequency. To be a true Laspeyres index, the base period expenditures should *coincide* with the base period for the prices. In fact, the actual target index used by many statistical agencies at the last stage of aggregation is a *Young index*, which is a weighted version of the unweighted Carli index.⁷ Both the Young and Carli indexes have definite upward biases compared to theoretical target indexes.⁸

I do not think that there is any role for the OECD to play in harmonizing national statistical agency practices at the elementary level of aggregation.

⁶ There are similar problem areas in PPI methodology.

⁷ This index is an expenditure share weighted average of price ratios where the numerator price is the price of the commodity in the current month and the denominator price is the price of the same commodity in a base month. The expenditure shares typically pertain to a base *year* (which is necessarily different from the base *month* for prices). Thus the Young index involves *three* periods: a base year (for expenditures), a base month (for prices) and a current month (for prices). The Carli index is simply an evenly weighted average of the price ratios. Hence, if the base year expenditure shares were all equal, the Young index would collapse down to a Carli index.

⁸ The theoretical target indexes are the Fisher, Walsh or Törnqvist Theil indexes.

Problem Area 2

At the elementary (or first) stages of aggregation, the Carli, Jevons or Dutot indexes are used. The Carli has a definite upward bias but *all three indexes suffer from being unweighted indexes*. Until relatively recently, when scanner data have become more readily available, it was thought that the biases that might result from the use of unweighted indexes were not particularly significant but recent evidence points to *a very significant bias problem* at lower levels of aggregation⁹ compared to results that are generated by the preferred target indexes mentioned above (i.e., the Fisher, Walsh and Törnqvist Theil price indexes). In any case, the standard statistical agency practice at lower levels of aggregation is simply not consistent with the Laspeyres index as a target index (since the Laspeyres index requires proper weighting at all levels of aggregation).

Again, I do not think that there is any role for the OECD to play in harmonizing national statistical agency practices at the elementary level of aggregation; this area is best left to the national statistical agencies themselves to move towards a “best practice” methodology.

Problem Area 3

The third major problem area with the standard CPI methodology is that although statistical agencies generally recognize that there is a problem with the treatment of quality change and new goods, it is difficult to work out a coherent methodological treatment of these problems in the context of a fixed base Laspeyres index. In fact, there is a considerable amount of controversy on how to integrate hedonic regression methodology into a cost of living framework. The theoretical and “practical” chapters on quality change in the new CPI Manual devote a lot of attention to these methodological problems. I would say that the problems created by the disappearance of old goods and the appearance of new models are now much more severe than they were when the traditional CPI methodology was developed some 80 years ago (when the problem was mostly ignored). For many categories of consumption, approximately 50% of the items that were priced at the beginning of the year are simply no longer available by the end of the year. Thus there is a tremendous problem of *sample attrition* due to the disappearance of old products, which impacts on the overall CPI methodology.

I believe that the most promising way to deal with the introduction of new products is by using hedonic regression techniques.¹⁰ However, estimating hedonic regressions is a rather labour intensive and expensive exercise. Hence it would be useful for the OECD to set up a “Hedonics Institute” where member countries could submit the data sets and associated hedonic regressions that have been estimated at the national level. The

⁹ See Diewert (2002; 609-610) or Chapter 20 in the CPI Manual ILO (2004) for recent evidence on this topic.

¹⁰ For recent reviews of the hedonic regression literature, see Triplett (2004), Chapters 7 and 21 in the PPI Manual (IMF 2004) and Chapters 7 and 21 in the CPI Manual (ILO 2004).

resulting information would then be made available to all member countries and useful economies of scale would result.¹¹

Problem Area 4

A fourth major problem area with standard CPI methodology is related to the first problem area and that is the *treatment of seasonal commodities*. The use of an annual basket or the use of annual expenditure shares is justified to a certain extent if one is interested in the longer run trend of inflation but if the focus is on short term month to month inflation (as is the focus of central banks), then it is obvious that the use of annual weights can lead to misleading signals from a short run perspective, since monthly price changes for commodities that are out of season (i.e., the seasonal weights for the commodity class are small for the two months being considered) can be greatly magnified by the use of annual weights. The problem of seasonal weights is a big one: in Canada, approximately 7% of the basket is not available at all for certain months of the year. Moreover, at least a third of the major commodity classes are subject to large seasonal fluctuations in weights. There are solutions to these seasonality problems but the solutions do not appeal to traditional CPI statisticians since they involve the construction of at least *two* indexes: one for the short term measurement of inflation that is restricted to nonseasonal commodities and another (more accurate) longer term index that covers seasonal and nonseasonal commodities.¹²

In order to treat seasonal commodities appropriately, detailed information on prices and quantities (or values) is required by season and since the OECD will not be in a position to collect such detailed information, I do not see a role for the OECD in this problem area.

Problem Area 5

A fifth problem with standard CPI methodology is that the problems of measuring complex services are generally neglected. In fact, a typical CPI will collect many more goods prices than services prices and will have many more commodity classes for goods rather than services. In a way, this just reflects the historical origins of existing CPI theory. Traditional CPI theory has essentially remained unchanged for 80 years but 80 years ago, goods were much more significant than services, and hence, historically, there was not much focus on the problems involved in measuring services. It is only over the last 30 or 40 years that the shift to services has caused service expenditures to exceed those on goods in many countries. However, if one looks at published CPI categories, there will generally be many more goods categories than services categories.¹³ In

¹¹ I understand that Eurostat has plans for a similar Institute to be set up for European Union countries. If the OECD sets up such an Institute as well, it should be coordinated with the Eurostat Institute.

¹² For the theoretical justification for the two classes of index, see Diewert (1998) (1999) (2002; 622-626), Alterman, Diewert and Feenstra (1999), Diewert, Finkel and Artsev (2004) and Chapter 22 in ILO (2004) and IMF (2004).

¹³ Detailed consumer price indexes for approximately 160 commodities are available from Statistics Canada on a monthly basis. Of these 160 consumer price indexes, only about 40 are devoted to service prices.

addition to inertia, there are some serious conceptual problems involved in measuring the prices of many services. Some examples of difficult to measure services are: expenditures on insurance, gambling, financial services, advertising services, telecommunication services (with complex plans), entertainment services and rental housing. For the most part, statistical agencies simply do not have appropriate methodologies to deal with these difficult conceptual measurement problems and so in many cases, these service sector outputs are either not measured at all or are deflated with very rough and ready deflators.

It seems to me that there is a role for the OECD in this area: the OECD should set up a Working Group that is dedicated to developing practical methods for measuring “difficult to measure” service sector outputs. This Group could provide both methodological approaches and experimental implementation of the new methods that would be developed. OECD economists¹⁴ have already been involved in task forces that have been looking at new methods for measuring financial sector outputs (one of the most difficult areas) and so having a broader Working Group would simply be an extension of these efforts. Both Eurostat and the Voorburg Group (a UN sponsored City Group) are already involved in pooling international resources in order to measure services better but I still see an important role for the OECD.

Problem Area 6

A final problem with pre ILO Manual CPI methodology was that it tended not to recognize that more than one CPI may be required to meet the needs of different users. For example, some users may require information on the month to month movement of prices in a timely fashion. This requirement leads to a Laspeyres type CPI along the lines of existing CPI's, where current information on weights is not necessarily available. However, other users may be more interested in a more accurate or representative measure of price change and may be willing to sacrifice timeliness for increased accuracy. Thus the Bureau of Labor Statistics in the U.S. is providing, on a delayed basis, a superlative index that uses current period weight information as well as base period weight information.¹⁵ This is an entirely reasonable development, recognizing that different users have different needs. A second example where multiple indexes would be useful occurs in the context of the treatment of owner occupied housing. Researchers have made solid cases for at least three different treatments of owner occupied housing: the acquisitions approach (just price out purchases of new dwelling units), the rental equivalence approach (impute a rent for the dwelling) and the user cost approach (work out all of the anticipated or actual costs of owning the house for the reference period including depreciation and the opportunity cost of the capital tied up in owning the dwelling). However, these three approaches to the treatment of owner occupied housing will usually give quite different numerical results in the short run.¹⁶

¹⁴ Paul Schreyer comes to mind; see Schreyer and Stauffer (2003). See also the discussion on measuring services in Ahmad, Lequiller, Marianna, Pilat, Schreyer and Wölfl (2003).

¹⁵ For an update on recent U.S. experience in this area, see Johnson, Reed and Stewart (2005).

¹⁶ See Chapter 23 in ILO (2004), Christensen, Dupont and Schreyer (2005) and Gudnason (2005) for further discussion on the alternative treatments of owner occupied housing.

Since all three approaches have strong support, it would be reasonable for a statistical agency to pick one approach for their flagship index but make available the other two treatments as “analytical series” for interested users. A third example where multiple indexes would be useful occurs in the context of seasonal commodities. The usual CPI is a month to month index and it is implicitly assumed that all commodities are available in each month. As we have noted in problem area 4 above, this assumption is not warranted: some 5 to 10 % of all commodities are generally not available in all months. In this context, a month to month CPI will not be as “accurate” as a year over year CPI that compares the prices of commodities in this month with the corresponding commodities in the same month a year ago. Hence again, the need for multiple indexes emerges to cater to the needs of different users.

Again, I see a role for the OECD in providing comparable information about the economic performance of member countries. I think that the OECD should:

- Compile chained (annual) superlative indexes for the main components of GDP for member countries on a delayed basis and
- Provide rough and ready estimates for the price and quantity of owner occupied housing for member countries on an acquisitions basis as well as on a rental equivalence basis and (simplified) user cost basis.¹⁷

3. Conclusion

In a paper presented at this conference, Ahnert and Branchi (2005) argue that national CPI's and HICP's (Eurostat's Harmonized Index of Consumer Prices) should be presented as two elements of one common price index system for Europe. We might ask whether their proposal should be extended from EU member countries to all OECD countries?

Although it might be useful for all OECD countries to compare their HICP inflation rates (should they choose to compile an HICP), I do not think it would be a worthwhile allocation of resources for non EU countries to compile an HICP. The problem with the HICP is that it was designed to be an “inflation” index, completely independently of the price indexes that are described in the System of National Accounts.¹⁸ Hence, it is not really comparable with any of the very useful indexes that are described in SNA 1993. If member countries have extra resources to spare in order to measure prices better, my own preference would be for investments in measuring services better and hence producing a better Producer Price Index and then to produce input cost indexes by industry¹⁹ so that the sources of industry total factor productivity growth could be more accurately estimated.

¹⁷ See Rosmundur (2005) for a description of the Icelandic simplified user cost system.

¹⁸ For an extensive (and somewhat critical) evaluation of the HICP, see Diewert (2002).

¹⁹ In particular, it is necessary to measure capital services better. The Canberra Group II on Capital Measurement is currently addressing this issue.

Another issue that surfaced during this conference is the following one: should the value of the land that sits under a new dwelling unit be included in a price index that follows the acquisitions approach to Owner Occupied Housing? It is worth quoting footnote 6 in Chapter 23 of the ILO Manual on this issue:

“This price index may or may not include the price of land on which the new dwelling unit is situated. Thus a new house price construction index would typically not include the land cost. The acquisitions approach concentrates on the purchases of households on goods and services that are provided by suppliers from outside the household sector. If the land on which a new house is situated was previously owned by the household sector, then presumably the cost of this land would be excluded from an acquisitions type new house price index.” ILO (2004; 420).

Even though I wrote the above material, I would like to argue against the point of view that it expresses. When we are constructing a consumer price index, we are looking at the *costs* of consumer/household purchases and we are not looking at the household’s *sources of income*. Thus it seems rather artificial to argue that when a household purchases a new house, we should not include the value of the land because the cost of the land is income to another household. Even though this position can be justified, I think that the public will have difficulty in understanding this point of view. Even if we took the ILO position, there are problems with the argument. When a new dwelling unit is built, it is built on either land that was previously agricultural or some existing home owner subdivides his or her property to allow a new dwelling unit to be built on the property or an existing dwelling unit is torn down and replaced with denser housing. In all of these cases, *the price of land associated with the original property will increase and this increased price of land should be taken into account*. As a final argument against the ILO position outlined above, neglecting land in the price of new housing means that the resulting acquisitions approach will give results that are *very different* from the results generated by the rentals and user cost approaches to measuring housing services since obviously, rents (and user costs) must be high enough to cover the opportunity cost of the land that the rental property sits on.

To conclude, I see a role for the OECD to provide harmonized information for member countries in the following 4 areas:

- Set up a “Hedonics Institute” where member country information on their experience with running hedonic regressions could be pooled and shared;
- Set up a Working Group that is dedicated to developing practical methods for measuring “difficult to measure” service sector outputs;
- Compile chained (annual) superlative indexes for the main components of GDP for member countries on a delayed basis and
- Provide estimates for the price and quantity of owner occupied housing for member countries on the three main approaches to the treatment of OOH.

Providing the above information to member countries seems to me to be an extension of the OECD mission to provide comparable information on the economic performance of member countries so that in the long run, performance can be improved.

References

- Ahmad, N., F. Lequiller, P. Marianna, D. Pilat, P. Schreyer and A. Wölfl (2003), *Comparing Labour Productivity Growth in the OECD Area: The Role of Measurement*, Directorate for Science, Technology and Industry Working Paper 2003/14, Paris: OECD.
- Ahnert, H. and M. Branchi (2005), “The HICP as an Anchor for European Consumer Price Statistics”, paper presented at the OECD Meeting on *Inflation Measures: Too High—Too Low—Internationally Comparable?*, Paris, June 21-22, 2005.
- Alterman, W.F., W.E. Diewert and R.C. Feenstra (1999), *International Trade Price Indexes and Seasonal Commodities*, Washington DC: Bureau of Labor Statistics.
- Blades, D. (2001), *Measuring Capital: OECD Manual: Measurement of Capital Stocks, Consumption of Fixed Capital and Capital Services*, Paris: OECD.
- Christensen, A.-K., J. Dupont and P. Schreyer (2005), “International Comparability of the Consumer Price Index: Owner-Occupied Housing”, paper presented at the OECD Meeting on *Inflation Measures: Too High—Too Low—Internationally Comparable?*, Paris, June 21-22, 2005.
- Diewert, W.E. (1998), “High Inflation, Seasonal Commodities and Annual Index Numbers”, *Macroeconomic Dynamics* 2, 456-471.
- Diewert, W.E. (1999), “Index Number Approaches to Seasonal Adjustment”, *Macroeconomic Dynamics* 3, 48-68.
- Diewert, W.E. (2002), “Harmonized Indexes of Consumer Prices: Their Conceptual Foundations”, *Swiss Journal of Economics and Statistics* 138:4, 547-637. <http://www.econ.ubc.ca/diewert/other.htm>
- Diewert, W.E. (2003), “Methodological Problems with the Consumer Price Index”, paper presented at the joint UNECE/ILO Meeting on Consumer Price Indices, held at the Palais des Nations, Geneva, December 4-5, 2003. <http://www.econ.ubc.ca/diewert/other.htm>
- Diewert, W.E., Y. Finkel and Y. Artsev (2004), “On the Treatment of Seasonal Commodities in the CPI: the Israeli Experience”, paper presented at the SSHRC International Conference on Index Number Theory and the Measurement of Prices and Productivity, Vancouver, June 30-July 3, 2004. <http://www.ipeer.ca/papers/YoelFinkel.doc>
- Gudnason, R. (2005), “Market Prices and User Cost”, paper presented at the OECD Meeting on *Inflation Measures: Too High—Too Low—Internationally Comparable?*, Paris, June 21-22, 2005.

- International Labour Organization, Eurostat, IMF, OECD and the World Bank (2004), *Consumer Price Index Manual: Theory and Practice*, Peter Hill (ed.), Geneva: ILO.
- International Monetary Fund, Eurostat, ILO, OECD and the World Bank (2004), *Producer Price Index Manual: Theory and Practice*, Paul Armknecht (ed.), Washington: IMF.
- Johnson, D.S., SB. Reed and K.J. Stewart (2005), “What has Happened to Price Measurement since the Boskin Report? The U.S. Experience”, paper presented at the OECD Meeting on *Inflation Measures: Too High—Too Low—Internationally Comparable?*, Paris, June 21-22, 2005.
- OECD (1999), *National Accounts; Main Aggregates; 1960-1997; Volume 1*, 1999 Edition, Paris: Organisation for Economic Co-Operation and Development.
- OECD (2004), *Revenue Statistics: 1965-2003*, Paris: OECD.
- Schreyer, P. (2001), *Measuring Productivity: OECD Manual: Measurement of Aggregate and Industry-Level Productivity Growth*, Paris: OECD.
- Schreyer, P. and P. Stauffer (2003), “Measuring the Production of Financial Corporations”, Draft Final Report, OECD Task Force on Financial Services (Banking Services) in National Accounts, paper presented at the OECD/BSF/SNB Workshop, August 28-29, 2003, Zurich, Switzerland.
- Triplett, J. (2004), *Handbook on Hedonic Indexes and Quality Adjustments in Price Indexes: Special Application to Information Technology Products*, Directorate for Science, Technology and Industry Working Paper 2004/9, Paris: OECD.
<http://www.oecd.org.dataoecd/37/31/33789552.pdf>