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Report on the CPI Sample Diversification Project
Phase I

Invited paper submitted by Statistics Canada*

I. Introduction

1. Following the considerable sample reduction in 1995, questions were raised regarding the ability of the remaining sample to capture price change in a reliable way, particularly at the most detailed level of publication, that is, indices for basic product classes by province. It was proposed by Prices Division management to allow for periodic expansions of the sample in selected areas in order to gauge whether or not the sample was adequate. A few such initiatives were launched, namely, for food purchased from restaurants, for traveller accommodation and for several categories of food purchased from stores. At the time, the intention was to test the sample, component by component, to ensure that it was defensible, and if not, to expand it by diversifying the products or outlets or geography covered by the sample.

2. The idea of sample diversification is not a new one: it was raised by Bohdan Schultz some fifteen years ago. In 1995, the large reduction of the sample brought this issue to the forefront. Over the last year or so, Prices Division have been giving serious consideration to the question of sample diversification, and at the same time, to the more general issue of sampling in the CPI.

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3. The primary objective of the project is to identify the areas where the sample is the least representative of the breadth of products available on the market and which are likely to display differing price behaviour. Of course, diversification of the sample does not have to be limited to diversification of products. It encompasses any dimension of the price sample which involves price variability. In addition to the product dimension, there is the geographic distribution of the sample, outlet selection, timing and frequency of collection. After some preliminary discussions, it was decided that the emphasis would be put on product diversification as this dimension was most likely to present the largest price movement dispersion.

4. In order to gain insight into some of the more practical questions remaining, the entire staff of the CPI section, invited guests from the Quality assurance section, from Survey Operations Division as well as from Business Survey Methods Division (BSMD) participated in a two-day workshop in November 1998. A Prices Division Steering Committee¹ managed the process and drafted eight recommendations as a result of this consultation. These recommendations are presented later in this report.

5. The first step in the process served multiple purposes. Raising awareness of all the challenges and obstacles to sample diversification, obtaining general agreement on CPI sampling principles, and gradually beginning to document some of the finer details of CPI methods and procedures to preserve continuity and to ensure transparency were among the main objectives of phase I of the diversification project.

6. Phase II of the project, which is currently underway, involves the systematic review of the content of each basic class in order to target the diversification where it will do the most good at the least cost. Such a review incidentally brings about a rethinking of the methods and tools that are used to put the index together and will hopefully result in a complete documentation of sampling and index construction practices in the CPI.

7. This report essentially describes the outcome of phase I of the project, setting the necessary groundwork for the more in-depth review and implementation of the diversification project in subsequent phases.

II. CPI Sample

8. The Consumer Price Index (CPI) is an indicator of aggregate change in the price of goods and services purchased by Canadian consumers. This global price change cannot be directly observed. Rather, it is estimated with a price index, an analytical tool based on index-number theory. Prices and weights—taking the form of expenditures by product group and region in the case of the CPI—are needed to calculate price indices. Price collection is

an integral part of the Consumer Price Index program and it is the diversification of this price sample that is the object of this initiative.

A. Statistical universe

9. The price survey frame is the universe of transactions. To each transaction corresponds a price that in turn is determined by different sets of factors. Among the possible determinants of price and/or price change, there are the product's physical characteristics, the brand, whether it is a new or established product, whether it is a high or low-end product, the type of outlet, its location, the level of service and other features such as delivery services, parking, refund policies, and finally the time of the day, week, season or year.

10. These various factors have different effects on price movements. The extent of such influence also depends on the particular product and its market. A given factor might be crucial in the case of one product and irrelevant to another. Such influence could have a major impact on price levels, but not on price movements. For example, size usually has no influence on the price of clothing for adults, although different sizes imply that relatively more or less fabric has been used to make a garment. However, with other products, like refrigerators, size is a key factor in price, perhaps even in price movements. The time of day a television set is purchased has little bearing on price—but can be a factor in the case of fresh baked goods or hotel rooms.

11. Price movements vary greatly across the many goods and services purchased by Canadian consumers and innumerable factors influence these movements. The influence these factors have on price movements in the universe of all transactions is unknown. The big challenge of price sampling is to judge which are likely to be the most important determinants of price movements, based on knowledge of markets, products and past behaviour of price samples.

12. To simplify the analysis, the factors influencing price movements can be grouped into four major categories. Those pertaining to product characteristics make up the first dimension of the sample. The second involves the characteristics of outlets. The third pertains to time-related factors. The last dimension includes factors relating to geography. These are the four dimensions of price sampling discussed below.

B. Dimensions of Price Sampling

Diversification of products, retail outlets and product varieties

13. It is generally recognized that consumers enjoy a much wider range of products now than ever before. Prices for different varieties of the same products may be subject to the same fluctuations—if not over the short term, at least over the medium term—because they compete on the same market. However, the effect of such competition is largely conditioned by market size. The more segmented the market, the more product prices are likely to behave differently from each other. That is why commodity specialists in the CPI should understand the markets on which these products are sold—as well as the products themselves.

14. It is not reasonable to assume prices for all new products or new varieties will behave like the prices of the representative products in the current sample. Consider television sets, for example. There are far more types of television sets available now than there were twenty years ago and, according to the Electronic Manufacturers Association of Canada (EMAC), prices for different television sets (i.e.; 11", 18", 21" and 34" screens, projection TVs, etc.) behave differently from month to month as well as over several years. These facts suggest that 11" screen TVs may not be in direct competition with large screen televisions.

15. The increasing complexity of the economy should thus be reflected in the selection of the sample, if diversification of the economy leads to a diversification of price movements on the market. Otherwise, the sample will represent an increasingly smaller share of consumer expenditures.

16. There are also significant changes in retailing practices underway. New types of stores have carved out important market shares. These include specialized big-box stores like Chapters, Toys'R'Us and Petsmart, Globo, among others. Other types of stores have begun to offer a much broader range of goods and services. For example, some grocery stores now offer financial services, travel services, dry cleaning and photo finishing. They sell drugs, clothing, household supplies, and even furniture. In some drug stores one can find household supplies, food —and even computers! Certain large chains like Eaton's and Sears are beginning to specialize in areas such as household appliances and clothing, but have dropped out of other markets, like toys, where they can no longer compete.

17. Trends in retail trade are important for sample selection—particularly if it is believed that the characteristics of different retail outlets have an impact on price movements². The selection of retail outlets thus serves several purposes. It may be desirable to diversify the types of such outlets, to detect the impact of different retail outlet characteristics on price movements. It may also be desirable to diversify retail outlets in order to diversify the products, since varieties often vary from one outlet

to another. In certain cases, like automobile dealerships, the most obvious way to diversify products is by diversifying outlets.

Diversification through time

18. Time may have different kinds of effects on price levels and price variations. There are two types of such effects. The first is the moment of purchase (time of day, week, month, year, or with respect to some other event). The influence of the time in the year a purchase is made is typically referred to as the "seasonal effect." With products such as perishable goods, the time of week or even hour of purchase could affect price level and variations.

19. The second is the time elapsed between the purchase and the moment that the consumer takes possession of (or consumes) the product in question. The advance purchase of a product (good or service) includes a certain guarantee to the consumer that the product will be available at the desired time. The consumer may be prepared to pay a higher price for a product that comes with this guarantee of availability. On the other hand, a seller may be prepared to accept a lower price for a product sold in advance, because advance sale also gives the seller a certain assurance. Last-minute sales may be advantageous to the consumer if availability is high and the seller is motivated to move products more quickly. However, when availability drops, relative scarcity will push prices in the opposite direction. The actual effect on price and price movements depends on market conditions.

Geographic diversification

20. The weights used for the various CPI product classes are determined according to Canadian rural and urban family expenditures. However, the prices themselves are only collected in cities. Are urban price movements representative of rural price movements? Do product prices vary greatly between smaller and larger cities or within a given region or province? Obviously, price levels differ between regions. For example, most products in northern Canada are more expensive than those found in the cities because of shipping costs. Price movements may also be affected by geographic factors, if there are any major changes in shipping costs or in demand, between regions.

21. It is generally recognized the geographic dimension is less significant than the product dimension. Survey managers in the CPI relied on the same hypothesis when the sample was reduced in 1995. At that time, they opted to cut the number of geographic strata and retail outlets represented, rather than the number of representative products. Furthermore, a BSMD survey conducted as part of the CPI Renovation Project, showed that reducing the number of geographic strata used in the CPI would have no significant effect on national or provincial indices.³

22. In a memorandum written in 1990⁴, Bohdan Schultz proposed the parameters of a one-time survey aimed at determining the benefits of adding prices from smaller and more remote towns to the Canadian CPI survey. His proposed survey was not conducted at the time. However, it could still be carried out to provide supporting evidence in the Canadian context. Statistics Sweden recently tested the same hypothesis, by comparing the Swedish CPI calculated on the basis of prices coming from all regions of the country, to the CPI calculated only on the basis of prices coming from the Stockholm region⁵. The author concluded there are no significant regional demarcations in the Swedish CPI.

23. Terri Markle recently authored a study⁶ in which she concluded that the probable effect on the overall CPI of omitting home ownership prices for rural households, using the parameters defined in the simulation exercise, would not warrant any change in the CPI methodology. However, she noted that conclusions as to the robustness of the all-items CPI are speculative, since hypotheses on differences in rural and urban price movements remain unconfirmed.

C. Current sampling method

24. With very few exceptions⁷, the Canadian CPI price sample is based on a non-probabilistic selection method. Representative products, product varieties and retail outlets are selected within each regional stratum based on market information obtained from various sources within the industry and through regional operations.

25. The Canadian CPI price sample is fairly small compared with that used by several statistical agencies of other countries. In many cases, the diversity of products and varieties in the sample is very limited compared to what is available in the market. Data are collected from only a few very similar retail outlets. This aspect has become even more pronounced since the sample was cut in 1995.

26. The timing of collection is not chosen through sampling. The price of most products is collected at about the same time each month. The time element in sampling primarily involves the determination of sampling frequency. This varies by product. Annual sampling is adequate for certain goods and services. In other cases, even monthly sampling is insufficient.

27. Geographic distribution of the sample differs by product. If it is believed that there is great regional homogeneity in price movements for a certain category of products, there is no point collecting prices within various communities of a given region. In contrast, data collection must be distributed over the broadest possible area if prices are a function of local conditions.

28. In the case of a non-probabilistic sample, where selection is ultimately based on the judgment of analysts, there is always a risk of sampling bias, the significance of which cannot be assessed. The fact that there is little diversity among the products included in a fairly small judgment sample can also increase the likelihood that discontinuities in the sample resulting from a high rate of quality change or product disappearance could have a perceptible impact on the derived indices.

D. Options

(i) Probability sampling

29. One way of dealing with the sampling bias is through probability sampling. This would not necessarily guarantee greater statistical reliability, which would depend on sample size. However, this method would let us do what is now impossible—generate measurements of statistical reliability.

30. Given the current budgetary situation, the cost of performing a probability sampling for products in retail outlets is prohibitive. However, probability sampling of retail outlets could be envisaged under two conditions. The first is the existence of an adequate retail outlet survey frame. The second is a fairly tight relationship between retail outlets and products because in this case, retail outlets could be selected with confidence that the representative product can be found there. Hotels, for example, are a case where probability sampling should be considered.

31. If statistical sampling were used to select retail outlets but not products, statistical reliability would only be assessed based on the variability of the estimate with respect to the selection of outlets. This means introducing probability sampling for retail outlets could only produce a partial measure of reliability. A quantitative assessment of the extent to which the estimate is likely to vary in terms of product choice would still elude us.

Recommendation #1:

The Steering Committee recommends that the use of probability sampling should be considered, albeit mainly for the selection of retail outlets.

(ii) Judgmental diversification

32. A diversification of the judgmental sample requires a deliberate selection of a wider variety of transactions. This could be done by increasing the number of geographic areas, retail outlets, physical product characteristics, and terms of sale—in short, all factors influencing price

movements. Such an initiative could remedy certain actual and potential problems with the current sample.

33. While doing so still would not guarantee an unbiased sample, diversification would increase sample representativity, and also permit greater continuity in the sample where a high rate of product disappearance or change in product quality is present. The increased sample size required by this process would also diminish the risk of an implicit over-weighting of abnormal price movements, which can happen in the context of a very small sample such as that used for the current CPI.

34. The four dimensions of price sample, that is, product, outlets, time and geography do not all influence price movements equally. It is generally recognized that product characteristics are key determinants of price movements. The other dimensions can also play an important role. However, given the time and financial constraints which Prices Division faces, it seems wiser to focus efforts on the diversification of products in the sample.

Recommendation #2:

The Steering Committee recommends sample diversification with respect to products in the CPI. To implement this plan, the Committee recommends a systematic review of all dimensions of the price sample. This includes the geographic distribution of price quotes, outlet selection, timing and frequency of collection, and of course, product selection.

III. Sampling principles

35. Before reviewing the CPI sample, its fundamental principles should be considered. This "back to basics" approach is aimed at ensuring that any resulting adjustment in current sampling practices is properly rooted in the theoretical principles involved in price sample selection.

A. Price changes over the medium term

36. In the CPI program, prices are the object of collection efforts. However, aggregate price change is the targeted variable, that which the CPI is trying to measure. Price movements could be defined as monthly, quarterly, annually—or even over a longer timeframe. Sampling can be structured to represent many such movements adequately, but it can only be optimized for one of them. Optimizing the sample requires defining which price movement is the target variable of the survey.

37. Selection of this target variable depends on the purposes to which the CPI will be put. Since the CPI is mainly used for indexing or adjusting payments and for assessing inflation, the target variable should not involve

very short-term (monthly) or very long-term (over several years) variations. Medium-term CPI price change, often represented by year-over-year variations between the same month in consecutive years, would be the most pertinent variable. Most users are interested in medium-term changes and in assessing this variable monthly. Other applications, however, require knowledge of the most recent monthly or quarterly movements. Although the aim is to optimize the sample for medium-term price movements, a sufficient number of observations is needed to maintain acceptable reliability for all uses based on published indices.

38. In the case of high inflation, attention would certainly turn to shorter-term CPI movements. According special importance to medium-term trends in sample allocation does not hinder the CPI's ability to detect monthly price swings during periods of high inflation. Prices of food, housing and clothing are still recorded monthly and these components make up more than half the family expenditures and include certain products with the most volatile prices.

Recommendation #3:

The Steering Committee recommends that the sample be optimized with respect to medium-term price change, as measured by year-over-year change in price indices. This medium-term trend in consumer prices is the most relevant variable for the main uses of the CPI. However, there are other uses that require the most recent measure of monthly or quarterly price change. Therefore, while aiming to optimize the sample in terms of year-over-year price changes, a sufficiently large sample must be maintained to ensure a sufficient level of reliability for all uses based on the published indices.

B. Sample stratification

39. Millions of transactions take place daily at thousands of retail outlets across the country. Sample selection can begin with sample stratification, which aims to focus collection efforts and increases the reliability and pertinence of indices calculated from prices collected. The goal of stratification is to group elements from the statistical universe into categories that are as homogeneous as possible in terms of the target variable. In the case of the CPI, this variable is medium-term price change.

40. The first step in CPI stratification serves to meet several goals. Price sampling starts with geographic and product stratification. This not only serves to meet overall national CPI sampling objectives, but to meet price index publishing requirements for each basic class with respect to the provinces, the territories and certain intra-provincial regions.

41. The basic class of products is the primary element used to construct the CPI fixed basket. Basic classes have been defined based on

considerations like analytical value, statistical reliability, economic importance and continuity. The consumer price index reference paper states that: "Uniformity of retail price movements was not used as the main criterion when defining basic classes...Relative uniformity can be approximated when commodities are classified by a combination of attributes such as end-usage, component materials, methods of production, etc., which are likely to be correlated with the price movement of the commodities."⁸

42. The degree of heterogeneity in price movements varies widely between basic classes. For some basic classes, samples could be selected without additional stratification whereas in order to represent other classes where price movements are presumed to be heterogeneous, further stratification would be in order.

43. As with basic classes, sub-classes used as strata should be mutually exclusive and exhaustive. Stratification should aim to create categories within which medium-term price changes are believed to be as homogeneous as possible, while being as heterogeneous as possible between strata. Furthermore, each stratum below a basic class should make up a significant share of total expenditures associated with this basic class.

44. Since individual price movements in the statistical universe are not known a priori, elements must be grouped together according to characteristics which are believed to be correlated with price movements. For example, sub-classes are often composed of substitute products, or products made with similar inputs. However, it is much harder to speculate on which factors are determinants of price movements than which are determinants of the level of prices. Creating sub-classes requires information on market shares, changes in input prices, key product characteristics, market segmentation and so forth. Conclusions can also be drawn based on similar transactions and product price movements. The number of strata appropriate for each basic class must be determined in view of this information.

45. To combine micro-indices for each stratum into one index for the basic class, a weight must be assigned to each stratum according to its importance in value in the same manner as basic class indices and more aggregate indices are weighted together to obtain the all-items index.

46. Currently, the term sub-class refers to a product aggregation level below that of basic class. Many sub-classes are used as strata. At this time, ninety of the one hundred eighty-two basic classes have been further stratified. In addition, certain sub-class indices have been produced primarily to permit better in-depth analysis of basic class indices. In these cases, the existence of sub-classes is not aimed at meeting any sampling needs. To avoid any confusion, different terms should be used according to each function. The term "sub-class" should designate product groupings (or strata) designed to improve sampling efficiency. An

"analytical micro-index" would refer to indices below basic classes which are produced solely for analytical purposes.

47. Weights used below the basic class level should only be associated with sub-class indices. No other micro-index below that of the basic class should be weighted, because it will only be used for analytical purposes, rather than to improve sampling efficiency. It should be possible to calculate any number of analytical micro-indices, as the need arises, without having any effect on the price index of the basic class.

48. Ideally, analytical micro-indices should be calculated outside the regular CPI computation system (currently, MPS). Below the basic class level, the only weighting structure remaining in the MPS system would be dictated by sample requirements. In the short term, the Prices Division Steering Committee recognized it may be difficult to eliminate analytical micro-indices from the MPS system, because an adequate alternative is currently not available for such analysis.

Recommendation #4:

Given that basic classes were not designed explicitly to group products according to similarity of price movements, it may be desirable in certain cases to pursue stratification below the basic class level. Stratification must aim to create groupings where it is believed that medium-term price change will be as homogeneous as possible, while being as heterogeneous as possible between strata. The indices for strata and sub-classes are assigned weights in aggregation. No other micro-indices below basic classes should be weighted.

C. Centralization versus decentralization

49. Strictly speaking, the sampling selection process begins with the selection of the most representative prices within each regional stratum and within each product stratum. Currently, this process is performed in several stages. The first involves selecting one or more representative products whose price movements will represent those of all products in the stratum. Each representative product has a specification listing its technical characteristics. The specification sets criteria for the final stage of sampling—the selection of products in the retail outlet. This specification may be very general or tightly defined, thus limiting product selection options in retail outlets to various degrees. The second stage of the process is the selection of retail outlets. Selection of the outlets directly depends on the choice of representative products. As mentioned, the final stage of this process is to select prices associated to a particular product variety within selected retail outlets.

50. Operationally, price sampling can be performed in different ways. Selection may be fairly centralized, with specifications providing relatively strict collection criteria, leaving interviewers little choice on the prices to be recorded. Selection can also be more decentralized, with specifications providing far more general criteria, giving more latitude for interviewers to determine the most representative product varieties in the field.

51. The diversification initiative was launched to improve sample representativity. Product diversification may be performed at different stages of sampling. It involves expanding the number of representative products or multiplying the number of product varieties for which prices are collected in each retail outlet. The distinction between diversification of representative products and diversification of varieties for which prices are collected depends on how restrictive the central specification for the representative product is.

52. The very large majority of representative products are fairly strictly defined in the CPI sample. Designating many specific representative products serves as a reminder for interviewers; it provides a certain guarantee that products with characteristics influencing price movements in a significant way are not omitted from the sample. When representative products are so tightly defined, however, this approach requires that a large number of representative products be designated to ensure that the class or sub-class is properly represented. In other words, under this approach, diversification of representative products is in order.

53. Should the representative products be more broadly defined, diversification of varieties selected in the field would be in order. For example, if interviewers were asked to record prices for the three most representative varieties of each broadly defined product (rather than just one) in a retail outlet, the sample would better cover factors affecting price movements—without an increase in the number of representative products in each class.

54. Diversification of product varieties is important because price movements among the varieties of a particular product are never completely homogeneous. Diversification is needed for brands, sizes, options and any other tangible and intangible characteristics that might influence price movements.

55. Some attention is already paid to diversifying product varieties in the CPI. Commodity specialists conduct a review to ensure that the same variety is not priced more than once in the same city. In the case of stage performances, for example, they ensure that the prices for different kinds of shows (ballet, opera, theatre, concert) are collected—rather than recording theatre prices four times in the same city.

56. Interviewers are required to record prices for different brands of cleaning products in different retail outlets, to make sure several leading brands are included in the sample. Cleaning product specifications have also been broadened so that interviewers can record the prices of the most popular varieties, whatever their sizes. In the past, the size was centrally determined in the specification of the representative product.

57. The choice between a centralized or decentralized approach is not an absolute one. It is a question of degree. Currently, Prices Division exerts substantial control over the selection of products in the sample. Just how much central control is needed to maximize representativity of a more diversified sample remains to be determined.

58. Consumption may vary widely between regions, whether by type of product, brand, size, options or price level (high or low end). In principle, decentralized price selection in retail outlets should improve sample representativity, especially if there is little consistency in consumption patterns between different regions. In practice, certain conditions are more favourable for decentralization. In other cases, better results may be obtained using a more centralized approach.

Conditions favouring decentralization:

- Major regional differences in consumption patterns
- Specialized product knowledge not required
- Lack of concrete or recent head office information on the more popular product varieties in each region
- Good communication between regional operations and head office
- Well-trained staff in regions

Conditions favouring centralization:

- Consumption patterns very consistent across the country in terms of various product characteristics
- Very homogeneous basic class requiring no diversification (for example, fuel)
- Specialized product knowledge required to make appropriate choices
- Poor relations with respondents (in-depth interviews could jeopardize the interviewers' access to the retail outlet)
- Complete and recent centrally available market information
- In the context of a small outlet sample, the selection of the most representative varieties in a given retail outlet may not be representative of the region if product or variety availability varies substantially from outlet to outlet. In such cases, it would be better to determine centrally which varieties should be selected.

59. While it remains important to have a well-trained regional office staff at all times, even a very modest decentralization of sampling will require a significant training investment for interviewers and project managers, along with a more direct and ongoing communication with the field staff.

Recommendation #5:

The Steering Committee recommends a case-by-case review, to identify the products that would lend themselves to a more decentralized approach to sampling. In determining the optimal degree of centralization, the following criteria should be considered: product homogeneity within the basic class, the degree of regional homogeneity of consumption patterns, the quality of information available in the field and in head office, respondent relations, regional representativity of outlets and the need for training. Where conditions are favourable to decentralization, the Committee recommends that this approach be gradually adopted.

D. Criteria of product selection

Representativity in terms of value

60. This initiative is aimed at improving representativity of the CPI sample. At first sight, representativity may appear a fairly obvious concept, not requiring any further definition. However, in the conceptual framework of price indices, sample representativity takes on special significance.

61. The reference document describing results of the revision based on 1967 expenditures states that: "...a selection of items for pricing...is made on the basis of the importance of items in family expenditures and the similarity of price movements of related items." ⁹ This criterion of representativity flows from the very definition of a fixed basket price index.

62. A fixed basket price index is equivalent to the average price ratios between two periods weighted according to each product's share of total expenditures. Indices for basic classes are aggregated to produce indices for major groups and for all-items using the same method. This weighting method means that movements in product prices with greater value have a bigger influence on movement of the aggregate index. Similarly, the choice of products and varieties should be based on their value so their influence on the index is proportional to their share of total expenditures.

Recommendation #6:

The Steering Committee recommends that the product sample be selected to be as representative as possible of the value of consumer expenditures. If a product's market share is unknown and cannot be estimated, the number of units sold can then be used as an alternative selection criterion.

E. Sample continuity

63. Factors other than just representativity must be considered in selecting a product for the CPI sample. Sample continuity is also an important criterion in product selection because calculation of pure price movement requires a month-to-month comparison of equivalent products. Quality change adjustment methods are used to maintain sample comparability over time if products undergo changes. These adjustment methods are approximate and may themselves introduce bias into calculation of the index.

64. The current practice of product selection is to seek products which are likely to have a long market life with little change in quality—and then retain these items in the sample as long as possible. The risk of bias resulting from changes in quality and the cost of making numerous adjustments for these changes is the reason for the current policy of minimizing the amount of product substitution. In practice, the current method means:

- Retaining outdated products and varieties in the sample that will be available on the market for a long time.
- Avoiding certain products (like low-end goods) that will not stay sufficiently long in the market
- Avoiding products that undergo many changes in quality
- Waiting a fairly long time before introducing new products to be sure they are well entrenched in the market

65. The greater the continuity, the lesser the representativity of the sample and the greater the possible bias caused by delaying the introduction of new goods. The balance between these representativity and continuity criteria is very delicate. The benefits and risks associated with different approaches may depend on the product group, because changes of quality and the appearance of new products do not occur at the same pace in all sectors.

Recommendation #7:

The Steering Committee recommends that the sample be updated more frequently and new products be introduced into the sample in a more timely fashion to reflect current Canadian consumption patterns. The Steering Committee recommends more widespread use of quality adjustment methods based on hedonic models. In cases where the use of hedonic models is not possible or suitable, the Committee recommends a review of other methods of quality adjustment.

F. Sampling for temporal and spatial indices

66. Currently, the price sample for the spatial index is a subset of the CPI sample. There is a tendency to allow product differences across regions only as a final recourse, because the construction of the spatial index requires a nationally comparable price sample. From an operational point of view, spatial comparability of the sample also offers certain benefits. It is easier to manage a more homogeneous sample and the results are simpler to analyze. Moreover, data processing is facilitated because the number of product varieties is more limited.

67. On the other hand, construction of temporal price indices requires a product sample that is as comparable as possible over time to permit calculation of pure price movements. For the purposes of a temporal CPI, comparability of products between retail outlets and across cities presents no conceptual advantages. Availability and consumption of products is not consistent throughout the country. By requiring comparability of products across cities, sample representativity might be diminished, thus creating a bias in measurement. This means that sampling objectives of the spatial and temporal index programs conflict.

68. The requirements of both programs could be met by establishing two separate samples. The first would be selected for maximum representativity, without consideration for spatial comparability. The explicit goal of the second would be to select a "national" sample for purposes of spatial comparisons. Data collection for the "national" sample could be performed every two or three years.

69. It may also be possible to use hedonic models to make quality adjustments to the prices of products selected for the temporal CPI in order to make them comparable across cities. Adjustments could then be made for products where hedonic models have already been developed and a supplementary sample could be collected to fill any gaps.

Recommendation #8:

The Steering Committee recommends putting aside the "comparability across cities" criterion in selecting the sample for a temporal CPI. The Committee recommends the consideration of two alternate solutions to meet the requirements of the spatial index program. The first involves the use of hedonic models to make quality adjustments to products in the CPI sample in order to make them comparable across cities. The second is to implement a special survey that would periodically supplement the regular price survey and that would be designed to meet the specific needs of the spatial index program.

ENDNOTES

- ¹ Members of the Prices Division steering committee included : Bohdan Schultz, Robin Lowe, Louis Marc Ducharme, Pierre Charbonneau, Cynthia Baumgarten, Ted Baldwin, Andy Baldwin and Marie Allard-Saulnier.
- ² See White, A., *Outlet Types and the Canadian Consumer Price Index*, to be published in the Analytical Series of Prices Division.
- ³ See Elgersma, P. and St-Martin, P., *Rapport d'étape sur la couverture géographique de l'IPC: Étude d'impact sur la qualité des indexes publiés*, Business Survey Methods Division, Statistics Canada, February 1993.
- ⁴ See Schultz, B., *Expanding the Geographical Coverage of our Consumer Price Surveys*, memorandum, Prices Division, June 1990.
- ⁵ See Dalén, J., *Sensitivity Analyses for Harmonising European Consumer Price Indexes*, paper presented at the First Meeting of the International Working Group on Price Indexes, Ottawa, Canada, November 1994.
- ⁶ See Markle, T., *The impact on the CPI of Not Surveying House Prices in Rural Regions: A Sensitivity Analysis*, Prices Division, Catalogue no. 62F0014MPB, document no. 8, Statistics Canada.
- ⁷ In particular, note that the price of rental accommodations is obtained through a random household sample via the Labour Force Survey.
- ⁸ The consumer price index reference paper, Update based on 1992 expenditures, catalogue no. 62-553 occasional, Statistics Canada, July 1995, p. 50.
- ⁹ The Consumer Price Index in Canada, 1961=100, catalogue no. 62-539, Statistics Canada, June 1973, p. 9.
