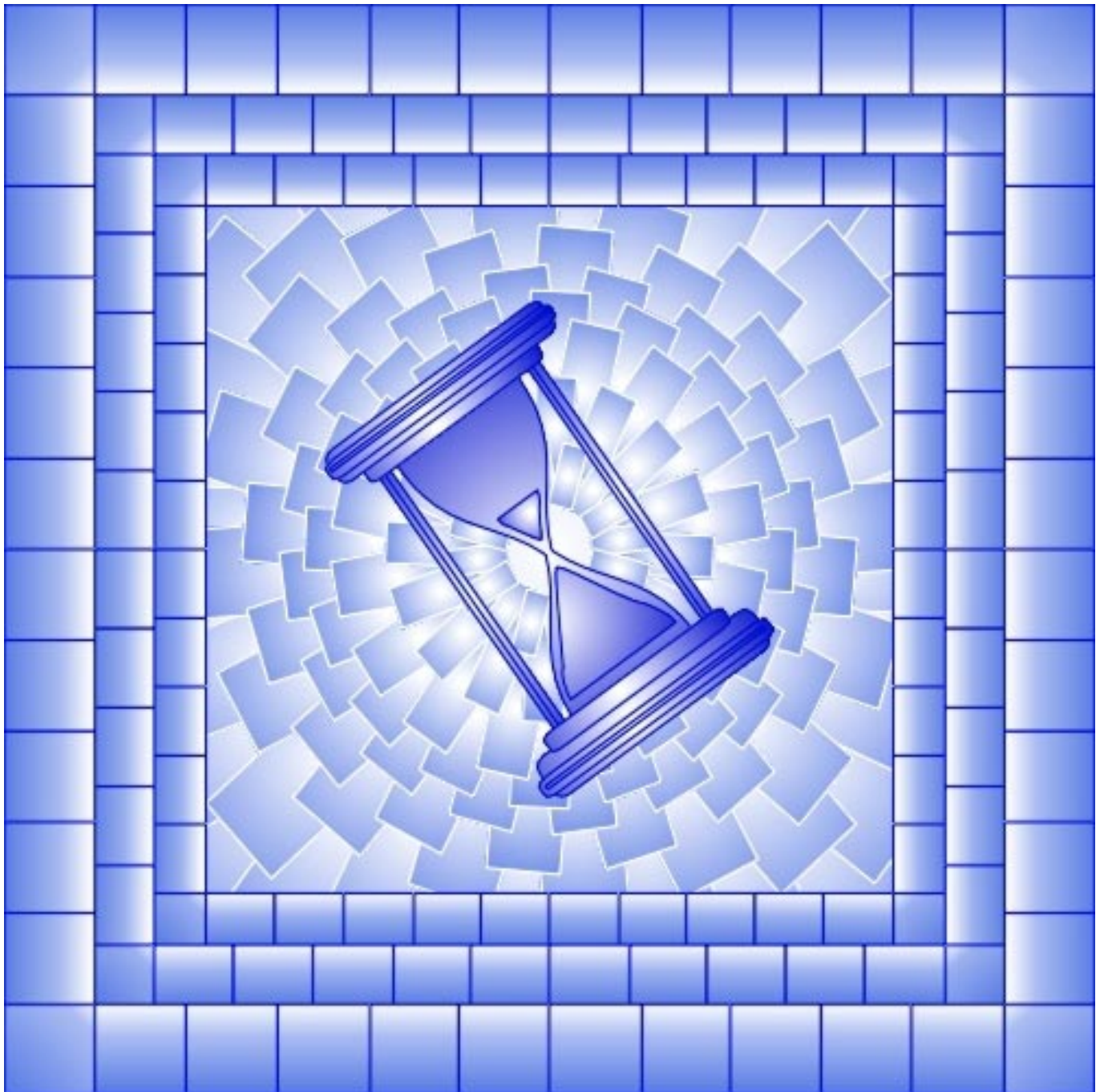# Analytical Series

Prices Division

*Item Selection and Quality Change in
the Canadian Consumer Price Index (CPI)*

By Robin Lowe

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Item Selection and Quality Change in
the Canadian Consumer Price Index (CPI)

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Preface

Prices Division first started publishing the Analytical Series in December 1996 as a means to convey conceptual and applied research undertaken by its staff, and at times, by other persons from within or outside Statistics Canada on the subject of price indexes.

All papers are reviewed by a panel of experts from within Statistics Canada or outside the agency. Views expressed in the papers are those of the authors and do not necessarily reflect those of Prices Division or Statistics Canada.

The purpose of the series is to disseminate knowledge and stimulate discussion. Questions and comments on any aspect of the papers are welcome and can be forwarded to Louis Marc Ducharme, Director, (Internet email: ducharl@statcan.ca; Telephone: 613-951-0688) or to Robin Lowe, Chief, Quality Assurance (Internet email: lowerob@statcan.ca; Telephone: 613-951-9495), Prices Division, Statistics Canada, Ottawa, Ontario, K1A 0T6.

Abstract

This paper examines the methods of adjustment for quality change made in the Canadian Consumer Price Index (CPI) for the period 1989 to 1994. It finds that in most cases the current Canadian practice ensures that the replacement of one commodity by another, one variety of a commodity by another, or one outlet by another, has no impact on the overall index. The main exceptions to this result occur when replacing varieties of commodities that are purchased only occasionally, and a judgement is made that the quality ratio between the old and new variety is not the same as the ratio of their prices. In these cases there is an impact on the index, up or down, depending on whether the change in price reported is higher or lower than the change in quality. From the experience of the CPI in these six years, there has been a correlation between the price ratio of a variety and its replacement and the index movement that derives from the judgement. The direction and size of the impact on the index depends largely on whether an item is replaced with a higher or lower priced item. For these reasons, the paper argues that more attention should be paid to ensuring that the item selection is more representative of current sales than has traditionally been the case.

Keywords: Price index, Quality change, Sampling.

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1.0   Introduction[*]

The evaluation of quality change — that is, how prices in the sample of observations are adjusted to account for changes in what is being observed — is regarded by many as one of the most important challenges of price index construction. However, selecting what to observe, at the finest level, and deciding when and how to change what is being observed, have been given less attention in the literature and in practice.[1] This paper will address some of these issues.

While the value weights for commodity groups are carefully determined from consumer expenditure surveys, there is little weighting below that level; and the determination of items that make up the commodity group (basic class) in the Canadian CPI is done judgementally. For instance, in Canada the selection of the representative commodities is done according to the following criteria[2]:

1) the price movement of the selected representative commodity should represent the price movement of a basic class; and

2) it is expected that the representative commodity will be available on the market for a reasonable length of time.

The final choice is made in consultation with retailers, distributors and manufacturers, complemented with a regular review of trade publications. In practice, high volume sellers are usually selected because they usually satisfy both criteria.

Once selected, the representative commodity usually remains in the sample indefinitely. While some changes occur because of a decision to change a representative commodity, most quality change evaluations are an unfortunate necessity forced upon the price statistician because of the unavailability of some observations in a given period.

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[*] *This is a revised version from the original draft prepared for the April 1997 meeting of the Ottawa Group on price indices. The paper has benefited from discussions with many people responsible for the CPI, in particular, Ted Baldwin and Marc Prud'homme. Candace Ruscher and Micki Kaminska did most of the computations.*

[1] *References to sampling for consumer price indexes include Allen (1964, 1975), Barnerjee (1960), Early (1990), McCarty (1961), Smith (1966) and Turvey (1989).*

[2] *See* **The consumer price index reference paper: Update based on 1992 expenditures**, *Catalogue No. 62-533, Statistics Canada (1995).*

In this paper, we examine the effect on the index when the price sample changes as a result of discontinuities in the observations.[3] The data are all quality change adjustments and all deletions from the sample made in the Canadian CPI between January 1989 and December 1994 for indexes derived from market surveys. Two arguments are made. First, that in many areas of the index, possibly obsolete item selections are continued for a non-existent benefit, as the cost of replacing them is minimal (and the replacement method should be improved). Second, in those cases where the evaluation of quality change is not an automatic procedure, the result is largely determined by the ratio of the price of the replacement item to the price of the item that was in the survey before.

2.0   Organisation of the CPI structure

A brief description of the organisation of the sample design and computation (or construction) of the Canadian CPI may be useful. The situation described is that of January 1989 to December 1994, a period when the CPI was based on expenditure patterns from the 1986 Family Expenditure Survey (FAMEX).[4,5] Figure 1 illustrates the organisation of the index.

In the Canadian CPI, each aggregate index is computed as a weighted average of indexes of the constituent basic groupings. Consequently, the indexes for the basic groupings form the main data blocks for computing the CPI, and also represent the price movement of the commodities within the basic grouping. In this period, in that 68% of the CPI we were examining, there were 309 basic groupings in the CPI, 99 of which were further divided into about 400 sub groups.[6] In total, there were about 600 representative commodities for which specifications were determined in the Canadian CPI. The sample for each basic group is also stratified geographically, so that there are potentially several thousand samples from which the

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[3] *For the purpose of this paper, we consider only commodities for which indexes are calculated from price surveys conducted in the field. These account for 68.4% of the total CPI. Commodities not covered in this study include shelter and other prices that are collected centrally, either from the producer (e.g. local telephone service) or from government agencies (e.g. cablevision and property taxes). Adjustments for quality change are made for most of these commodities, but in a different context.*

[4] *Normally the weighting patterns above the basic level are updated every four years. This exceptional six-year period was due to the replacement in January 1991 of the Manufacturers' Sales Tax by the Goods and Services Tax (GST). As the GST was levied on a broader range of goods and services at the retail level, it changed the relative prices of commodities and might have affected expenditures, so that a 1990 FAMEX survey could have been obsolete by the time its results were introduced. The 1990 survey was postponed, therefore, to 1992. With the 1996 survey of expenditures, the results introduced in 1998, we return to the regular frequency of updating.*

[5] *Some changes to the CPI occurred in 1995. The organisation has remained similar. The price sample has become smaller, and the geographical stratification has been reduced from 34 to 17.*

[6] *In order to maintain a certain level of flexibility in the index, the weights of the sub groups within basic groupings are sometimes changed between basket updates to reflect important changes in purchasing patterns. Cases where this has actually occurred are for automobiles (about 20 different models) and packaged vacation tours (35 different packages). In such circumstances, a value weight is reassigned from another basic group that is deemed similar. In these cases, changes in the weighting pattern are not allowed to affect the index movement. Other cases, such as to introduce new commodities like CDs, or the latest type of battery, that were not available, or were insignificant at the time of the last basket update, are also treated by reassigning weights so as not to affect the index with their introduction.*

overall index is derived. In fact, the number of samples is considerably less as many are imputed from others.

Each item in the sample is described in detail and often contains the terms of sale. As with most national CPIs, the Canadian CPI uses a matched sample approach to insure that the indices of the basic grouping reflect pure price movement. This means that the sampled prices refer to items of the same quantity and same (or equivalent) quality. The most recent index is updated by the movement of the average[7] of prices in the sample that can be matched from the last pricing period to the current one. So long as the price is available for each identical item, as specified between the two periods, there is no problem and the principle of matching samples is satisfied. If a price observation is missing for the current period, but is expected to be temporary, the most recent price for that item is imputed. However, if a price for the identical item cannot be found, some action must be taken to deal with this change in the sample of observed prices.

Chart 1: Organisation of the index

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                          ┌──────────────┐
                          │  All-items   │
                          └──────┬───────┘
                ┌────────────────┴────────────────┐
      ┌─────────────────────┐          ┌─────────────────────┐
      │  309 basic groups   │          │  Other commodities  │
      │       (68%)         │          │       (32%)         │
      │ Weights from FAMEX  │          │ Weights from FAMEX  │
      └──────────┬──────────┘          └─────────────────────┘
        ┌────────┴──────────────────────┐
        │                    ┌─────────────────────────┐
        │                    │   (For 99 basic groups)  │
        │                    │  Up to 34 regional strata│
        │                    │   Weights from FAMEX     │
        │                    └────────────┬─────────────┘
┌─────────────────────┐     ┌──────────────────────────────────────────┐
│ (For 210 basic      │     │         (For each stratum)                │
│  groups)            │     │   400 subgroups from 99 basic groups      │
│ Up to 34 regional   │     │ Weights may change between expenditure    │
│  strata             │     │            surveys.                       │
│ Weights from FAMEX  │     └──────────────────────────────────────────┘
└─────────────────────┘
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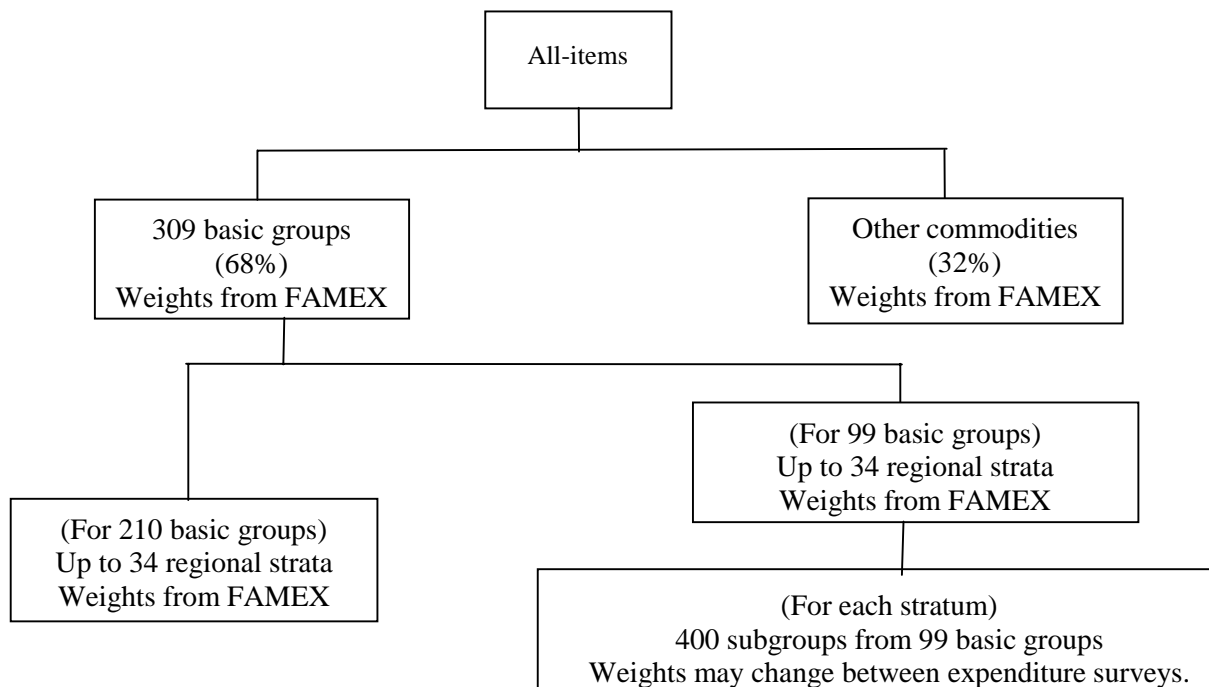
[7] *Until 1995, the average was the unweighted arithmetic mean of prices. Since January 1995, it has been the unweighted geometric mean.*

3.0   Types of quality change evaluation

The various methods for treating quality change have frequently been described in the literature.[8]   They fall into two broad categories, depending on whether relative market prices reflect the relative quality attributes of the commodity.

If they do, a number of well-established procedures can be followed in order to adjust for quality change.   Firstly, comparisons of market prices can be used to make one-to-one comparisons between an item and its replacement ("splicing" in the Canadian terminology) using the ratio of prices at a common time period.   Alternatively, two different samples can be linked using the movement of the items common to both samples.   Thirdly, a detailed description of items may be transformed into a list of characteristics to which regression analysis can be applied to estimate shadow prices for the various characteristics.   In this way, market prices for physical packages that may change are converted into market prices for characteristics that do not. This method is useful when it is difficult to find on a regular basis identical items from period to period, but when the list of characteristics and the range of values they take do not change between periods.   This last approach generates what is often referred to as hedonic price indexes.

If the market evaluation is not accepted, then interventions to superimpose a judgement can be used, as if there is some essential quality embodied in a commodity, separate from the value the market puts on it.   This information may come from the producer of the commodity or from someone else, such as a price collector or commodity specialist, who is in a good position to assess the degree of quality change from a consumer's point of view.   The decision to accept or reject the market evaluation is in itself a matter of judgement.   There are clearly some occasions when wide-reaching changes occur suddenly that affect the whole market impeding the comparison of prices.   Examples are the issue and expiration of patents, changes in the minimum amount of insulation required in houses, new legally required equipment in cars or television sets, and legal changes to the minimum required amount or type of auto insurance.   In all these cases, some judgement on the monetary value of these changes has to be made because the consumer cannot exercise a choice.   But whether regular market activity distorts values is not so easy to judge.   What is clear is that, in the Canadian CPI, the only way in which the introduction of a new or modified commodity can have an impact on the index is through a one-to-one evaluation of its quality compared to the item it is replacing.

In treating changes in the sample, all the techniques except the regression approach were used in the Canadian CPI during the relevant study period.[9]   The incidence of quality changes and the nature of the treatment vary according to the commodity type.   However, the method used in the case of the loss of an outlet remains the same regardless of the type of commodity.

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[8] *See for instance Armknecht and Moulton (1995), Armknecht and Weyback (1989), Hofsten (1952), Jaffe (1959), Triplett (1971), and Turvey (1997).*

[9] *With the introduction of the commodity "computers" in the 1992 basket, regression techniques are used to adjust for quality changes.*

If a price for an item is no longer available because the outlet from which it is collected is no longer available, it is always replaced by finding a new outlet, and modifying the sample by introducing the new item from the new outlet at some later date. In the interim, the two samples are linked together by calculating the index from the reduced matched sample. The cases where this occurs are described as "outlet replacements" in the rest of the paper. There are other possible reasons for changing the sample in this way, but the loss of an outlet accounts for most of them. All the other treatments of changes in the sample involving a one-to-one comparison between the missing item and its replacement are described as "quality changes" in the rest of the paper.

The amount of outlet replacement is quite constant across most commodities, while the incidence of quality change varies widely. In total, quality change accounted for about three times as many adjustments as outlet replacements did.

4.0   Dealing with changes for routinely purchased commodities

4.1   Incidence of changes

In looking at the different groups of commodities, we first define routine purchases. The consumer shops for these items every day or every week. The frequency is sufficiently high that if the consumer tries a new item and does not like it, returning to the original item is easy and the loss is small. This category includes all food purchased from stores, some take-out food, household cleaning products, some basic clothing items, gasoline, personal care items, some reading and recreational items such as magazines, books, tapes and CDs, and tobacco and alcohol products. Altogether, 172 of the 309 basic groupings in the CPI fall into this category, accounting for 32.7% out of the total weight of 68.4%. For these commodities, a seller of a new product has to sell it not just once to each customer, but repeatedly, so that the market is constantly assessing the relative values of the different items for sale.

Table 1 on page 17 shows the incidence of outlet replacement and quality change for each commodity. Within each defined sample a number of observations are collected for each pricing period. The incidences are defined as the ratio of the number of observations during a year that either disappear because of (i) the outlet losses, or (ii) quality to the average number of observations in the sample during that same year. Thus, 10% under the "outlet replacement" heading means that there is a 10% chance that any observation in a sample for that commodity will be dropped from the sample within a year. Similarly, under the heading "quality change", there is a 10% chance that at least one quality change adjustment will occur. This measure of incidence enables comparisons among commodities that have different pricing frequencies. For example, if there are ten observations for coffee, which is priced every month, and one has a quality change in a year (10%), then the total percentage of observations with a quality change is about 0.8% (or 1/120). In the case for dry-cleaning, however, which is priced four times a year, the same incidence would imply that 2.5% of the observations had a quality change (1/40).

As the primary concern is about the probability of getting an interruption in the flow of observations, the incidence numbers are more informative than the ratios. The incidences shown in Table 1 are calculated for each year and averaged over the entire six years or less for some commodities.[10]

The type of adjustment for quality change is also shown. "Splices"[11] are where the ratio of prices between the original item and its replacement is assumed to equal the ratio of qualities. "Judgement changes" are those where this assumption does not hold. Together, splices and judgement changes make up "All quality changes". In assembling these figures from historical records, it was impossible to distinguish real quality change adjustments from corrections to the survey data – either errors in collection, or in recording the description of the items. These corrections were almost certainly splices. Consequently, some caution should be exercised when interpreting the results as the total incidence figures and the percentage of splices may be slightly overstated.

4.2   The consequences of splicing

From Table 1, it can be seen that the overwhelming majority of interruptions for these routinely purchased commodities are treated in one of two ways: either by splicing a quality change or by linking in observations from a new outlet through a common matched sample. There were about half as many outlet replacements as quality changes. Judgement quality changes are rare; only two commodities had an incidence of judgement quality change as much as 10% and only 14 commodities (8% of the total) had an incidence over 5%.

Any splice could be handled the same way as outlet replacements are. Both methods give similar results. The current splice method should be replaced by the movement of matched observations in the sample for two reasons.

The first reason is that they do not produce exactly the same result; splices are not applied in their pure form. Ideally, the ratio of prices in the same period should equal the ratio of qualities. But rarely are overlapping prices collected in the same period. Instead, it is called a splice if the ratio of the price of the replacement item in the next period to the price of the original in the first period is taken to be the ratio of their qualities. This implies a combination of a true splice and the assumption of no price change between two periods. If there are ten observations in a sample and one is a so-called splice, the index for the period will be based on the price movement of the other nine items and zero movement for the tenth. With the linked matched sample, the index will depend only on the movement of the other nine. Although the difference is usually not significant,[12] it would be better not to assume zero price change as it is

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[10]   *The two incidences are independent of each other, though the sum overstates the incidence of all discontinuities slightly. This is because some items may have had a quality change before being dropped from the sample in the same year.*

[11]   *This is not exactly correct, as is explained in the next sub-section.*

[12]   *An extreme example of how it can be significant was in late 1994 when the commodity "broccoli" was added to the price survey. As often happens with a new sample, there were a large number of corrections and editing to be made after the first*

not necessary. Furthermore, although it appears not to be a serious problem when the commodity is priced monthly and the rate of price change is small, these conditions may not always hold. Many commodities are priced quarterly or even less frequently; thus the assumption of no price change over the longer period is less sustainable. As the result of this method is always to dampen the index movement, whether up or down, the impact of this needs further investigation.

The second reason to prefer linking by matched samples to splicing is a reflection of attitude. As it is currently designed, the adjustment process, except for outlet changes, is set up to maintain the longest chronological continuity as possible. It is well known that the price statistician is always faced with the trade-off between maintaining historical continuity in the data and keeping the sample as current as possible.[13] However, in this case the trade-off is unbalanced. There is no cost to keeping the sample up-to-date, and a replacement can be made at any time and to anything with little cost. The current method maintains the old sample well beyond its relevant period without any compensating advantage in the treatment of quality change. The perspective and philosophy needs to be changed to aim to keep the sample up-to-date and to allow more frequent changes to the sample.

Most changes to an existing sample are made only because there is no other choice. One might think that is because the concept of a fixed basket is being applied down to the finest detail — to preserve the selection of items from particular outlets under the same terms of sale. However, apart from being a very restrictive measurement, it is not applied at higher levels of aggregation. The weights of the sub indexes within the categories identified from the Family Expenditure Survey can be and are changed occasionally between basket updates. Some new commodities were introduced during this study period, and some were dropped. Furthermore, the specifications for items may be changed, and such changes do account for some judgement changes. For example, the item to be priced for soft drinks was changed from a can to a larger plastic bottle. When the ratio of prices was not the same as the ratio of sizes, the change registered was a judgement change. However, the numbers show that modifying the item selection is not very common. In most cases, once the sample is selected it is maintained as if the intention is to preserve and respect the principle of an unchanging basket for as long as possible.

The combination of the overwhelming use of splicing, together with the low incidence of changes suggested that samples may be allowed to become outdated. Less than half of the representative commodities registered incidences of any kind of quality change above 10%, and only 25 of the 172 above 20%. Although some basic food commodities may not have changed over the years, product development and variation are extensive for many commodities yet barely show up in the data. Recent work using scanner data for coffee found that 30% of the sales of roasted coffee at the end of the study period were for varieties that were not available at the beginning of the period, three years earlier (Scobie, 1997). Yet the incidence of quality change in the official CPI for coffee is 3.7%; and we see similarly low incidence of quality change for other commodities where the number of varieties has clearly grown over time.

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collection. These corrections were spliced into the index the following month dampening the index movement by almost half. The prices of broccoli, as shown by the rest of the sample, had risen sharply that month.

[13] *This point was raised by Triplett (1996) among others.*

The same considerations that apply to using prices as a valid indicator of quality among competing items within a commodity definition apply also to competing outlets. Irrespective of the variation in the amount of service provided by competing outlets (and the margin in supermarkets is only about 20% of the sale price), the sample would be improved if more diverse outlet types were included in it.

5.0 Dealing with changes to commodities purchased infrequently

For commodities purchased infrequently, dealing with discontinuities is more problematic. An individual's perception or judgement of changes in quality may be impeded. Even when such an apparently straightforward purchase as a pair of sneakers is made, it is not easy to replicate the last purchase made, and it is not easy to compare the values of the replacements. The field is ripe for advertisers and marketers to disguise quality, and market the good on the basis of improvements from some earlier age rather than on price.[14] It is not surprising, therefore, to find that the price collector often judges that a replacement item is better or worse than the ratio of its prices would imply. It is also not surprising if items disappear more frequently, as there is more incentive for a producer to replace them by new varieties that can be promoted as improved, with a higher price tag.

5.1 Incidence of changes

Table 2 on page 21 shows the incidence of outlet replacement and quality change for commodities that could be called occasional purchases.[15] These include restaurant meals, household equipment and furnishings, most clothing, new cars and repairs and maintenance, dental care, most recreation equipment and services and packaged vacations. Altogether there are 137 commodities covering 35.7% out of the total weight of 68.4% of the CPI. Compared to the routine purchases' category, the incidence of quality change is much higher, and there is a significant proportion of cases for which a judgement is applied rather than splicing being used. Although the incidence of outlet replacement is about the same as for routinely purchased commodities, it only amounts to about one-fifth the number of quality changes.

Within this group there are wide variations in the incidence of quality change and the type of treatment. The lowest incidences of judgements fall on a group of service commodities. They include shoe repairs, oil changes, dental care, auto maintenance, VCR repairs, and piano lessons. Several of them have low overall incidence of quality change as well.

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[14] *Hofsten mentioned this as far back as 1952.*

[15] *This distinction is subjective. It is based on distinguishing among consumers' ability to judge quality. A distinction could also be made by rating the degree of price competition, rather than non-price competition, in different markets.*

Commodities with a high incidence of splicing are those undergoing rapid technical change such as portable radios, microwave ovens, stereo equipment, VCRs, colour TVs, and hair dryers.

The highest incidence of judgements is generally found in the clothing group and new car purchases. However, quality changes occur so frequently for some women's clothing items that they appear on the list of high incidence of spliced items as well.

Overall, it appears that splicing is the preferred method of treatment for the easiest and most difficult items, and judgements are used for the commodities found in between these two extremes.[16]

5.2   Patterns of judgement

The first judgement is whether to splice or to impose some other evaluation. Splicing is a little more common when the price change is small, due largely to the strong tendency to regard the replacement to be of equal quality when the price is the same, but the difference in incidence is not very great. It is not very different for most commodities taken individually, either. For example, 71% of changes on portable radios are spliced when the price change is over 10%, and 69% are spliced when it is under. There are few commodities where there is a big difference; for instance, cars (6% of small changes spliced, 15% of larger ones) and trucks and vans (3% and 32%, respectively). The difference comes from how judgements are applied.

When judgement is applied, there are differences in the patterns, according to whether there is a large price difference between the missing item and its replacement or not. In examining these differences, it will be useful to look at clothing separately from the other commodities. In the Canadian CPI, quality judgements for most commodities are applied by commodity specialists in the central office in Ottawa, based on acquired commodity intelligence from various sources such as producers. For clothing, however, the judgements are applied in the field by the price collectors.

Chart 2 on the following page shows the pattern of judgements. For all occasionally purchased commodities other than clothing, there are approximately the same number of cases where the replacement price is within 10% of the old item's price, as there are cases where the price differential is more.

The first of the four diagrams shows, for example, that for occasional purchases, when the change in reported prices was less than 10%, in 9.4% of the cases, the index fell, as the quality of the replacement item rose more than the price.

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[16]   *This is perhaps not so bizarre. Just as there is no price dispersion in two extreme circumstances of perfect competition and monopoly — so in allowing the market to set values, there are two extremes. In the case of a truly new product, the manufacturer has no frame of reference. It is not competing with other varieties of the same commodity, but in a much broader context, and its value in the market is unknown at first.*

In another 10.4% of cases, while the quality rose, the price actually fell. For these commodities where a judgement was used, the index rose in 61% of the cases (the sum of the percentages in the unshaded areas). For larger changes in the price (over 10%), the overall result was similar — the index rose in 58% of the cases.

It is noticeable that when the price difference between the item and its replacement is large, the kinds of judgement were concentrated in a few segments. Situations where the replacement item was more expensive and the quality judged to have increased but less than the price accounted for 37% of all cases. The corresponding downside — prices fall but quality falls less accounted for another 22% of cases. In contrast, for smaller changes the results were distributed more evenly.

Clothing judgements were applied somewhat differently. There were rather more large changes in price than small ones (14,000 against 10,500 in six years), and small changes were much more likely to be spliced. Otherwise the patterns are similar, but more extreme. Small adjustments (the bottom left chart) show a spread of results. With larger changes (bottom right), like other commodities, there is an even more marked concentration in these two segments of the chart. Between them – price rising, quality rising less, and price falling, quality falling less – they cover 63% of all cases.

When the price change is small almost any combination of price and quality change is common. However, when it is large the index will rise or fall depending on whether the replacement costs more or less than the replaced item. This is quite plausible in the case of increases. Many small changes are likely to be slight modifications to what is essentially the same item, while if there is a major replacement, the manufacturer may try to take advantage of the situation to introduce a price increase with the new model. This tendency is more pronounced with price increases than with declines — when price and quality increased, the index went up almost four times as often as down, while when they both declined, the index only declined twice as often as it rose.[17] In some cases, the tendency to view changes in this particular way is absolute.

In preliminary work done by Markle (1997), in applying regression techniques to clothing, a comparison was made between the adjustments called for by the regression model in certain changes in men's dress shirts, and those actually made. In 29 occurrences during part of 1996, there were no cases where the quality increase was considered to be greater than the price increase, no cases where there was a quality decline greater than the price decline, and no cases where the quality was judged to have changed when the price did not. The regression model gave changes in almost every case.

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[17] *The tendency was not true for all items. For example, in the case of portable radios, the index went down with a price and quality increase in 17% of all changes (though it still went up in 20%). Its pattern of small changes, other than recognising no quality change in a large number of cases, was similar to other commodities.*

Chart 2: Distribution of judgement quality change adjustments[18]

Occasional purchases excluding clothing

Small changes in Price (< 10%)

Posted price change
13.0
Splice line

9.1   23.9
9.4

5.3 ← → 3.9 Quality change

10.3
10.4

3.6

11.1

Large changes in price

Posted price change
6.5
Splice line

3.6   36.9
9.6

← → Quality change

10.6
4.3

21.7

6.7

Clothing

Small changes in price (< 10%)

Posted price change
25.7
Splice line

5.8   14.0
2.9

20.4 ← → 5.5 Quality change

11.3
5.1

1.8

7.4

Large changes in price

Posted price change
7.1
Splice line

2.8   47.8
2.5

← → Quality change

10.8
4.3

15.2

9.4

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[18] *In this chart the ratio of the price of the replacement item to the price of the replaced item can be plotted against the ratio of their qualities. If these are equal, the index will not change as a result of the replacement. This is a splice, and accounts for the 45º splice line drawn on the chart. The shaded area shows those combinations where the index falls. Conversely, combinations in the shaded area show increases in the index. One can plot each individual change on this chart, but the data points would saturate the area. Instead, it shows the percentage of cases that fall into each combination. There are thirteen possible combinations. Three of them are on the splice line: price and quality increasing, decreasing, or staying the same. Then, there are six segments, and four combinations on the axes where only the price or the quality changes. As only the judgement cases are plotted here, there are no numbers on the splice line. On the charts showing large changes in the price ratio, there can be no combinations on the Y-axis either, as the price ratio cannot be 1.*

5.3   The relationship between judgement replacements and index changes

Not only the direction of changes follows a pattern, so does the magnitude of the index adjustment. In Chart 3 on the following page, the relationship between the ratio of prices of each item and its replacement, and the impact on the index movement (its judged pure price movement) is plotted for all judgement changes on occasionally purchased goods. There were a little over 32,000 cases during the six-year period. The average index ratio is calculated for all changes in each price range — in 5% increments up to a price ratio of 1.5 and 10% intervals above that. The first graph shows all cases together, and with clothing, the largest group, which accounts for just over 40% of all the changes. The second graph shows the relationship for three of the largest groups of commodities: "furniture and appliances", "sports equipment" which includes most of the recreation group, and "recreational equipment" which includes TVs, stereos, VCRs, and cameras (commodities that are highly influenced by advances in electronics).

It is clear that the larger the difference between the sticker price of an item and its replacement, the larger will be the change to the index. If the price of the replacement is 50% higher, the quality increase, on average, will be judged to be about 35%, and the index will increase 15%. If the price increase is 15%, the quality increase will be about 7% and the index will increase 8%. This shape holds for all commodities. For clothing, the line is a little steeper than for the others, but all lines tend to rise in approximately the same way.[19]

The reasons for this type of behaviour are not obvious at first. We would expect price changes and quality changes to be correlated with each other but there is no obvious reason why the residual, the index movement, should also be correlated. Splices would show as a flat line along Y=1. We might expect judgements to lie along another line, or for there to be no discernible pattern.

Two possible explanations come to mind. The first is that price collectors, and commodity specialists, for whatever reason, subconsciously trim observed quality changes. There is something reassuring in this; the price surveyors and commodity specialists are also consumers, and their own personal feeling that nothing is quite as good or as bad as it appears is probably shared by other consumers. Another explanation could be that producers and retailers, whatever the commodity produced or sold, may think that it is easier to pass along a real price (quality adjusted) increase with a large increase in quality and a significantly higher sticker price, than it is with a smaller one. It is more difficult though to see why they would combine a large real price decline with a large apparent one.

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[19]   *At the extremes, there is more noise; only 5% of price ratios are over 1.5. Recreational equipment in particular has a falling line at the right, but there are only 2% of its changes with a price ratio over 1.5 — 45 cases in six years. The other main group with a lot of changes — cars and vans — is not shown here; almost all its changes are within 25% of its previous price and within those boundaries, its relationship, when plotted, is indistinguishable from the others.*

Chart 3: Ratio of indexes to ratio of prices: judgements
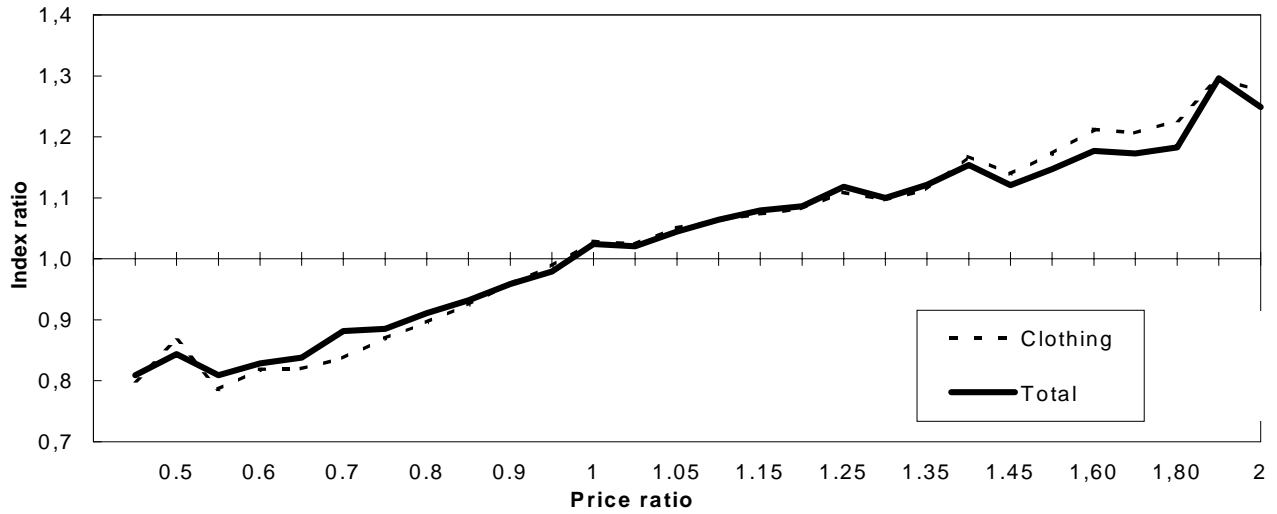
Distribution of price ratios   Count

Clothing   0.7 1.5 1.8 3.2 3.5 4.8 4.7 5.0 5.0 3.5 8.6 5.6 9.9 7.8 5.3 4.6 4.4 3.3 2.1 2.4 1.2 3.0 2.4 1.2 0.9 0.4 0.1 1.9   13,635

Total   0.6 1.2 1.3 2.4 3.0 4.2 4.8 5.9 7.2 6.0 6.0 10.1 11.6 8.4 5.2 4.1 3.4 2.6 1.7 1.6 0.9 2.1 1.5 0.9 0.7 0.3 0.1 1.4   32,488
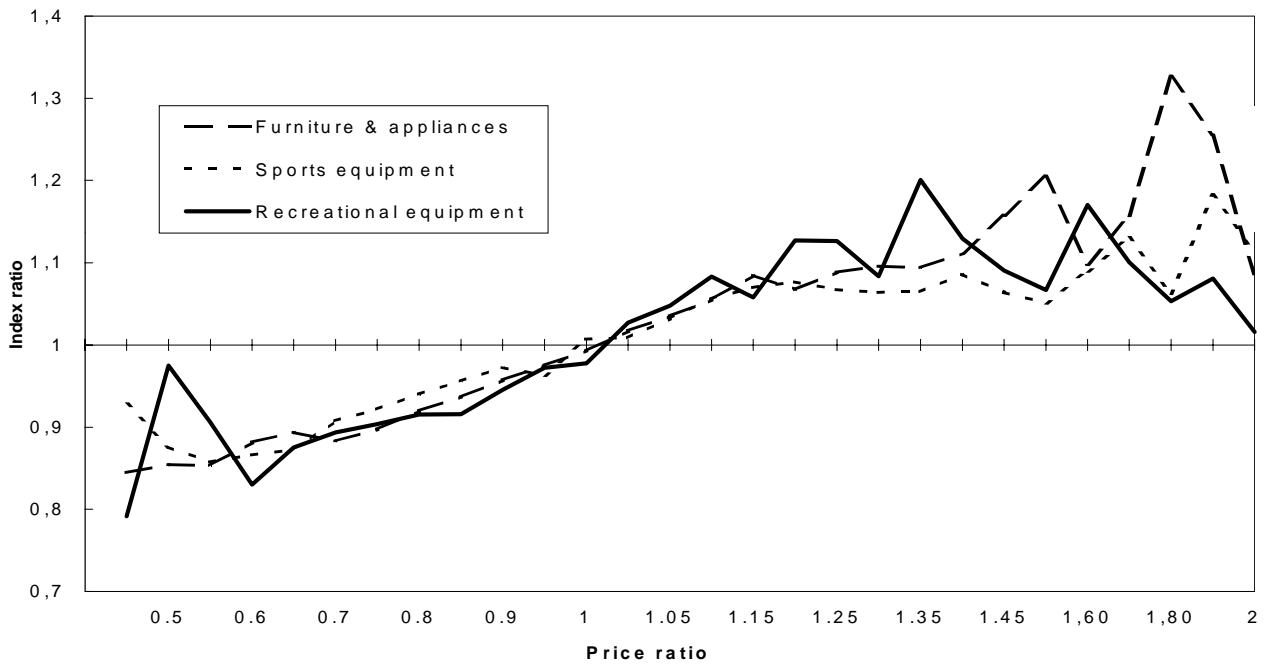
Distribution of price ratios   Count

Furniture Appliances   0.5 1.0 1.1 2.4 3.5 5.3 6.6 8.8 11.3 8.8 4.7 11.6 10.2 7.0 4.5 3.1 2.0 1.6 1.1 0.7 0.7 0.9 0.5 0.3 0.2 0.1 0.0 0.4   5,111

Sports equipment   0.6 1.6 1.3 2.8 3.5 4.4 5.8 6.8 8.1 6.4 5.6 6.9 9.4 7.3 5.1 3.9 4.2 3.2 2.4 1.6 1.0 2.3 1.7 1.2 0.8 0.3 0.1 1.1   5065

Recreational equipment   0.6 0.6 0.7 1.4 2.3 4.0 5.8 10.3 15.0 7.9 4.6 8.7 9.9 7.7 4.4 4.5 2.9 2.2 1.5 0.8 0.5 1.5 0.6 0.4 0.3 0.2 0.1 0.4   2258

For whatever reason, let us suppose that the judgements are correct. It follows that it is of paramount importance to ensure that the replacements are made consistently with the evolution of the market. If consumers are generally trading up in the market, then the replacement should generally be of a higher quality and price. According to statistics available for automobiles, this has generally been the case. In contrast, if, as it has been observed in recent years for many commodities, stagnant incomes in Canada have led consumers to find cheaper goods, the replacement should be generally cheaper.

Is it possible that in conducting the survey, the replacements reflected changes in the market? From the strict instructions given to price collectors this would seem unlikely. They are instructed to find an item satisfying the same specification, which probably is not up-to-date with recent market trends. They are also told to find a market volume seller. However, as the item being replaced is almost certainly not a volume seller by the time it is replaced, there are no guarantees that there will be a direct comparison.

Nonetheless, it is possible that replacements may still, in this narrower field, mirror market evolution. At present, we do not have not enough evidence to say. It can be said that over the six years under study, the net impact of judgement quality changes on commodity indexes at the Canada level has been small. This is only because there have been almost as many downward replacements as upward ones. The average price ratio of replacements is not far from "1" for most commodities, regardless of the fact that the price ratios of over half the replacements are more than 110% or less than 90%. For most commodities, although there is a wide range of replacements their impact tends to cancel out.[20] There are some commodities, though, for which this does not seem to be true, and we can only imagine the result if the same association between posted price change and index change holds in periods of steady inflation.

6.0   Conclusion

There is no justification to abandon all judgements only to rely on better-drawn matched samples. The ability to make small adjustments for occasionally purchased commodities is probably necessary. Clothing adjustments have not been shown to be wrong and with the rapid turnover in the sample of seasonal items, matched price samples would be very small. For that reason, it may be worth using regression methods to match characteristics. But, if we are putting faith in regression methods for clothing, it is inconsistent to continue imposing judgements. If the consumer cannot make an informed assessment of the total package, it is difficult to see how that consumer could assess the relative values and merits of the embodied characteristics within it. A hedonic price index should move in the long run like a matched sample. In any case, a good regression index requires a representative sample just as much as a conventional one does.

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[20] *The impact does not cancel out within each geographic stratum though. Index movements below the Canada level, for individual commodities, can vary widely because of the impact of one quality change adjustment.*

And since a regression index can put a value on a new characteristic no better than any other method, it is vital that new products, even those with little importance, be included in the sample as early as possible. Many will disappear quickly too, but no one can know which.

In summary, the performance of quality change assessment has shown some surprises. In a very large number of cases, the action mirrors closely an automatic matching of samples. In those cases where a judgement is applied, a pattern has emerged, that makes the result largely dependent on the price of the selected replacement. Because of the relatively even distribution of upward and downward adjustments, the impact of judgements on the index has been muted in the six years under study, but it may not have been in other economic situations. Furthermore, the measurement of the impact of quality change adjustments is compromised by a lack of current market data, which would guide us to the kinds of replacements that should be made. More attention to this would improve the quality adjustment process, as well as providing us with other benefits associated with developing a more diverse and more up-to-date sample.

Table 1: Incidence of changes for routine items

Basic group number	Title	Weight in 1986	Incidence of outlet losses (%)	Incidence of quality changes		% of quality changes that are splices
				All changes (%)	Judgement changes (%)	
1009	round steak	0.28	5.3	1.4	0.5	65.5
1011	sirloin steak	0.25	5.1	3.9	1.9	51.8
1013	prime rib roast	0.09	5.3	5.9	2.4	59.7
1015	chuck or blade roast	0.17	4.5	10.8	3.9	64.2
1017	stewing beef	0.05	4.6	2.0	0.2	89.1
1019	ground beef	0.44	4.3	2.6	0.9	65.6
1025	veal	0.09	4.0	17.1	3.4	80.3
1027	lamb	0.05	3.9	19.1	3.3	82.5
1033	pork loin chops	0.31	5.2	1.1	0.3	69.6
1037	boston butt	0.05	4.2	5.2	1.0	80.6
1045	beef liver	0.03	3.6	12.6	1.9	84.6
1053	chicken	0.48	4.2	6.1	0.9	85.7
1055	frozen turkey	0.08	4.1	17.2	3.1	82.3
1061	sliced bacon	0.15	4.6	13.0	0.9	93.4
1063	dinner ham	0.09	3.4	35.5	2.7	92.3
1069	pork sausage	0.12	3.9	18.0	1.4	92.1
1073	wieners	0.11	4.4	11.2	1.1	90.5
1075	salami sausage	0.17	3.7	19.7	1.0	95.2
1079	sliced cooked meats	0.24	4.4	17.3	0.7	96.0
1081	beef or chicken concentrate	0.06	4.5	10.2	0.7	93.3
1089	canned luncheon meat	0.05	5.1	6.7	0.2	97.2
1095	frozen cod fillets	0.07	4.8	19.6	6.4	67.2
1097	frozen sole fillets	0.09	4.9	21.2	7.2	66.2
1099	frozen haddock fillets	0.04	5.4	21.6	2.4	88.9
1113	fish sticks	0.01	4.8	7.6	0.5	93.2
1121	canned salmon	0.06	3.8	20.6	1.2	93.9
1123	canned tuna	0.05	3.9	24.7	1.5	93.9
1131	canned shrimp	0.05	5.7	18.2	0.6	96.5
1133	canned smoked oysters	0.06	4.5	15.7	0.6	95.9
1143	half and half cream	0.04	0.5	0.7	0.0	100.0
1145	homogenised milk	0.29	5.5	0.4	0.0	87.5
1147	2% milk	0.65	5.8	0.4	0.0	87.0
1151	yoghurt	0.11	n/a	8.7	0.9	89.2
1153	butter	0.19	n/a	6.8	0.8	88.9
1155	cheddar cheese	0.20	4.7	9.0	0.5	94.2
1159	processed cheese slices	0.19	4.9	6.2	0.5	91.2
1161	cottage cheese	0.04	4.5	11.1	1.5	86.8
1163	mozzarella cheese	0.22	4.4	16.1	1.0	93.8
1165	powdered skim milk	0.01	4.8	10.6	0.5	95.6
1167	evaporated milk	0.03	5.1	6.2	1.1	82.4
1169	ice cream	0.12	4.7	12.0	1.3	89.1
1177	eggs	0.21	5.3	0.6	0.3	58.3
1183	bread	0.47	1.5	7.5	0.7	91.3
1185	hamburger buns	0.18	4.7	11.7	1.2	90.0
1187	soda crackers	0.11	4.7	6.4	1.4	78.6

Table 1: Incidence of changes for routine items (continued)

Basic group number	Title	Weight in 1986	Incidence of outlet losses (%)	Incidence of quality changes		% of quality changes that are splices
				All changes (%)	Judgement changes (%)	
1189	cookies	0.23	4.2	10.9	1.2	88.8
1191	doughnuts	0.03	4.4	25.2	2.1	91.7
1195	bran muffins	0.17	4.5	4.2	0.6	87.0
1203	macaroni	0.09	5.0	8.8	0.9	89.4
1205	macaroni/cheese dinner	0.03	5.0	6.1	0.6	90.8
1209	long grain rice	0.07	5.1	6.3	0.4	93.9
1211	flour	0.06	4.9	8.1	0.5	93.6
1219	breakfast cereal	0.23	4.8	7.6	0.9	88.3
1221	cake mix	0.04	5.0	6.2	1.0	84.5
1229	apples	0.20	5.4	1.3	0.3	80.0
1231	bananas	0.15	5.6	0.4	0.2	42.9
1235	grapefruit	0.03	6.0	0.9	0.5	47.4
1237	grapes	0.13	3.3	11.3	0.1	98.8
1241	melon	0.05	10.6	2.2	0.2	89.1
1243	oranges	0.18	5.4	2.2	0.3	84.4
1245	peaches	0.05	20.2	0.5	0.5	12.5
1247	pears	0.04	5.6	1.0	0.3	70.0
1249	plums	0.02	20.4	0.1	0.1	0.0
1255	fresh strawberries	0.03	20.7	5.5	2.9	46.8
1269	seedless raisons	0.05	4.9	9.2	0.4	95.5
1277	canned apple juice	0.12	4.6	13.9	1.4	90.2
1281	canned orange juice	0.10	5.0	30.8	3.6	88.2
1287	frozen orange juice	0.14	4.9	8.0	1.2	85.5
1301	canned fruit cocktail	0.02	4.9	9.5	0.3	96.6
1305	strawberry jam	0.11	5.0	9.7	0.5	94.6
1315	shelled peanuts	0.08	4.9	20.0	1.2	94.1
1325	broccoli	0.05	0.6	7.2	1.2	83.8
1329	cabbage	0.03	5.5	3.7	0.6	82.7
1331	carrots	0.07	5.6	1.9	0.5	75.7
1335	celery	0.05	6.2	2.2	0.5	76.1
1337	corn	0.03	20.9	13.7	3.9	71.9
1339	cucumbers	0.05	5.3	2.4	1.3	48.0
1341	lettuce	0.12	5.5	3.7	1.6	56.0
1343	mushrooms	0.08	4.5	4.4	1.1	75.7
1345	onions	0.07	5.5	0.5	0.3	33.3
1349	potatoes	0.16	5.4	1.5	0.6	58.6
1355	tomatoes	0.17	5.2	1.9	0.8	55.0
1373	frozen french fries	0.08	3.8	4.7	0.3	92.9
1383	canned green beans	0.05	5.0	15.0	0.4	97.2
1385	canned baked beans	0.04	4.7	5.8	0.4	92.7
1393	canned corn	0.04	5.0	10.7	0.9	91.7
1397	canned peas	0.03	4.8	11.2	0.4	96.3
1399	canned tomatoes	0.06	4.5	9.5	0.5	94.4
1403	canned tomato juice	0.03	4.5	9.5	1.1	88.4
1409	pickles	0.06	4.9	11.8	1.0	91.3

Table 1: Incidence of changes for routine items (continued)

Basic group number	Title	Weight in 1986	Incidence of outlet losses (%)	Incidence of quality changes		% of quality changes that are splices
				All changes (%)	Judgement changes (%)	
1413	ketchup	0.04	4.6	12.5	1.2	90.1
1415	spaghetti sauce	0.11	4.8	13.3	1.3	90.4
1417	salad dressing	0.09	4.8	9.7	1.0	90.1
1421	black pepper	0.03	5.0	23.5	10.0	57.6
1427	white sugar	0.08	4.9	1.5	1.0	28.1
1435	candy bar, chocolate	0.22	19.4	12.1	0.7	94.4
1449	roasted coffee	0.13	2.9	3.7	0.8	79.7
1451	instant coffee	0.15	4.7	7.0	1.1	84.2
1455	tea bags	0.08	4.8	12.3	1.6	87.3
1461	margarine	0.12	4.8	14.2	1.8	87.4
1473	cooking or salad oil	0.07	4.9	7.9	0.8	90.4
1479	canned vegetable soup	0.14	5.2	5.9	0.7	88.7
1485	baby food	0.02	31.9	10.6	1.5	86.1
1489	infant formula	0.04	0.0	0.0	0.0	100.0
1495	frozen cake, iced	0.09	4.9	15.2	0.7	95.2
1497	frozen meat pie	0.05	4.9	8.9	1.6	82.4
1503	cocoa	0.06	4.7	3.7	0.6	84.6
1509	honey	0.03	4.8	12.1	0.5	95.9
1511	peanut butter	0.10	5.2	6.2	0.4	93.7
1517	fruit flavoured crystals	0.06	5.1	7.1	1.1	84.8
1519	table salt	0.03	5.0	2.5	0.0	96.2
1525	potato chips	0.16	5.0	14.8	1.8	87.9
1537	soft drinks	0.52	4.2	22.1	9.0	59.1
1717	snacks	0.68	19.1	26.4	8.4	68.0
1729	take home food	0.81	4.7	9.1	1.6	82.8
2041	fuel oil, furnace	0.48	3.7	1.5	0.1	91.7
2223	day care	0.58	4.7	2.7	1.4	47.4
2229	baby sitting	0.22	19.9	1.3	0.2	84.6
2231	house cleaning service	0.29	12.5	12.0	4.9	59.5
2235	canned dog food	0.29	5.0	17.4	2.7	84.6
2237	dry/moist dog food	0.22	5.0	14.0	1.7	88.0
2247	synthetic detergent powder	0.25	4.1	51.6	16.2	68.6
2249	dishwashing detergent	0.09	4.7	28.2	6.7	76.1
2251	dishwasher detergent	0.06	4.8	11.1	2.3	78.9
2257	scouring powder	0.12	4.5	4.3	0.6	84.8
2259	liquid floor wax	0.09	4.8	15.6	1.3	91.7
2265	liquid bleach	0.08	4.6	9.3	1.8	80.7
2267	liquid fabric softener	0.14	4.7	17.7 *	5.0	71.8
2275	paper towels	0.12	4.2	21.6	2.2	90.0
2277	tissues	0.36	4.4	16.2	2.1	86.7
2281	envelopes	0.05	7.1	31.9	7.3	77.1
2285	paper	0.11	4.7	14.7 *	1.0	93.0
2287	garbage bags	0.11	4.6	8.2	1.3	84.0
2289	plastic wrap	0.05	5.0	6.3	0.8	87.5
2291	aluminum foil	0.07	4.9	9.0	1.1	87.6

Table 1: Incidence of changes for routine items (concluded)

Basic group number	Title	Weight in 1986	Incidence of outlet losses (%)	Incidence of quality changes All changes (%)	Judgement changes (%)	% of quality changes that are splices
2309	light bulbs	0.09	5.1	33.7	6.7	80.0
2311	batteries	0.10	10.9	14.8	4.0	73.2
3713	sewing thread	0.03	7.5	4.4	1.4	69.2
3731	dry-cleaning	0.38	5.4	3.2	0.8	75.6
3733	coin-operated laundry	0.21	4.2	3.4	0.3	92.6
4019	auto fuel	3.76	10.4	2.2	0.1	94.4
4045	parking, hourly	0.14	5.5	2.6	0.6	76.2
5003	bandages	0.03	6.9	26.6	1.6	94.2
5005	pharmaceuticals	0.48	6.5	11.1 *	1.4	87.2
5015	soaking solution	0.05	6.8	0.3	0.0	100.0
5207	cleansing cream	0.17	6.8	32.2	1.8	94.5
5211	lipstick	0.09	8.0	14.0	2.3	83.2
5215	cologne	0.19	7.2	37.5	2.0	94.7
5221	shampoo	0.32	7.4	21.6	2.5	88.6
5229	deodorant	0.19	6.9	17.6	2.4	86.6
5231	shaving cream	0.08	4.5	11.2	0.8	92.6
5239	toothpaste	0.16	6.6	12.0	2.1	82.9
5243	toilet soap	0.12	6.5	32.3	2.1	93.4
5245	razor blades	0.05	6.5	15.1	0.7	95.3
5247	infants' disposable diapers	0.12	7.0	36.3	2.9	92.0
5253	sanitary napkins	0.16	6.5	31.1	9.1	70.8
6057	35 mm colour film	0.12	5.1	14.3	2.8	80.4
6059	35 mm colour film printing	0.27	8.2	14.2	8.9	37.6
6143	cassettes and CDs	0.30	17.6	10.3 *	6.3	38.9
6145	video tape	0.07	5.4	33.3	5.7	82.8
6151	movie cassette rental	0.15	6.1	20.3	1.2	94.0
6159	movie admission	0.20	7.5	3.3	0.3	89.5
6305	magazines	0.22	6.0	0.5	3.3	77.3
6307	books	0.25	5.2	0.4	0.0	96.8
7005	cigarillos	0.02	21.7	15.9	3.4	78.9
7007	cigarettes	1.89	13.7	9.1	3.5	62.0
7205	beer in licensed premises	0.87	8.7	10.6	2.8	73.7
7209	liquor in licensed premises	0.48	8.7	14.7	3.6	75.6
7213	beer at home	0.99	8.9	6.8	2.4	64.5
7215	wine	0.56	1.6	13.5	6.2	54.0
7217	liquor	0.85	1.3	9.5	5.7	40.2

* Indicates some diversity in the incidence of changes within sub groups of this basic group.

Table 2: Incidence of changes for occasional items

Basic group number	Title	Weight in 1986	Incidence of outlet losses (%)	Incidence of quality changes All Changes (%)	Judgement changes (%)	% of quality changes that are splices
1705	breakfast	0.28	13.1	11.6	2.4	79.0
1707	lunch	1.05	5.9	16.6	6.0	64.0
1709	dinner	2.22	7.5	34.7	13.7	60.5
2015	home maintenance	1.76	3.9	31.3 *	12.5	59.9
2055	hotel accommodation	0.42	8.3	6.4	2.3	63.8
2057	motel accommodation	0.41	11.1	3.9	1.9	50.0
2297	nursery shrubs	0.18	11.0	27.4	8.1	70.4
2299	flowers	0.19	9.5	20.5 *	8.0	61.1
2303	lawn fertiliser	0.08	12.2	38.1	12.6	66.8
2511	sofa	0.60	4.4	62.9	30.2	52.0
2517	bedroom suite	0.40	4.4	43.3	19.0	56.1
2521	dining room suite	0.27	3.8	49.0	23.1	53.0
2525	entertainment centre	0.24	3.8	30.6 *	9.0	70.5
2527	patio furniture	0.04	11.9	45.0	19.4	57.0
2531	mattress and boxspring	0.20	5.2	50.3	22.8	54.7
2539	curtains	0.17	7.2	27.5	12.7	53.9
2541	drapes	0.16	7.3	33.1	18.3	44.9
2547	bed sheets	0.11	4.9	46.1	22.0	52.2
2551	comforter	0.12	4.8	42.5	21.9	48.5
2555	bath towel	0.09	5.0	33.5	17.5	47.8
2559	broadloom	0.12	9.2	48.7	26.6	45.4
2583	refrigerator	0.29	4.8	75.3	42.1	44.1
2591	electric range	0.12	4.9	68.3	36.3	46.8
2593	microwave oven	0.23	7.3	72.4	31.8	56.0
2594	gas barbecue	0.05	5.6	53.0	32.6	38.5
2595	electric kettle	0.05	4.5	32.4	8.9	72.6
2605	food mixer	0.04	4.6	31.9	5.3	83.4
2611	automatic washer	0.18	5.0	63.7	33.2	47.8
2613	clothes dryer	0.11	5.0	68.1	38.1	44.1
2621	vacuum cleaner	0.20	6.8	51.3	21.0	59.1
2623	dishwasher	0.05	4.8	65.1	34.8	46.5
2633	cookware	0.08	6.3	40.3 *	9.6	76.2
2643	silverplated flatware	0.02	6.2	7.6	2.3	69.4
2645	stainless steel flatware	0.03	6.5	16.1	5.6	65.5
2647	bone china dishes	0.09	5.1	31.2 *	8.1	74.1
2649	crystal glassware	0.04	7.2	21.5	6.3	70.8
2655	power tools	0.10	15.8	30.1	9.3	69.3
2657	hand tools	0.15	9.9	18.5	2.9	84.3
2663	lawnmower, gasoline	0.23	13.5	50.1	30.0	40.1
2687	luggage	0.05	6.8	30.0	11.2	62.8
2701	appliance repairs	0.09	7.4	20.9	5.5	73.8
3007	women's fur coat	0.17	10.7	72.2	56.2	22.1
3009	women's winter coat	0.24	6.8	89.3	66.0	26.0
3011	women's raincoat	0.06	3.6	76.9	56.8	26.1
3013	women's blazer	0.09	8.3	67.2 *	40.2	40.2

Table 2: Incidence of changes for occasional items (continued)

Basic group number	Title	Weight in 1986	Incidence of outlet losses (%)	Incidence of quality changes		% of quality changes that are splices
				All changes (%)	Judgement changes (%)	
3019	women's dress	0.72	2.3	99.7	48.7	51.1
3025	women's slacks	0.28	6.4	64.8	37.4	42.3
3027	women's skirt	0.22	5.4	70.0	42.9	38.8
3029	women's blouse	0.34	3.9	96.9	47.1	51.4
3033	women's sweater	0.34	6.6	89.4	53.6	40.0
3039	women's bathing suit	0.18	9.2	93.5	63.6	31.9
3047	women's brassiere	0.12	6.6	29.4	12.5	57.6
3049	women's underwear	0.10	6.6	36.4	16.1	55.9
3051	women's pantyhose	0.24	5.6	23.9	10.5	56.1
3053	women's night-gown	0.07	6.2	82.3	47.5	42.2
3055	women's lounge gown	0.04	7.5	86.6	47.2	45.5
3059	women's gloves	0.04	4.5	63.0	30.8	51.2
3063	women's handbag, etc.	0.17	4.8	79.9 *	37.8	52.6
3069	women's wrist watch	0.06	5.8	61.0	30.8	49.5
3071	women's gold jewellery	0.38	9.5	32.6 *	14.0	57.0
3077	women's shoes	0.57	3.9	67.6	39.2	42.0
3203	girls' winterwear	0.08	3.2	40.2	28.6	28.9
3209	girls' sweater	0.10	6.6	90.8	50.5	44.3
3211	girls' socks	0.06	5.8	60.0	22.2	63.0
3215	girls' shoes	0.11	3.4	75.7	36.9	51.2
3307	men's coat	0.17	9.2	56.5 *	38.5	31.9
3309	men's raincoat	0.02	4.2	63.7	40.7	36.1
3311	men's golf jacket	0.08	5.6	74.3	44.9	39.6
3315	men's business suit	0.34	2.6	75.6	48.6	35.7
3317	men's sports jacket	0.13	3.3	45.4	29.7	34.6
3321	men's jeans	0.20	3.9	25.6	12.2	52.4
3323	men's dress/casual slacks	0.21	4.6	37.1	19.8	46.7
3327	men's dress shirt	0.20	5.1	40.9	23.6	42.3
3333	men's sweatshirt	0.18	4.0	65.3	37.7	42.3
3335	men's sweater	0.17	5.6	84.2	50.8	39.7
3337	men's socks	0.08	3.9	46.1	18.7	59.4
3339	men's briefs	0.08	5.2	23.0	11.1	51.7
3345	men's ski jacket	0.04	5.4	92.5	62.9	32.0
3347	men's swim trunks	0.07	4.5	63.0	35.4	43.8
3357	men's wallet	0.13	4.8	77.7	39.1	49.7
3363	men's wrist watch	0.15	5.1	68.2	31.4	53.9
3371	men's shoes	0.22	5.0	48.4 *	26.9	44.5
3373	men's work boots	0.09	9.3	26.5	12.0	54.6
3375	men's athletic shoes	0.09	3.6	65.3	39.6	39.3
3503	boys' ski jacket	0.05	7.3	90.2	61.4	31.9
3505	boys' jeans	0.09	5.5	40.3	20.9	48.2
3507	boys' shirt	0.07	6.6	80.4	45.5	43.4
3513	boys' shoes	0.08	4.7	65.0	36.2	44.3
3605	infant's sleeper	0.12	4.8	64.1	29.3	54.2
3705	knitting yarn	0.07	6.3	11.1	4.1	63.3

Table 2: Incidence of changes for occasional items (continued)

Basic group number	Title	Weight in 1986	Incidence of outlet losses (%)	Incidence of quality changes		% of quality changes that are splices
				All changes (%)	Judgement changes (%)	
3709	broadcloth	0.09	7.3	34.7 *	19.6	43.5
3715	zipper	0.03	8.0	16.7	4.7	72.0
3725	shoe repairs	0.04	6.5	2.9	0.2	92.9
4005	new car purchase	7.10	7.9	57.2 *	51.9	9.2
4007	new van purchase	1.01	5.0	77.9	65.8	15.5
4015	car rental	0.41	1.3	16.0	9.5	40.8
4023	automobile tire replacement	0.30	5.6	33.5	6.3	81.2
4025	car battery	0.05	6.4	22.1	3.3	85.3
4027	auto maintenance items	0.29	11.9	34.8 *	0.8	97.6
4031	oil change	0.02	16.6	23.4 *	0.4	98.2
4033	tune up	0.21	3.4	35.6	3.4	90.6
4035	auto repairs	0.76	3.5	36.2	3.2	91.1
4047	driving lessons	0.04	5.5	23.9	15.5	34.9
5009	eyeglass lenses	0.23	6.9	3.0	0.4	85.7
5011	contact lenses	0.02	6.7	4.9	1.5	68.9
5013	eyeglass frames	0.03	6.2	36.2	1.2	96.6
5023	dentures	0.14	5.4	5.9	3.0	49.0
5025	dental care	0.51	12.8	1.8	0.4	75.4
5249	portable hair dryer	0.02	4.9	46.0	5.7	87.6
5257	hairdressing	0.96	5.1	9.3	2.9	69.4
6007	golf equipment	0.06	10.2	32.1 *	21.8	32.2
6009	hockey equipment	0.04	10.6	48.2	36.0	25.2
6011	men's hockey skates	0.04	23.3	50.7	43.1	15.1
6013	alpine ski equipment	0.08	8.8	76.2	63.3	17.0
6015	cross country skis	0.02	27.7	51.6	37.7	26.9
6017	fishing gear	0.05	14.7	21.9 *	13.4	38.7
6019	sports equipment	0.14	12.7	57.3	34.4	39.9
6025	doll	0.09	8.9	54.1	34.8	35.7
6027	toys	0.09	9.6	51.0	36.5	28.4
6043	games	0.42	7.5	31.3	25.0	20.3
6049	camera	0.11	19.7	46.6	18.2	61.0
6075	sleeping bag	0.05	8.5	43.2	24.3	43.6
6087	travel trailer	0.11	9.3	39.3 *	31.9	18.9
6091	motorcycle	0.14	8.1	33.5	20.3	39.4
6099	boat	0.13	12.5	27.6 *	18.2	34.0
6101	bicycle	0.12	18.6	39.0 *	25.3	35.2
6127	portable radio/cassette player	0.12	8.7	65.4	19.6	70.0
6131	colour TV	0.33	14.7	56.0	23.2	58.5
6139	VCR	0.28	10.1	59.2	24.9	58.0
6141	stereo equipment	0.23	31.2	56.5	18.1	67.9
6153	VCR repairs	0.03	21.8	9.2	1.1	88.0
6179	golf membership	0.16	6.9	6.3	4.5	29.3
6181	bowling	0.03	4.5	1.8	1.7	7.7

Table 2: Incidence of changes for occasional items (concluded)

Basic group number	Title	Weight in 1986	Incidence of outlet losses (%)	Incidence of quality changes		% of quality changes that are splices
				All Changes (%)	Judgement changes (%)	
6189	fitness centre	0.23	5.1	13.3	7.1	46.6
6195	golf green fee	0.18	6.6	3.5	1.5	56.5
6201	alpine ski lift fee	0.17	1.5	15.5	7.5	51.9
6213	package holiday trip	0.84	10.6	32.8	31.2	4.9
6513	piano lessons	0.19	8.1	3.7	1.3	64.7

* indicates some diversity in the incidence of changes within sub groups of this basic group.

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