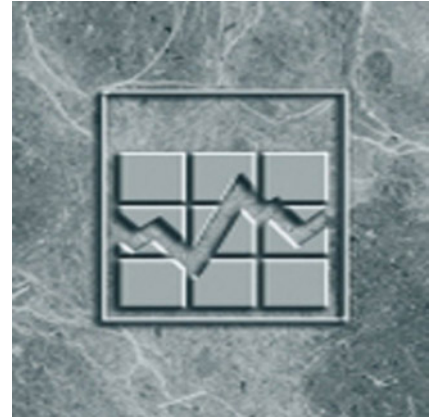## Research Paper

Household expenditures research paper series

Constant dollar adjustment of expenditure data from the Survey of Household Spending

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Note of appreciation

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Executive summary

It has been proposed from time to time that the Survey of Household Spending (SHS), and its predecessor Family Expenditure Survey (FAMEX), should present historical time series and comparisons in constant dollars (Champion, 1995, p. 69). This would make it possible to make comparisons of consumer expenditures over time with respect to a constant price base, and thus avoid making comparisons with the Consumer Price Index to see how changes in spending differ from inflation.

This discussion paper reviews the previous research into this subject and examines two principal methods of converting spending data into constant dollars. The purpose of this discussion paper is to show interested parties how the two methods differ in complexity of implementation and interpretation. We invite comments from interested readers on the relative merits of the approaches.

Most previous research here at Statistics Canada on using constant dollars for the expenditure surveys (Champion 1995, Genest-Laplante 1999, Poon, 2001) has focused on the method of converting each spending category time series into constant dollars by using an appropriate individual index for that particular category. This approach has always foundered on the problem of finding an appropriate index for each spending category. While useful in the context of the System of National Accounts, in the household expenditure context often there are inconsistencies in definitions between price indexes and expenditure categories, or an appropriate index is unavailable or even indefinable. As a result, no real progress has been made in producing these data.

This discussion paper will suggest that there are additional problems in using the standard constant dollar methodology in the context of a household expenditure survey, beyond the problem of finding an appropriately defined index. The rank order of budget items is not preserved with this method. The budget percentage of the item is also not preserved. More importantly, the resulting trend in the constant dollar time series may be misleading in the household budget context.

The method that is proposed instead is to produce household expenditure time series in terms of "inflation adjusted" dollars. This method uses the Canada-level Consumer Price Index All-items index to adjust all spending figures. This adjustment technique preserves rank order and budget percentage of spending items. It is also relatively simple, easy to understand and apply, and does not require the research and calculation of special new index numbers. It can be used easily at aggregate or detailed levels without undue complication. It is already the method used by the U.K. Office of National Statistics. The Canada-level all-items index is suggested because, although provincial level all-items indexes are available, the differences are small and also there are no completely appropriate price indexes for the three territories at this time.

Background

The Survey of Household Spending (SHS) is an annual survey of private households which collects detailed information on annual expenditures for consumer goods and services, household equipment, and changes in household assets and liabilities. It is used to measure consumer spending as part of the System of National Accounts, to measure the living standards of different households, and to periodically update the weights of the Consumer Price Index. As such, a major purpose of the survey is to estimate how much households allocate their budgets to different consumer goods and services.

The SHS was first conducted in 1998 for the 1997 reference year. It replaced the Family Expenditure Survey (FAMEX) which, prior to 1998, had been run every two to five years since the 1960s to measure household living standards and to update the Consumer Price Index weights. The Survey of Household Spending data, like the FAMEX data before it, are published in current dollars (C$). It has been suggested from time to time that it would be desirable to make comparisons between years in constant dollars (K$) (Champion, 1995, p. 69).

Constant dollar adjustment – Why do it?

The basic idea of constant dollars is to eliminate the effects of price changes, in order to allow comparisons to be made between years without having to take into account the effect of inflation. Consider the following example: if average prices double between two periods to be compared, and consumer spending also doubles, then the real quantity of goods and services purchased may not have changed and the whole doubling of spending could be attributed to inflation, rather than any increase in household living standards.

This effect is particularly important when the years to be compared are far apart, and significant changes in average price levels have occurred. However, the practice for FAMEX and the SHS has been to present the data in current dollars only. For FAMEX, the reason for this at the time was that the series was irregular and the content and geographical coverage varied over time. Intervals between surveys ranged from two to four years, and geographic coverage since 1969 ranged from eight cities to all areas of the country (Champion, 1995, p. 69). Since the FAMEX data were used primarily for cross-sectional studies, it was felt that a constant dollar series, however constructed, would be of limited usefulness. It was also felt that the personal expenditure data from the System of National Accounts in constant dollars filled all needs for trend analysis. However, since the SHS has been an annual survey since 1997, with a more consistent geographic coverage and content, the time may have come to revisit this issue.

This discussion paper reviews the previous research into the subject of constant dollars and examines two methods of converting spending data into constant dollars which have been commonly used. The purpose of this discussion paper is to show interested parties how these two methods differ in complexity of implementation and interpretation. We invite comments from interested readers on the relative merits of the approaches as well as the merits of retaining the

status quo of publishing results in current dollars only. There may be arguments for continuing to produce time series in current dollars and allowing users to make their own adjustments as they see fit.

This paper will examine two methods of adjusting household expenditure data for inflation, which we will call the Individual Index Method and the Inflation Adjusted Method.

Individual Index Method

The first method, which has been the standard method proposed in previous studies of constant dollars for expenditure surveys (Champion 1995, Genest-Laplante 1999, Poon 2001), is to adjust each spending category by an appropriate price index for that category, i.e. food spending is adjusted by the food price index, shelter spending by the shelter price index, and so on.

The advantage of this method is the usefulness of the interpretation of the resulting time series. What this method does is to transform each expenditure time series from a total value (price * quantity * quality) series into a (quantity*quality) consumption series. If the index has been correctly constructed, all the effects of price change will be removed by the price index and the constant dollar figure will reflect only changes in the quantity and quality of the good or service consumed. This is precisely the method used in the System of National Accounts to track changes in real output in the economy.

The difficulties with this method in a household spending context are the following:

First, there needs to be a well defined price index which is equivalent to each spending category to be adjusted. This is the roadblock that previous studies have run up against repeatedly: the mismatch at the detailed level between spending categories and the available price indexes. Most of the previous constant dollar studies have recommended the production of new or special price indexes to deal with this problem. Sometimes this is a problem of definitions. For one example, in the SHS, health care expenditures include mostly out-of-pocket expenditures for care that are not covered by public or private insurance, while the CPI price index for health care represents the entire price of health care items sold at a retail level. Sometimes, the problem is that there is no well-defined or even a meaningful price index for an expenditure category, such as personal taxes or RRSP contributions, or games of chance. Appendix 2, excerpted from the paper of Éric Genest-Laplante (1999), contains a detailed examination of the problems of matching SHS spending categories with CPI categories.

The second problem is that constant dollar time series using individual price indexes do not preserve the rank order or percentage of total budget for the spending categories in years other than the reference year.

Third, although the resulting quantity-quality consumption trend is very useful for certain kinds of analysis such as that done in the System of National Accounts, it can present problems when analyzing household budgets, which is one of the principal purposes of the SHS. If the price of a particular good or service doubles and average household spending on this category doubles, it may be misleading to state that in constant dollars no change has occurred at the household level, if households have re-allocated their budgets to accommodate this price change. The dollar figures for each category are not equivalent or interchangeable between spending categories. Examples of the issues that arise with this method in a household expenditure context will be shown in the numerical examples below.

Inflation Adjusted Method

The second method is one that can be called "inflation adjusted dollars". In this method only the all-items price index is used to adjust every spending category. This is done by choosing any base year for comparison, often the current year, and dividing the expenditures for every category by the all-items price index relative to the base year.

The advantages of this method are that it preserves the rank order and percentage of total spending of each category; and since all values are divided by the same adjustment figure, it can be applied to all categories of spending whether or not they have a meaningfully defined individual price index. It is well suited to a budget-allocation analysis of spending, where all dollars are treated as equal and interchangeable between categories of goods and services, and where the percentage of total spending devoted to a category is of interest. It is easy to calculate and apply.

Another advantage is that for years that are very far apart there may be great changes in the categories of goods available, i.e. new categories may come into existence while older ones disappear. This method can still be applied in these cases.

The main difference in this method is the meaning that can be attributed to the time series of any individual spending category. It is not to be interpreted in terms of quantity consumed, but rather in terms of how much reference year purchasing power is spent on the category.

Example of the two methods using SHS data

The application and difference between these two methods will be illustrated using examples for three SHS spending categories with different trends in spending and prices: computer hardware, tuition fees, and tobacco products. These have well defined indexes that can be applied to the category, but bear in mind that this is not true for all household expenditure categories. Table 1.1 presents the original SHS data, showing unadjusted average annual spending per household in current dollars.

Table 1.1
SHS average annual expenditures for tuition fees, tobacco products, computer equipment and supplies, current dollars (C$), 1997-2002

	1997	1998	1999	2000	2001	2002	1997-2002 change %
Tuition fees	460	492	534	587	648	647	40.7%
Tobacco products and smokers' supplies	551	558	546	541	611	728	32.2%
Computer equipment and supplies	299	318	322	364	353	341	14.2%

Source: Statistics Canada [2]

This shows three broad trends: from 1997 to 2002, in current dollars, average household spending on tuition fees rose by 41%, average spending on tobacco increased 32%, while average spending on computer equipment rose by 14%.

Example using the Individual Index Method

Table 1.2 shows the Table 1.1 current dollar SHS data adjusted into constant dollars using the Individual Index Method. See Appendix 4 for details of the calculations involved.

Table 1.2
SHS average annual expenditures for tuition fees, tobacco products, computer equipment and supplies, 2002 constant dollars (K$), Individual Index Method, 1997-2002

	1997	1998	1999	2000	2001	2002	1997-2002 change %
Tuition fees	608	598	605	631	674	647	6.50%
Tobacco products and smokers' supplies	934	894	854	807	806	728	-22.00%
Computer equipment and supplies	98	133	184	249	288	341	247.80%

These time series should be interpreted as showing changes over time in the quantity and quality of these items purchased by households. This constant dollar time series can be interpreted as an indication of "how much" of a category the average household bought in comparison to the reference year.

For example, consider computer equipment and supplies. The constant dollar time series showed an increase of 247.8% compared to the increase of only 14.2% in current dollars. This means that the average household bought almost 250% more computer power in 2002 than in 1997. Alternatively, you could say that the amount of computer power the average household purchased in 1997 could have been bought in 2002 for $98.

Consider tobacco products and smokers' supplies. Although the current dollar time series showed an increase in spending of 32% over the time period, the constant dollar series showed a decrease of 22% over this same period. This means that the average household bought 22% less tobacco product in 2002 than in 1997.

In current dollars, average spending on tuition fees showed an increase of 41%. After adjusting by the tuition index, spending in constant dollars showed an increase of only 6.5%. This would indicate that households were consuming only slightly more education (in some sense of quantity and quality) over this time period.

This interpretation of the time series is interesting and useful and is what is done in the System of National Accounts in order to track changes in real output of the economy. However, this interpretation presents challenges in the context of a household budget survey.

First of all, it may be misleading in the context of household expenditures to say that average spending on tuition has remained the same, or that average spending on tobacco products has declined. It may be true that the quantity of tobacco consumed has gone down, but if the price increases faster than the average rate of inflation, then this may have an affect on how households budget their spending.

The match between the spending category and the price index must be particularly exact for this interpretation to hold. In the case of computers, the price index is a hedonic index modeling the combination of features such as memory and speed that make up the most useful aspect of a computer's utility (Barzyk, 1999, Statistics Canada [6]). The SHS spending category includes both hardware and peripherals, and a shift over time in the proportion of spending on these two sub-categories might make this interpretation inappropriate.

Another issue is that the ranking for spending categories is sometimes changed. In the current dollar data, in 2000 and 2001, households spent more money on tuition than on tobacco. In constant dollars for those same years the order is reversed and households seem to have spent more on tobacco than on tuition.

The percentage of the household budget that is devoted to a particular spending category is also affected by this method of conversion into constant dollars. For example, households spent on average 0.6% of their budget on computer equipment in 1997 current dollars. In constant dollars, households spent only 0.2% of their budget on computer equipment in that year.

Example using the Inflation Adjusted Method

The second method of adjusting the spending data into constant dollars we shall call the Inflation Adjusted Method. In its simplest form, the Canada-level all-items price index is used to adjust every spending category. This is done by choosing the base year for comparison (in this case 2002), and dividing the expenditure for each category by the Canada-level all-items price index relative to the base year.

With this method each year is scaled by a constant factor reflecting the average effect of inflation relative to the reference year.

Table 1.3
SHS average expenditures for tuition fees, tobacco products, computer equipment and supplies (K$), Canada-level CPI all-items Inflation Adjusted Method

	1997	1998	1999	2000	2001	2002	1997-2002 change %
Tuition fees	509	539	575	616	663	647	27.20%
Tobacco products and smokers' supplies	610	612	588	568	624	728	19.50%
Computer equipment and supplies	330	349	346	382	360	341	3.20%

In this table, the spending on computers in 1997 is $330, rather than $98 in the Individual Index Method. The increase in spending on computer equipment from 1997 to 2002 is 3.2%, rather than 250% using the Individual Index Method. This figure can be interpreted as showing that spending rose by 3.2% more than the average effect of inflation. In contrast, spending on tobacco was up almost 20% above inflation effects, and tuition spending increased by 27.2% after taking the average rate of inflation into account.

The advantages of this method are that it preserves the rank and percentage of total spending for each category, it is easy to calculate and apply, and since all values are interpreted as representing a quantity of purchasing power, rather than a specific quantity of good or service, it can also be applied to all categories of spending whether or not they have a meaningfully defined individual price index. It is well suited to a budget-allocation analysis of spending, where all dollars are treated as equal and interchangeable between categories of goods and services, and where the percentage of total spending devoted to a category is of interest.

It is therefore proposed that if it is decided to publish constant dollar figures for the Survey of Household Spending, then the Inflation Adjusted Method be

adopted as the preferred methodology. Readers of this paper are invited to submit their opinions on this conclusion to the Income Statistics Division.

Provincial level expenditure data

The SHS produces provincial estimates as well. There can be differences in the inflation rate in different provinces. Since provincial average spending figures per household are not directly additive to national figures in the spending tables, either the national CPI all-items index or individual provincial all-items indexes could be used. However, there are no territory-wide indexes produced for the three northern territories. Rather, indexes for Whitehorse and for Yellowknife are available. These can be used as approximations for territorial indexes, but this is not altogether adequate. There will be an index created for Iqaluit, but as of yet there is no local price index for use in Nunavut.

Table 1.4 shows the two methods side by side for each year. For most provinces the difference in average spending is relatively small, around 1% or less. The largest discrepancy is in Alberta and British Columbia, with a 2.8% and 3.0% difference between the provincial-level adjustment and the Canada-level figure, due to different average inflation rates. The Yukon and NWT provincial-level adjustments are based on the indexes for Whitehorse and Yellowknife alone, and are only approximations.

Because the differences are small between the two methods and because indexes are not yet well defined for the Northern Territories, it is proposed to use the Canada-level price index. Users are invited to comment on this decision as well.

Table 1.4
SHS average total expenditure by province, comparing constant dollars using the CPI Canada level all-items index and provincial all-items indexes, in 2002K$, 1997-2002

	1997		1998		1999	
	Canada	Provincial	Canada	Provincial	Canada	Provincial
Newfoundland and Labrador	42,599	41,757	44,838	44,279	45,595	45,148
Prince Edward Island	46,094	46,061	46,349	46,967	48,575	49,477
Nova Scotia	46,362	46,587	47,085	47,445	49,087	49,507
New Brunswick	45,868	46,013	45,119	45,428	47,942	48,350
Quebec	47,772	47,561	48,114	47,665	50,319	49,970
Ontario	61,083	61,476	61,797	62,196	62,990	63,286
Manitoba	51,020	50,886	50,823	50,527	52,926	52,516
Saskatchewan	48,877	49,564	49,014	49,491	50,218	50,732
Alberta	60,699	62,252	61,742	63,217	63,501	64,581
British Columbia	58,201	56,559	58,861	57,575	58,965	58,052
Yukon Territory	66,192	64,099	64,236	62,160	64,256	62,647
Northwest Territories	71,612	69,535	78,565	77,067	85,206	84,187
Nunavut	..	..	49,076	..	50,381	..
Canada	55,194	55,194	55,807	55,807	57,308	57,308

	2000		2001		2002		% Change, 1997-2002	
	Canada	Provincial	Canada	Provincial	Canada	Provincial	Canada	Provincial
Newfoundland and Labrador	45,172	44,606	47,486	47,584	47,965	47,965	12.60%	14.90%
Prince Edward Island	47,021	47,257	47,801	48,021	48,065	48,065	4.30%	4.40%
Nova Scotia	50,629	50,657	49,773	50,151	51,243	51,243	10.50%	10.00%
New Brunswick	49,128	49,267	48,454	49,007	50,039	50,039	9.10%	8.70%
Quebec	50,461	50,261	51,094	50,993	51,213	51,213	7.20%	7.70%
Ontario	65,527	65,727	65,523	65,399	67,538	67,538	10.60%	9.90%
Manitoba	52,545	52,238	52,739	52,396	53,129	53,129	4.10%	4.40%
Saskatchewan	48,948	49,486	49,338	49,624	51,365	51,365	5.10%	3.60%
Alberta	64,841	65,426	66,979	67,752	67,727	67,727	11.60%	8.80%
British Columbia	58,188	57,751	58,414	58,477	60,596	60,596	4.10%	7.10%
Yukon Territory	..	..	64,671	63,691	..	..	…	…
Northwest Territories	..	..	69,512	69,979	..	..	…	…
Nunavut	..	..	54,171	..	..	..	…	…
Canada	58,309	58,309	58,766	58,766	60,090	60,090	8.90%	8.90%

Recommendations

Most investigation at Statistics Canada into the method of converting Survey of Household Spending expenditure time series into constant dollars has used the Individual Index Method for each spending category. This has always run up against the problem of finding an appropriate index for each spending category. Often there are inconsistencies in definitions, or an appropriate index is unavailable or even indefinable. As a result, there has been little progress in publishing useful constant dollar data for the SHS.

This paper suggests that even if there were appropriate indexes for all categories, there would be additional problems with using the Individual Index Method in the context of a household budget survey. The rank of spending categories is not preserved with this method. The budget percentage of the item is also not preserved. More importantly, the resulting constant dollar time series may be misleading in a household budget context. An alternative technique is the Inflation Adjusted Method. This adjusts all spending categories using the Canada-level all-items price index. This method preserves the rank and budget percentage of spending items.

This discussion paper invites interested readers to comment on the proposal to use the proposed Inflation Adjusted Method as the preferred method for reporting constant dollar time series for the Survey of Household Spending.

Options

There are three main questions to be addressed. First, is it necessary to produce a constant dollar time series for the SHS in the first place? Secondly, if so, then what methodology would be preferred? Two are proposed, called for the purpose of this paper the Individual Index Method, and the recommended Inflation Adjusted Method. Are there other alternatives? Thirdly, if the Inflation Adjusted Method is adopted, do readers agree with the recommendation to use the Canada-level price index, rather than the provincial indexes?

How to comment

Those who are interested in expressing their opinions on the options listed above are invited to send their comments by December 31, 2005 to:

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Appendix 1

Review of previous work

There have been a number of investigations of this topic over the years. I will refer to the results of three of these papers, which have thoroughly covered the theoretical terrain before, without duplicating the work here.

Harry Champion (1995; FAMEX Reference Paper) discussed the considerations that led to the decision to not calculate constant dollar figures for FAMEX. This was partly the result of FAMEX being an ad hoc survey with varying intervals and coverage, so no meaningful time series would result in any case. The Personal Consumption Expenditure series in constant dollars produced for the Income and Expenditure Accounts Division (IEAD) was considered to be sufficient for the study of trends. Another consideration at that time was the absence of proper price indexes for many of the expenditure categories. In addition to the lack of correspondence in definitions of groupings, the geographic coverage of FAMEX varied from eight urban areas to the whole country.

Éric Genest-Laplante (1999: Deflation of HRRS and SHS Expenditures) covered the issue of matching SHS expenditure categories to CPI categories in great detail. The new SHS did not have the ad hoc nature of FAMEX, so the possibility of producing constant dollar figures was re-investigated. He has provided the most thorough review to date of the relationship between the categories of the Consumer Price Index and the SHS.

His conclusion was similar to Harry Champion's conclusion; in that the biggest obstacle to the production of constant dollar figures was that the price indexes for many of the expenditure categories would require research or were problematic to define. Some items of current consumption such as games of chance and various insurance payments did not have counterparts in the CPI. In particular, the items that make up the difference between total current consumption and total expenditure (personal taxes, personal insurance payments and pension contributions, and gifts of money and contributions) account for nearly 30% of total expenditure and none has an index available without a great deal of further research.

Even in those categories that seem to line up, there are more than a few theoretical difficulties. For example, the SHS category "Health Care" consists largely of those out-of-pocket expenditures not covered by insurance, while the CPI category is designed to estimate the total price of those expenses which consumers see at the retail level.

Preston Poon (2001) also studied the use of individual price indexes for constant dollar estimation and reached a similar conclusion to that of Éric Genest-Laplante.

Appendix 2

Detailed comparison of available price indexes with SHS expenditure categories

(from "Deflation of HRRS and SHS Expenditures", By Éric Genest-Laplante, 1999)

Note: This is an extract from a Statistics Canada staff report entitled "Deflation of HRRS and SHS Expenditures" by Éric Genest-Laplante, which addresses in considerable detail the issues involved in aligning SHS categories with Prices Division indexes.

SHS expenditure categories

The structure of expenses in SHS consists of 16 main groups of current consumption expenditure plus 3 more groups of expenses. For several groups, there exists an index produced by the Prices Division that bears the same name as the SHS category. This is no coincidence since most of the CPI weights are directly derived from the SHS (see Statistics Canada, [4], chap. 6). In the following pages, we look at each group in turn. The process we follow is to compare the composition of the Prices Division index to the composition of the corresponding SHS group, whenever possible. If not, we underline the difficulties that we may encounter and/or indicate tips or suggestions for further research.

Food

There is little confusion about what should be designated as food. There exists a readily available index that could be used to deflate expenditure. For further needs, indexes also exist for food in stores and food in restaurants, as well as indexes for a wide variety of food categories.

Shelter

The Prices Division composite index for shelter includes three main subcomponents. Those are: *Rented accommodation* (26.8%),[1] *Owned accommodation* (55.9%) and *Water, fuel and electricity* (17.3%). The first and third subcomponents correspond to the main expenditure subcategories of the SHS *Shelter* group.

However, there are some differences affecting the *Owned accommodation* subcomponent. First, only mortgage interest cost is included in the Prices Division index while interest and principal are both included in SHS (new in 1997). Second, the Prices Division index includes a *Replacement cost* component which has no correspondence in SHS because it is a hypothetical amount, close to the concept of amortization. Third, SHS *Shelter* now excludes the interest portion of irregular and/or lump sum payments and money borrowed

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1. For weightings of components in the various indexes to be discussed, see [4] and [8].

against home equity. Finally, SHS *Shelter* excludes mortgage interest for vacation homes.

It should be noted that IEAD uses a combination of the CPI and suppliers' survey data in deflating energy (fuel and electricity). IEAD reports that it is more reliable than using FAMEX weights.

Household operation

There exists a composite index for *Household operations and furnishings*, but also one separate index for each group. Though the subcategories are not exactly the same, the Prices Division aggregate index for *Household operations* seems to cover the same goods and services as in SHS, except maybe for a few minor components, like purchase of telephones and such related matters.

Household furnishings and equipment

No difference is detectable between this SHS expenditure group and the Prices Division *Household furnishings* subcategory. The latter is mainly composed of *Furniture and household textiles* (49.0%) and *Household equipment* (42.5%).

Clothing

Almost all the subcomponents of SHS *Clothing* can be found in the composite Prices Division index for *Clothing and footwear*. The exceptions may be the gifts of clothing, but they are treated separately below. We should note that there are now fewer subcomponents in SHS than in the Prices Division index, due to the reduction in the number of questions, though this does not affect the choice of an index.

Gifts of clothing

No index exists at this time for this specific group. At first sight, it seems quite plausible that one can use the index retained for clothing. However, the Prices Division index for clothing includes a subcategory named *Clothing materials, notions and services*, which constitutes about 9.4% of the composite Prices Division index. Materials and services are unlikely to be given as gifts, so the corresponding shares of these components should be excluded. Apart from that, there is no evidence that some clothing goods are more likely to be given than others.

Transportation

There are no significant differences between the composition of the Prices Division *Transportation* index and the SHS corresponding group. The two main components for both of them are *Private transportation* and *Public transportation*, whose weights in the Prices Division index are about 91.5% and 8.5% respectively.

The problem in constructing a reliable index is, however, more complex than it appears. Indeed, the Prices Division index for *Transportation* does not account for all the subtleties of the reality. Here are some of them: first, there is no separate index for used cars or for new cars, both being aggregated into one index. Second, there are some problems with long-term leasing. Third, air transportation, which represents about 50% of public transportation, is hard to evaluate because of the discount policies practiced by airlines.

Health care

In the Prices Division index for Health care, there are two subcategories, that is, *Health care goods* and *Health care services*, whose shares in the composite index are respectively 40.3% and 59.7%. The SHS *Health care* group has also two subcategories: *Direct costs to households* (71.6% of expenses in 1997) and *Health insurance premiums* (28.4% of expenses).

Unfortunately, the first SHS subcategory comprises both Prices Division goods and services, while SHS *Health insurance premiums* have no counterpart. The fact is that health insurance premiums are not included in the CPI because, in some provinces, services resulting from these premiums are completely financed by taxes and hence are treated as a public service. In other provinces, households do pay health insurance premiums, but these cannot be connected with any specific quantity or quality of the services rendered. Prices Division does not calculate a separate index for this category.

Another problem that must be taken into consideration concerns health care goods (even charged directly to households). For example, if posted prices of medicinal and pharmaceutical products go up and the health insurance coverage also increases, the prices paid by the household would remain the same. Such problems are commonplace when insurance topics are involved, so one should be very cautious when attempting to find a suitable deflator.

Personal care

Overall, the SHS and Prices Division Personal care groups are equivalent. The *Personal care supplies and equipment* component counts for about 62% of the composite index while the share of *Personal care services* component is 38%.

Recreation

Although the SHS expenditures are a lot more detailed than their Prices Division counterparts, it appears that the *Recreation* categories are equivalent. In Prices Division system, there are four main subcategories: *Recreational equipment and services* (24.0%), *Purchase and operation of recreational vehicles* (12.5%), *Home entertainment equipment and services* (18.2%) and *Travel services* (19.7%).

Reading materials and other printed matter

Here again, SHS expenditures are more detailed. Furthermore, they include services like duplicating or library fees, while those are not included in the corresponding Prices Division index. However, as it can be seen by looking at the 1997 SHS and 1996 FAMEX data, services represent only a small part of the total expenses in this category.

Education

The *Education* categories in SHS and in the Prices Division index seem equivalent. On one hand, even if it is difficult to know with precision what is included in the *Other lessons, courses, and educational services* component of the Prices Division index, chances are good that it corresponds for the most part to what is included in *Other courses and lessons* and *Other educational services* subcategories of SHS. On the other hand, its share in the parent category is only between 10% and 15%.

Tobacco products and alcoholic beverages

The SHS and Prices Division index categories are almost identical. The only exception is the SHS *Self-made alcoholic beverages* subcategory, but it accounts only for a tiny fraction (less than 5%) of the SHS parent category. Note that the two subcategories have almost the same share in the composite Prices Division index, with a slight predominance of *Alcoholic beverages* (52.8%).

There is conflicting evidence on whether FAMEX and SHS underestimate expenditure on tobacco and alcoholic beverages.

Games of chance

This is a new separate category in the 1997 SHS. No index is currently being produced by Prices Division, but IEAD models the deflation of this category on the method used to deflate insurance, by using the CPI and a prizes-to-stakes ratio.

Miscellaneous

This SHS group has no counterpart in Prices Division. It is composed of several subcategories, none having an associated index. Based on 1997 SHS expenditures, the most important of them are (with shares of total miscellaneous in parentheses): *Financial services* (30.1%), *Dues to unions and professional associations* (22.6%) and *Legal services n.e.s.* (16.4%). Note that IEAD refers to administrative data in order to deflate financial and legal services.

Non-money gifts

Prior to 1997, data on gifts were collected in two categories: money and non-money. Beginning with 1997 SHS, data on non-money gifts are collected within

each category and are not separated from other expenses, except for clothing. Money gifts are still collected separately.

While the non-money gifts category becomes useless with the new scheme, it is still needed when one wishes to compare historical data. However, these gifts may be of any kind, and so the only realistic index we can use to deflate this category is the CPI itself. The problem is that the weighting of the CPI does not necessarily reflect the actual shares of each gift.

Total current consumption

This aggregate is the sum of expenses of all 16 above categories. As we have seen, most of these expenditures are included as components of the CPI. Also, we do know that there are some notable exceptions: *Games of chance*, *Miscellaneous* and part of *Health care* categories. However, the first two of them represent only 0.5% and 1.6% respectively of total current consumption according to 1997 SHS. The *Health care* component represents 2.3% of the total current consumption, but the part of it that is not taken into account in the CPI is about 0.7%.

Total Expenditures

To obtain total expenditure, there are three more expenditure groups that are considered in SHS: personal taxes, personal insurance payments and pension contributions, and gifts of money and contributions to persons outside households. Though there does not exist readily available indexes for those categories, there are some suggestions that can be made in order to direct possible research.

Personal taxes

This is a complex matter since many factors contribute to change the level of personal taxes, among others tax legislation or household income. As a first step, it would be a good idea to look at changes in legislation over the years, in order to get a comprehensive understanding of the context. A further investigation could be made by looking at administrative data.

Personal insurance payments and pension contributions

This category has four main components. For two of them, representing about 80% of the category's expenses, information is at least partially available. For *Employment insurance premiums*, it is possible to trace back changes in the legislation. Information concerning *Retirement and pension fund payments* can be collected from some sources, at least for Canada and Quebec pension plans (Statistics Canada [9], [10]), and for other pension plans. Of course, one must integrate this information and collect information from other sources to construct an index, but these are good starting points.

For *Life insurance premiums*, information should be collected directly from the sources, that is, insurance companies. It could be a lot more difficult to find reliable information about *Annuity contracts and transfers to RRIFs.*

Gifts of money and contributions to persons outside households

The first component of this group is *Money and support payments.* About 88% of this, according to the 1997 SHS, consists of pension payments to persons living in Canada. A good index for that could be the CPI, since pensions could serve any purpose. However, about one-third of the expenditure in the aggregate group falls in the second component, *Contributions to charity.* More investigation is thus necessary.

Insurance

Insurance can be seen in two different ways. If it can be related to a specific good, like a car or a house, it is usually incorporated as an integral part of the cost of owning or renting the associated good. In this case, an index for insurance can be found (in fact, it is the same as the one for the associated good).

If it cannot be related to specific goods or services, this often means difficulties. Examples include health insurance, but also life insurance and disability insurance. As we have seen, there is no easy way to handle such a problem and some research has still to be done. Yet IEAD has managed the problem in its own way, by using a benefits-to-premiums ratio (Statistics Canada [8]). Details about this method can be obtained from IEAD.

Total expenditure

The problem of finding a suitable index for this category is pretty much the same as for **Total current consumption**. We have only added to the previous difficulties: indeed, the three above categories have a combined share of 29.3% in 1997 SHS total expenditure, and none of these has a readily available index.

Correspondence between the CPI and SHS goods and services

The coverage of the SHS is more extensive than the coverage of the CPI. For this reason, a category in a Prices Division index is almost never exactly equivalent to a similar-name category in SHS. Very often though, we can consider that the goods and services in many SHS categories are close enough to those in Prices Division indexes for practical purposes. When using a CPI-based index, one should thus keep this point in mind.

Appendix 3

International practice

The following three household expenditure surveys are given as examples, not an exhaustive list. However, they are good illustrations of three different approaches to the constant dollar issue used by three different major statistical agencies.

US Consumer Expenditure Survey (CES)

The US CES, produced by the US Department of Labor, does not publish any constant dollar tables. They only publish current dollars and compare year to year changes with the relevant price index in the analytical text, in a similar manner to the current SHS publication and Daily release.

UK Expenditure and Food Survey (EFS)

The UK EFS uses the Inflation Adjusted Method (ONS, 2004). Their publication includes historical tables that show expenditures in constant prices. Their methodology is to use the UK Retail Price Index all-items index, rather than individual price indexes for each category. All expenditure items for a given year are scaled by the price relative of that year, in relation to the current year.

This is done not only for reasons of simplicity, which is a reason not to be dismissed, but also in order to preserve the spending proportions and rank order of the individual categories. When expenditure items are deflated using individual indexes, the rank order of some items and their proportion of the total budget are not preserved. Also, the new EFS replaced the older Family Expenditure Survey, and the spending categories are based on COICOP standards, causing numerous breaks in the time series that would be difficult to adjust individually.

New Zealand Household Economic Survey (HES)

The New Zealand Household Economic Survey publishes constant dollar tables, with each broad spending category adjusted using the Individual Index Method, but only for those spending categories for which CPI price indexes provide a good match, while simply leaving out any categories which do not have a well defined corresponding price index (Statistics New Zealand, 2003). This means that the problem of generating a constant dollar series for problematic items such as personal taxes is avoided, and that attention is focused mostly on current consumption items. The interpretation of the resulting time series as a quantity index is made quite clear in the accompanying analytical text.

Appendix 4

Detailed calculations for constant dollar examples

To produce constant dollar figures for the example, using the Individual Index Method, you need to use the price index that is equivalent to each spending category and is defined as equivalent in content.

Table 4.1
CPI price indexes for tuition fees, tobacco products, computer equipment and supplies (1992=100)

	1997	1998	1999	2000	2001	2002
Tuition fees	155.8	169.2	181.8	191.7	198.0	205.8
Tobacco products and smokers' supplies	67.6	71.5	73.2	76.8	86.8	114.5
Computer equipment and supplies	72.8	57.2	41.7	35.0	29.3	23.9

The indexes show that, from 1997 to 2002, tuition fees and tobacco have increased in price sharply while the price of computers has decreased dramatically. These are then converted into price relatives to 2002 prices. This is done simply by dividing the price index for any given year and category by the 2002 index number for that category. For example, for tuition fees in 1997, price relative to 2002 = 155.8 ÷ 205.8 = 0.757.

Table 4.2
Price relatives for tuition fees, tobacco products, and computer equipment and supplies, (2002=1.000)

	1997	1998	1999	2000	2001	2002
Tuition fees	0.757	0.822	0.883	0.931	0.962	1.000
Tobacco products and smokers' supplies	0.590	0.624	0.639	0.671	0.758	1.000
Computer equipment and supplies	3.046	2.393	1.745	1.5	1.226	1.000

The final constant dollar figures for these categories are calculated by dividing the current dollar figures in Table 1.1 by the price relative in the equivalent cell in Table 4.2.

Table 4.3
SHS average expenditures for tuition fees, tobacco products, computer equipment and supplies using the Individual Index Method (2002 constant $), 1997-2002

	1997	1998	1999	2000	2001	2002
Tuition fees	608	598	605	631	674	647
Tobacco products and smokers' supplies	934	894	854	807	806	728
Computer equipment and supplies	98	133	184	249	288	341

Example of the same data, using the CPI All-items Inflation Adjusted Method

For any category in year y,
Inflation-adjusted K$ for year y = original Current $ ÷ (all-items index for year y relative to base year all-items index)

First, the CPI All-items price index series is divided by the index of the reference year (in this case, 2002) to derive a series of prices relative to 2002:
e.g., for the year 1997, 107.6÷119.0 = 0.904

Table 4.4
CPI all-items price index

	1997	1998	1999	2000	2001	2002
CPI All-items 1992 = 100	107.6	108.6	110.5	113.5	116.4	119.0
CPI All-items price relatives, 2002 = 1.00	0.904	0.913	0.929	0.954	0.978	1.00

Source: CANSIM Table 326-0002

Then the average expenditures for every expenditure category are divided by the price relatives for that year to produce inflation adjusted expenditures.

Table 4.5
SHS average expenditures for tuition fees, tobacco products, computer equipment and supplies (K$), CPI all-items Inflation Adjusted Method

	1997	1998	1999	2000	2001	2002
Tuition fees	509	539	575	616	663	647
Tobacco products and smokers' supplies	610	612	588	568	624	728
Computer equipment and supplies	330	349	346	382	360	341

Appendix 5

Comparison of the results of the two methods

Table 5.1
Computer equipment and supplies - Comparison of Individual Index Method and Canada-level CPI all-items Inflation Adjusted Method, C$, and K$, 1997-2002

	1997	1998	1999	2000	2001	2002
Original C$	299	318	322	364	353	341
Individual K$	98	133	184	249	288	341
All-items K$	330	349	346	382	360	341

Table 5.2
Tobacco products expenses, comparison of Individual Index Method and Canada-level CPI all-items Inflation Adjusted Method, C$ and K$, 1997-2002

	1997	1998	1999	2000	2001	2002
Original C$	551	558	546	541	611	728
Individual K$	934	894	854	807	806	728
All-items K$	610	612	588	568	624	728

Table 5.3
Tuition expenses, comparison of Individual Index Method and Canada-level CPI all-items Inflation Adjusted Method, C$ and K$, 1997-2002

	1997	1998	1999	2000	2001	2002
Original C$	460	492	534	587	648	647
Individual K$	608	598	605	631	674	647
All-items K$	509	539	575	616	663	647

Figure 5.1
Computer equipment and supplies expenses, comparison of Individual Index Method and Canada-level CPI all-items inflation adjustment method, C$ and K$, 1997-2002
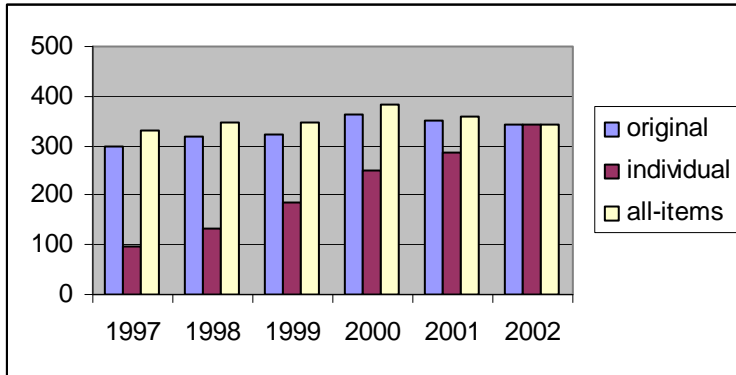

Figure 5.2
Tobacco products expenses, comparison of Individual Index Method and Canada-level CPI all-items Inflation Adjusted Method, C$ and K$, 1997-2002

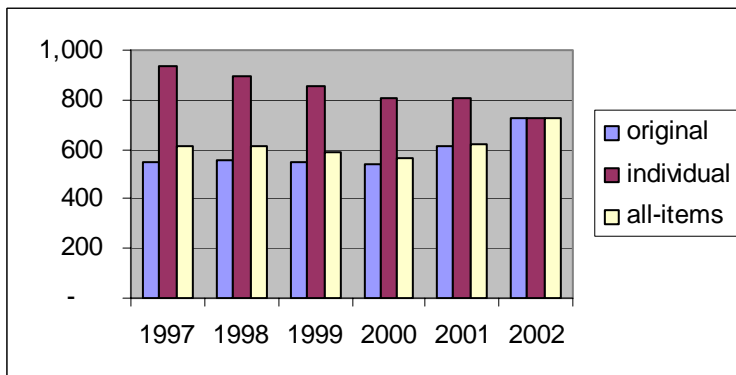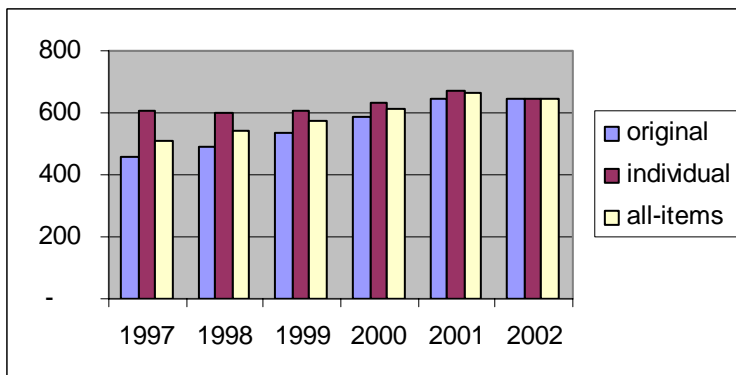**Figure 5.3**
Tuition expenses, comparison of Individual Index Method and Canada-level CPI all-items Inflation Adjusted Method, C$, and K$, 1997-2002

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