Volume Title: Household Production and Consumption

Volume Author/Editor: Nestor E. Terleckyj

Volume Publisher: NBER

Volume ISBN: 0-870-14515-0

Volume URL: http://www.nber.org/books/terl76-1

Publication Date: 1976

Chapter Title: Measuring Real Consumption from Quantity Data, Canada 1935-1968

Chapter Author: Dan Usher

Chapter URL: http://www.nber.org/chapters/c3971

Chapter pages in book: (p. 585 - 647)

Measuring Real Consumption from Quantity Data, Canada 1935–1968 *

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TIME series of real consumption may be constructed by deflation or by revaluation. To measure real consumption by deflation, one divides the value of consumption in current dollars by the value of an appropriately chosen price index. To measure real consumption by revaluation, one collects time series of quantities consumed and evaluates the quantities of each year by the prices of some arbitrarily chosen base year.

In principle and subject to the appropriate choice of index number formulae, deflation and revaluation ought to give identical measures of real consumption, because quantity is equal to the ratio of value and price for the aggregate of all goods, as well as for goods taken one at a time. Suppose the year 0 is chosen as a base year in the double sense that real consumption in the year 0 is set at 100 and that prices in the year 0 are used as weights in the quantity index. In each year t, real consumption assessed by revaluation is given by the quantity index

$$Q_0^t = \frac{\sum_{i=1}^{n} p_i^0 q_i^t}{\sum_{i=1}^{n} p_i^0 q_i^0} \times 100 \qquad (1)$$

where p_i^0 is the price of the good i in the year t, q_i^t is the quantity

* I appreciate the able assistance of Robert Lippens and Mrs. Wiktoria Kierzkowski in collecting and processing the data. Malcolm Urquhart and Joel Diena of Statistics Canada have read drafts of this essay and have made helpful suggestions. The project was financed in part by the Canada Council and in part by Statistics Canada.

consumed of the good i in the year t and so on. Real consumption assessed by deflation is the ratio of an index Y_0^t of consumption in current dollars

$$Y_0^t = \frac{\sum_{i=1}^{n} p_i^t q_i^t}{\sum_{i=1}^{n} p_i^0 q_i^0} \times 100 \tag{2}$$

and a Paasche price index

$$P_o^t = \frac{\sum_{i=1}^{n} p_i^t q_i^t}{\sum_{i=1}^{n} p_i^0 q_i^t} \tag{3}$$

We see at once that the two measures of real consumption are the same,[1] that is

$$Q_0^t = Y_0^t / P_o^t \tag{4}$$

The two series are not the same in practice because the world does not present us with neat time series of prices and quantities of n distinct goods which together constitute the whole of real consumption. In the course of this paper it will be shown that the rate of growth of real consumption assessed by revaluation is typically less than the rate of growth of real consumption assessed by deflation, and that the ratio of the two series provides a measure—a crude one but the only such measure we possess—of the rate of quality change implicit in the official national accounts. The time series obtained from the revaluation of quantity data also provides a link between growth rates of consumption of particular goods and services and the growth rate of consumption as a whole.

Deflation is preferred to revaluation for measuring real consumption in the official national accounts in every country in the world. There are cogent reasons for this preference, but there has to my knowledge been no systematic analysis of the relative merits of the two series. Nor has there been any attempt to measure real consumption by revaluation to compare the growth rates of the two series and draw out the

[1] As is well known from the theory of index numbers, a base-weighted Laspeyres quantity index may be a biased indicator of the extent to which people are becoming better off in the course of time. The index is sufficient for the limited purpose of contrasting deflation and revaluation.

extra information the second series provides about the process of economic growth. That is the purpose of this paper.

I attempt to construct a time series of real consumption from quantity data for Canada over the years 1935 to 1968. The paper begins with a statement of the reasons why national accounting offices choose to measure real consumption by deflation rather than by revaluation of quantity data. There follows a discussion of the kind of information one might hope to obtain by measuring real consumption by revaluation as well. There is a discussion of problems in collecting and processing quantity data. Finally, there is a brief description of the results.

THE ADVANTAGES OF DEFLATION

The advantages of deflation are these:

(i) The data on value and prices required for measuring real consumption by deflation are more readily available than the quantity data required for measuring real consumption by revaluation. Data required for deflation are consumption in current dollars, which can be got from financial statements of firms, and a sample of prices. We need not have a complete enumeration of prices because competition can be trusted to keep price differentials among firms within a narrow range. By contrast, quantity data can only be obtained from a complete enumeration of firms or from a very large and detailed sample of households. At present there are many items of consumption, including books and furniture, for which we have no quantity data at all.

(ii) Deflation makes it possible to measure real consumption without having to account explicitly for the full diversity of goods and services in the economy. In measuring real consumption by deflation, one can get by with a price index of a few representative goods in each category of expenditure, in the hope that prices of goods in the index change at about the same rate as the average of prices of all goods in the category. In measuring real consumption by revaluation of quantity data, we must somehow come to grips with the fact that there is an infinite variety of goods and services, and that no two goods are really identical in every respect. Some goods, such as pounds of flour bought at different times, are similar enough so that we are content to treat them as amounts of the same commodity. Other goods are so nearly unique that we hesitate to combine them into quantities presumed to persist in some homogeneous form for the whole duration of the time series. Novelties, such as hulahoops, clackers, and yoyos, are goods of this sort, and as a matter of practice, one has little option

but to assume that prices of novelties rise at about the same rate as prices of some other class of goods. One deflates values of novelties by, for instance, the consumer price index to obtain a time series of the real output of novelties, on the assumption that, whatever novelties may be, the efficiency of labor and capital in producing them is rising at about the same rate as the efficiency of labor and capital in producing other things. Since one cannot construct a genuine time series of the quantity of novelties, the validity of the assumption cannot be checked, and we can never know whether the estimate of the quantity of novelties is accurate or not. As an alternative, we could derive a quantity series for novelties by assuming that consumption of novelties increases at the same rate as consumption of some other class of commodities. This assumption is probably less satisfactory than the assumption that the relative price of novelties and some other class of commodities has remained constant.

(iii) Devaluation entails an automatic correction for quality change. Think of value, v, as being the product of price, p, quantity, q, and quality, m. We would like a time series of real consumption to reflect changes in quantity and quality but not price. We get this result if we deflate value by a price index, as long as the price index represents the value each year of a bundle of goods of a given quality and design; the price index would be a true reflection of p, and the deflated series would be $v/p = qm$, which is exactly what we require. If consumers consider one good suit to be the equivalent of two poor suits no matter how many good suits and how many poor suits are put onto the market, then the dollar value of expenditure on suits deflated by the price of one kind of suit or by a price index with fixed weights is an ideal measure of real consumption of suits, while a quantity index of the number of suits purchased would be inappropriate.[2]

These advantages of deflation over revaluation, the availability of data, the ease of accounting for the diversity of goods and services, and the automatic correction for quality change, provide some justification for the preference for deflation in the official national accounts.

THE ADVANTAGES OF REVALUATION

It would be difficult to argue for the replacement of deflation by revaluation as the principal method of measuring real consumption in

[2] This example shows that deflation may give us a correct measure of real consumption inclusive of quality change, but it does not prove that quality change is always accounted for correctly. In the course of this paper, we shall consider examples where quality change is overlooked or is imputed erroneously.

the national accounts, but I think a case can be made for measuring real consumption both ways. A supplementary series constructed by revaluation of quantity data can be useful in several respects:

(i) The principal reason for wanting a time series of real consumption derived from quantity data is to connect our measure of aggregate consumption with information about particular goods and services we enjoy. One would like to think of national income statistics as constituting the last chapter and summation of an imaginary statistical abstract. Each preceding chapter shows change, improvement or deterioration of some aspect of the economy—food, clothing, transport and communication, health, education. The final chapter combines changes in all aspects of the economy into one measure of the progress of the economy as a whole. The accounts as they are now set up do not serve that purpose because one cannot link time series of real consumption to more detailed and specific information about the economy. Measures of real consumption based directly on quantity data forge the link automatically.

For example, the Canadian national accounts show that food consumption per head has increased at a rate of 1.4 per cent per annum between 1935 and 1968. Broadly speaking, Statistics Canada arrives at that figure by dividing the value of retail sales of food by the food component of the consumer price index. Let us consider this 1.4 per cent and ask what information it contains about food consumption in Canada. One might ask what the growth of 1.4 per cent in food consumption implies about the Canadian diet. Can we infer from the 50 per cent increase in food consumption that Canadians are enjoying an adequate or more than adequate diet, that diets in 1935 were on the average inadequate, or that Canadians are eating more or better food in 1968 than in 1935? Of course, one can only speak of averages in this context because nothing in the national accounts indicates, or is intended to indicate, whether consumption is evenly distributed; but one might ask whether all Canadians would have adequate diets if food consumption were evenly distributed. To all of these questions, the answer is the same. We do not know and cannot find out, even by examining the primary data that enter into the construction of the national accounts.

Food consumption as measured in the national accounts may have increased for a number of reasons: Canadians may be consuming more food of all kinds, more bread, cheese, fish, milk, and so on. Canadians may be switching from less nutritious to more nutritious food—from bread to meat, fruit, and fresh vegetables. The increase in food con-

sumption may reflect a change in the seasonality of our eating habits; we may be paying a premium for fresh fruits and vegetables out of season. The quality of food may have improved. Bread may be richer in vitamins, apples less likely to be rotten or wormy, flour less likely to be dirty or to contain impurities. Increased food consumption has many dimensions, but nothing in the national accounts as they are now constructed permits us to apportion the total increase among the contributing factors or even to say with confidence which factors are accounted for and which are not. Worse still, the measured increase in food consumption may reflect factors which are quite separate from the amount and quality of the food we eat. Part of the measured increase in food consumption is factory preparation of TV dinners, cloth for tea bags, tin for cans, ice for freezing, paper for packaging, or labor cost of washing, peeling, grinding, or mashing food before it enters the home. Factory preparation of food may improve its quality as food, or it may be a convenience for housewives, in effect, a labor-saving device comparable to home freezers or automatic mixers. Food and packaging are both goods, and increases in both have a place in the national accounts, but one would like to know which is which. One would like to know what proportion of the 1.4 per cent increase is food and what proportion is paper and tin. On this matter, the accounts are silent. The increase might be food, packaging, or any combination of the two.

The argument for connecting aggregate consumption with the detail of quantities consumed is reinforced by the recent revival of interest in the welfare implications of the national accounts. It is felt that social indicators of justice, equality, education, health and other non-economic aspects of well-being should be compiled and, if possible, combined with economic statistics into aggregates which might signify progress or retrogression. The measurement of real consumption from quantity data fits particularly well with these developments, because social indicators are themselves like quantity data in the sense that they could serve as arguments in the utility function. Crime rates, hours of leisure, proportions of eligible age groups attending school, age-specific mortality rates, pollution indexes, or Gini ratios of the income distribution can be arranged in time series and might be incorporated like ordinary quantity series into the body of the accounts if appropriate prices could be found or imputed. These imputations can be introduced more easily and naturally when real consumption is initially developed from quantity data than when real consumption is measured as a value deflated by a price index.

A case can be made that the increase over time in urban site rents should be counted as a cost of progress and should not be included in consumption. To exclude site rents, one must limit consideration of housing to the physical characteristics of the house and its grounds—number of rooms, floor space per room, area of the lot, facilities, and so on—and ignore advantages of location. This correction comes automatically when real consumption is measured by revaluing quantity data.

(ii) An index of quality change in consumption goods can be obtained as the ratio of real consumption assessed by deflation and real consumption assessed by revaluation, because the former includes quality change while the latter does not. This measure of implicit quality change is a crude one, for the two time-series of real consumption may diverge for a variety of reasons, not the least of which is that the index number formula employed in measuring real consumption from quantity data differs substantially from the formula employed in the construction of the national accounts. Nevertheless, this measure of quality change is the only such measure we possess, and it is possible on occasion to bring general knowledge to bear on the question of whether the rate of implicit quality change is reasonable or not. For instance, it is shown below that of the 1.4 per cent annual increase in real food consumption per head in the national accounts, only 0.6 per cent can be accounted for by the increase in quantity, leaving 0.8 per cent that must be explained by quality change. That seems to me to be a very high rate of quality change in food and suggests that the sources of quality change ought to be examined closely. The work of Griliches and others on hedonic price indexes has tended to suggest that quality change has been imperfectly removed from the price indexes used in the national accounts so that the growth rate of real income is underestimated. By contrast, the growth rate of our quality series seems unreasonably large for some categories of expenditure, suggesting that the overall bias in the growth rate of real consumption may go in either direction.

It should be stressed that the measure of real consumption assessed by deflation will only capture quality change if all quality change is eliminated from the price index, and that complete elimination of quality change from the price index may prove difficult or impossible. There are situations where quality change cannot be measured at all because similar items cannot be identified as different amounts of the same stuff. One can say that a 1920 model automobile and a 1970 model automobile are both members of the genus "automobile," but

a Pierce-Arrow of 1920 is better than a Volkswagen of 1970 in some respects and worse in others. Even when quality change can be identified, the spread between the prices of two qualities of goods may vary over time because of relative scarcity or changes in tastes. Suppose that red salmon is preferred to white salmon for buffet lunches, but that white salmon is preferred to red salmon in salmon sandwiches. In 1935, red salmon was rare and costly relative to white salmon, and statisticians considered red salmon to be the higher quality item. In the interval between 1935 and 1968, red salmon became more plentiful, and by 1968 a great deal of red salmon was used in salmon sandwiches and white salmon was relatively expensive. The statistician who based his quality classification on the year 1935 would overestimate the improvement in welfare resulting from the increased consumption of salmon, while the statistician who set his quality classification on the year 1968 would underestimate it. The index number problem in this example is not different from index number problems that arise when time series of ordinary commodities are combined, but problems of this sort might easily be overlooked in the procedures for constructing price indexes to deflate values in the national accounts.

Deflation may also give rise to spurious quality change when the price of a commodity varies from place to place or when part of the price of a good is payment to avoid externalities which have emerged since the first year of the time series. An example of spurious quality change is provided by the valuation of "natural" foods in the national accounts. Today we pay a substantial premium for foods guaranteed to have been grown on farms that use only natural fertilizer. Perhaps the ill effects of chemical fertilizers ought to be reflected somewhere in the accounts, but there is surely something peculiar in the present practice of implicitly counting that premium as extra food in a comparison with an earlier year when natural fertilizers were used as a matter of course. A similar problem arises from the effect of urbanization on the value of housing services. The quantity of housing in the national accounts is measured by deflating the value of rents paid or imputed by a price index of rents, with farmhouses and city houses treated as though they were separate commodities. Since rents are generally higher in the cities than on the farms, the identical house is counted as more house if it happens to be in the city than if it happens to be in the country. Consequently, an increase in the proportion of city houses to farm houses causes the national accounts to show an increase in housing services per head even if no one is better or more comfortably housed than he was before.

(iii) All commodities, even those we call goods as opposed to services, are really bundles of goods and services. A pound of cheese purchased at the grocer's is more than just cheese; it is the convenience and aesthetic appeal of the shop where it is sold, the length of time one has to wait at the cash register, the delivery from the shop to the purchaser's home, the extent to which it is processed, cooked, or cut to save the purchaser time in preparation at home. These services, ancillary to the purchase of a piece of cheese, are included in real consumption measured by deflation but excluded from real consumption measured by revaluation, and any increase over time in services provided per unit of goods is reflected as part of the growth rate of one series but not the other. A strong case can be made that an increase in services per unit of goods ought to be counted as part of economic growth, but enough exceptions can be found to this general rule to justify the creation of a supplementary series of goods exclusive of their service component. A large part of the improvement in the service component of goods consists either of a substitute for housework or of some other labor-saving arrangement. Since housework is excluded from the national income, substitutes for housework might be excluded as well. Alternatively, if real income were to include an imputation for leisure, it would be double counting to include labor-saving increases in the service component of goods. Time series of quantities of goods exclusive of their service components are what is required for linking the data in the accounts with investigations of special aspects of welfare such as diets or housing conditions.

(iv) Time series of quality might have some interesting uses in the theory of demand. In every attempt to compute a set of demand elasticities for all commodities simultaneously that has come to my attention, the authors have used real expenditures by commodity group in the national accounts as if these series were quantity data. It may be that the quality series implicit in each of the national accounts series have more in common with one another than with the series of quantities to which they are attached. "Quality of food" and "quality of clothing" may be more like one commodity in their response to changes in income or to changes in prices of other goods than "quality of food" is like "quantity of food" or "quality of clothing" is like "quantity of clothing." I have not attempted to test this conjecture. In view of the biases and approximations that enter into the construction of the two series of real consumption, and of the fact that the quality series is a residual, it is doubtful whether this conjecture could be tested with the available data.

A TIME-SERIES OF REAL-CONSUMPTION-BASED QUANTITY DATA: CANADA, 1937 TO 1968

I have assembled all the relevant quantity data I could find into a time series of real consumption by revaluing quantities at 1961 prices. The main results of this computation are presented in Table 1, which is a comparison of my estimates of the growth rates of real consumption and its components with the estimates in the official national accounts. The aggregated commodities in Table 1 are food, alcohol, tobacco, housing, automobile services, purchased transport, communication, appliances, health services, and clothing. Several hundred time series of quantities from which the aggregates were derived are presented in Table 2. The main results of the study are presented at the end of the paper in a series of charts, one for each aggregate commodity and one for real consumption as a whole. Each chart is a comparison of time series of real consumption as assessed in the national accounts, of real consumption as we have estimated it from quantity data, and of implicit quality change defined as the ratio of the two series in every year.

The tables are largely self-explanatory, and the sources of data are indicated in the notes. In discussing this material, I will first consider a number of empirical and conceptual problems that emerged in the course of preparing the data, and will then comment briefly on some of the results.

(i) Missing data. The data are incomplete in two respects. There are whole categories of expenditures for which we have no quantity data or so little that it is not worth attempting to construct a quantity index, and there are some items missing from every category of expenditure. For the categories of "recreation" and "miscellaneous," where we have virtually no quantity data at all, I have treated the time series of real consumption in the national accounts as though they were quantity data, and have included these series with genuine time series of quantities in computing the overall rate of real consumption as assessed by revaluation. For all other categories of expenditure, I have adopted a procedure equivalent to assuming that the rate of growth of the missing series is equal to the rate of growth of the series included in Table 2. The procedure is to weight growth rates of the principal categories of real consumption not by the 1961 values derived from the prices and quantities in Table 2, but by the corresponding values in the official national accounts. Consider, for instance, the growth rate of food consumption of 0.6 per cent in the far right-hand column of Table. 1. This figure is the growth rate of the value at 1961 prices of

TABLE 1

A Comparison of Growth Rates of Consumption per Head: Canada, 1935–1968

	From the National Accounts		Recomputation from Quantity Data	
	Values in Dollars per Head in 1961 (1)	Growth Rates (Per Cent) (2)	Values in Dollars per Head in 1961 (3)	Growth Rates (Per Cent) (4)
Food	266.37	1.4	266.37	0.6
Alcohol	51.49	3.8	51.49	3.2
Tobacco	40.79	2.9	40.79	2.9
Clothing	124.79	1.8	124.79	0.9
Housing	355.96	2.8	329.09	0.6
Appliances			26.87	6.8
Health services	56.80	2.2	108.62	1.7
Purchased transport	34.27	2.6	34.27	0.1
Automobiles	126.38	4.6	126.38	3.6
Communication	20.67	4.2	20.67	3.1
Education	13.82	4.9	138.23	2.2
Recreation	63.44	3.5	63.44	3.5
Miscellaneous	222.56	3.5	207.30	3.1
Total real consumption	1,377.34	2.8	1,538.31	1.8

NOTE : The values in column 1 and the growth rates in column 2 are from unpublished and preliminary estimates by Statistics Canada of personal consumption expenditure. The categories of expenditure are the same as those in the national accounts except that "housing" includes "gross rent, fuel, and power" and "furniture, furnishings, and household equipment and operation," with the exception of appliances. The category of recreation in Table 1 consists of the national accounts categories of "recreation, entertainment, and education" less education, which is included separately. Column 3 is the same as column 1, except for "health" and "education," which include public current expenditure as estimated in Table 3; for "appliances," the value of which is taken from *National Accounts: Income and Expenditure, 1965*, Dominion Bureau of Statistics (DBS), 13-201, Table 47, item 23; and for "miscellaneous," which excludes some provincial sales tax, originally put into the miscellaneous category because it could not be allocated among commodities. The growth rates in column 4 are from Table 2. The growth rates for consumption as a whole in columns 2 and 4 are computed according to the formula:

$$G = \sum_i V_i G_i \div \sum_i V_i$$

where

G is the growth rate of total real consumption;
i refers to a row in the table;
G_i is the growth rate in the ith row; and
V_i is the value in the ith row.

TABLE 2

Quantity Data: Canada 1935–1968

A. Food: Domestic Disappearance, Lbs. per Capita, Calendar Year or Crop Year Commencing:

	1935	1940	1945	1950	1955	1960	1965	1968	1961 Price ¢ per Lb.
Meat (carcass weight)									
Beef	53.6	54.5	67.0	50.6	71.5	69.2	81.7	86.8	81.7
Veal	9.8	10.8	12.5	9.4	8.7	7.6	8.4	6.4	90.9
Mutton and lamb	6.0	4.5	4.3	2.2	2.8	3.2	2.8	4.2	71.2
Pork	39.3	44.7	52.7	54.9	57.6	55.3	49.2	53.6	79.3
Offal	5.5	5.5	5.7	4.9	5.7	4.9	3.6	3.8	10.0
Canned meat	1.3	1.1	3.4	4.0	4.5	6.4	4.3	4.3	47.2
Total meat	115.5	121.1	145.6	126.0	150.8	146.6	150.0	159.1	
Eggs	34.6	30.8	33.0	30.1	36.4	36.7	32.0	32.0	26.4
Poultry (edible weight)									
Chicken	8.6	9.0	11.5	9.2	12.6	15.1	19.2	21.2	70.5
Other	1.8	2.6	2.7	2.3	4.1	5.6	8.0	8.2	70.9
Total poultry	10.4	11.6	14.2	11.5	16.7	20.7	27.2	29.4	
Pulses and Nuts									
Dry beans	4.3	3.8	3.8	4.8	3.7	2.9	2.4	2.2	11.1
Dry peas	6.3	5.1	2.9	1.8	0.9	1.4	1.6	0.2	11.1
Nuts	3.0	3.2	4.4	3.6	3.9	4.2	4.9	4.8	49.2
Cocoa	2.6	4.4	3.3	2.9	2.7	1.5	3.5	3.9	122.6
Total pulses & nuts	16.2	15.5	14.4	13.1	11.2	10.0	12.4	11.1	
Oils and Fats									
Butter	30.6	30.4	21.1	22.3	20.5	13.8	15.1	13.3	69.9
Lard	3.9	7.0	11.3	9.5	8.6	7.2	7.4	7.8	23.1
Margarine	0.0	0.0	0.0	6.8	8.0	7.6	7.0	7.6	31.0
Shortening	9.8	7.6	9.8	9.6	9.8	9.4	9.9	14.1	34.3
Other	(3.0)	(3.0)	(3.0)	3.0	2.4	4.1	4.7	5.9	42.1
Total oils and fats	47.3	48.0	45.2	51.2	49.3	44.9	44.1	48.7	

Potatoes									
White	198.6	213.0	162.9	180.8	150.6	158.9	156.0	170.2	4.8
Sweet	0.5	0.6	0.8	0.8	0.6	0.5	0.4	0.2	16.8
Total potatoes	199.1	213.6	163.7	181.6	151.2	159.4	156.4	170.4	
Cereals									
Flour:									
Wheat	179.2	164.2	197.2	158.3	147.8				
Rye	0.4	0.4	0.2	0.3	0.9				
Total	179.6	164.6	197.4	158.6	148.7	135.2	142.6	130.1	24.9 (bread)
Oatmeal & rolled oats	8.0	7.3	9.5	6.2	5.0	4.8	5.1	3.8	9.2
Pot & pearl barley	0.3	0.3	0.8	0.3	0.2	0.2	0.1	0.1	9.2
Cornmeal & flour	1.7	0.2	0.8	0.8	0.8	1.7	3.0	4.1	9.2
Buckwheat flour	0.2	0.1	0.1	0.1	0.1	0.1	0.04	0.02	9.2
Rice	4.0	3.7	3.3	4.1	4.5	4.5	6.1	4.5	20.8
Breakfast food	5.3	5.2	8.0	6.8	7.3	7.2	7.0		31.8
Total cereals	100.1	181.4	219.9	176.9	166.6	153.7	163.9	142.2	
Sugars									
Sugar	87.5	96.5	74.3	101.0	97.1	96.6	100.5	101.8	9.6
Maple sugar, etc.	2.8	2.7	1.1	1.6	1.1	0.8	0.4	0.5	30.0
Honey	2.9	2.2	3.1	2.3	1.7	1.4	1.8	1.4	30.3
Other	(7.0)	(7.0)	(7.0)	(7.0)	(7.0)	5.5	5.7	5.5	19.1
Total Sugars	100.2	108.4	85.5	111.9	106.9	104.3	108.4	109.2	
Coffee	3.2	3.5	4.5	6.0	6.6	9.0	8.7	9.7	120.0
Tea	3.2	3.6	4.2	4.0	2.7	2.4	2.4	2.5	74.0
Vegetables (fresh equivalent basis)									
Cabbage		13.6	18.9	14.1	12.4	10.2	9.0	9.3	8.9
Lettuce		5.2	6.2	7.2	8.2	8.4	9.7	10.5	19.0
Spinach		1.6	1.2	1.2	1.1	0.8	0.7	0.5	24.4
Carrots: fresh		9.6	12.0	15.6	13.2	16.9	14.1	15.1	13.4
canned	0.12	0.12	1.3	0.5	0.5	1.1	1.8	1.9	
Total		10.3	15.1	17.3	15.5	18.0	15.9	17.0	
Beans: fresh		2.6	2.4	2.6	2.1	1.9	1.7	0.8	28.3
canned	.7	1.1	2.0	1.8	2.3	2.3	2.4	2.7	
frozen							1.2	0.8	
baked canned	2.1	3.6	1.8	4.4	3.9	4.2	5.3	4.3	
Total	2.8	7.3	6.2	8.8	8.3	8.4	10.8	8.6	

(continued)

TABLE 2 (continued)

A. Food (continued)

	1935	1940	1945	1950	1955	1960	1965	1968	1961 Price ¢ per Lb.
Peas: fresh		1.5	1.0	0.9	0.7		0.1		26.9
canned		3.6	5.5	4.6	5.7	4.3	4.0	4.4	
frozen							2.2	2.7	
Total		4.8	6.9	6.3	7.8	4.3	6.3	7.1	
Beets: fresh		5.1	5.0	5.6	4.2	3.3	1.1	1.1	12.2
canned	0.1	0.3	1.1	0.9	1.0	0.9	1.0	1.0	
Total		5.4	6.3	6.3	5.4	4.2	2.1	2.1	
Cauliflower		2.3	2.9	2.6	2.4	1.6	2.0	1.8	34.4
Celery		5.2	7.1	6.6	8.2	6.6	6.4	6.7	15.5
Corn: fresh		4.0	5.1	3.1	2.0	3.9	4.0	3.5	10.1
canned	6.4	6.0	7.2	10.8	10.4	9.8	10.6	11.3	
frozen							2.4	3.1	
Total		12.1	14.3	18.0	16.3	13.7	17.0	17.9	
Cucumbers		(1.7)	(1.7)	(1.7)	(1.7)	(1.7)	1.4	3.0	15.0
Onions, not processed		10.5	13.2	14.2	13.0	11.8	13.0	10.3	11.5
Asparagus: fresh		0.4	0.3	0.4	0.3	0.3	0.2	0.5	33.6
canned	0.3	0.5	0.3	0.5	0.5	0.6	0.6	0.6	
frozen							0.1	0.1	
Total		0.6	0.6	0.6	0.7	0.9	0.9	1.2	
Turnips		(4.5)	(4.5)	(4.5)	(4.5)	(4.5)	7.2	7.7	7.3
Unspecified: fresh						13.9	1.8	2.2	15.0
canned		0.3	0.4	0.8	0.7	0.8	3.0	3.3	
frozen				0.8	2.7	5.5	1.3	1.2	
Total		0.3	0.4	1.6	3.4	20.2	6.1	6.7	
Total vegetables		81.8	103.8	106.6	105.1	110.6	113.9	115.1	

Fruit (fresh equivalent basis)									
Apples: fresh		29.4	12.8	24.7	31.6	14.7	27.4	27.1	18.4
canned		4.1	2.4	2.1	3.2	2.9	3.5	4.1	
juice		2.2	4.5	7.0	11.5	8.1	8.9	11.1	
frozen							0.6	0.6	
Total		37.2	25.6	37.3	45.5	25.7	40.4	42.9	
Apricots: fresh		0.3	0.4	0.4	0.7	0.4	0.1	0.3	33.6
canned		0.1	0.1	0.2	0.5	0.4	0.4	0.4	
Total		1.4	0.5	1.3	1.6	0.8	0.5	0.7	
Bananas	13.2	13.0	24.0	11.5	18.2	(16.7)	16.1	17.6	18.7
Cherries: fresh		0.4	0.7	0.5	1.4	0.2	0.6	0.9	29.1
canned		0.3	0.1	0.5	0.6	0.6	0.5	0.3	
frozen						0.1	0.7	0.6	
Total		0.8	1.0	1.3	2.4	0.9	1.8	1.8	
Peaches: fresh		4.4	5.6	2.2	4.6	4.8	4.2	5.2	33.6
canned		1.8	1.4	3.6	4.0	4.2	4.4	3.7	
Total		6.6	7.6	6.5	9.1	9.0	8.6	8.9	
Pineapples: fresh		0.9	1.3	0.6			0.3	0.3	11.0
canned		2.6	0.2	2.2	3.1		4.0	3.6	
juice		0.5	0.3	1.4	1.7		1.3	1.7	
Total		4.0	1.8	4.2	4.8	(5.7)	5.6	5.6	
Plums, etc.: fresh		1.3	2.2	1.5	2.3	1.7	1.7	1.8	20.0
canned		0.2	0.8	0.5	0.5	0.3	0.3	0.3	
Total		6.1	10.7	5.2	5.1	2.0	2.0	2.1	
Raspberries: fresh		0.9	0.6	0.6	0.4	0.1		0.1	
canned		0.1		0.1	0.1	0.1	0.1	0.1	
frozen						0.5	0.6	0.6	
Total		1.2	1.3	1.1	1.1	0.7	0.7	0.8	
Strawberries: fresh		2.3	1.0	1.1	1.4	1.5	0.9	1.8	56.1
canned		0.1		0.2	0.2	0.1	0.1	0.1	35.3
frozen						1.0	1.3	1.1	
Total		3.0	1.6	2.0	2.7	2.6	2.3	3.0	
Grapes		21.1	23.9	24.7	22.4	8.7	11.9	10.5	27.5
Pears: fresh		2.1	3.9	1.8	3.0	2.6	2.1	2.7	21.1
canned		1.0	0.9	1.9	2.2	1.8	2.4	2.1	23.2
Total		3.0	4.8	3.8	5.2	4.4	4.5	4.8	

(continued)

TABLE 2 (continued)

A. Food (concluded)

	1935	1940	1945	1950	1955	1960	1965	1968	1961 Price ¢ per Lb.
Unspecified: fresh				0.4	0.7		7.9	7.2	25.0
canned							5.1	5.3	
frozen				0.3	1.1		0.4	0.1	
juice		2.9	3.4	11.2	27.0		3.9	5.7	
other							21.7	20.7	
dried	23.2	19.2	25.6	19.2	15.6				
Total	23.2	22.1	29.0	31.1	20.1	37.7	38.4	38.0	
Citrus: fresh lemons		2.7	3.4	2.1	2.0				
fresh oranges		21.9	37.8	24.0	27.1				18.2
fresh grapefruit		4.5	9.7	6.7	8.4				26.8
fresh total		29.1	50.9	32.8	37.5	31.7	25.0	23.3	20.0
juice		3.4	4.0	13.0	31.5	31.7	21.6	28.1	
Total		22.5	54.9	45.8	69.0	66.0	46.6	51.4	
Tomato (fresh equivalent)		42.4	52.8	53.9	55.9	59.3	60.9	61.6	25.1
Total fruit		194.4	239.5	229.7	263.1	240.2	243.1	252.5	
Fish									
Fresh & frozen		6.1	6.8	6.8	7.3	7.7	9.0	8.3	48.0
Smoked, salted, pickled		1.7	1.6	2.3	1.8	1.8	1.6	0.9	30.3
Canned		3.8	2.6	4.6	4.5	3.1	2.9	3.0	35.9
Total fish		11.6	11.0	13.7	13.6	14.6	13.5	12.2	
Milk & Cheese									
Fluid milk & cream: retail wt.	400.7	387.6	468.8	401.1	397.7	393.2	318.5	294.7	11.7
milk solid	45.7	44.2	53.4	45.7	45.3	44.3	36.3	33.7	102.3
Cheese									
Cheddar: retail wt.	2.7	2.2	2.4	2.3	2.8	5.9	3.4	3.4	73.0 (all cheese)
milk solid	1.8	1.5	1.6	1.5	1.9	3.8	2.2	2.2	121.7
Processed: retail wt.	1.0	1.5	2.9	2.5	2.9		3.8	4.3	
milk solid	.6	.9	1.7	1.5	1.7		2.2	2.5	121.7
Cottage: retail wt.		0.2	0.4	0.6	0.9	1.3	1.6	1.7	
milk solid		0.1	0.1	0.2	0.2	0.3	0.4	0.4	121.7

Other: retail wt.						1.3	1.9	2.7	
milk solid						0.8	1.2	1.8	121.7
Ice Cream: retail wt.	3.0	4.9	7.2	8.6	10.4	39.1	27.4	35.8	
milk solid	.4	.6	.9	1.1	1.3	4.7	3.4	4.5	233.0
Whole Milk									
Evaporated: retail wt.	4.3	8.3	11.4	17.5	18.4	17.7	16.1	14.3	10.1
milk solid	1.1	2.1	2.9	4.4	4.6	4.6	4.2	3.7	64.4
Condensed: retail wt.	0.7	0.6	0.8	0.8	0.8	0.8	1.0	1.2	35.3
milk solid	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	141.2
Powdered: retail wt.		0.1	0.5	0.4	0.2	0.3	0.2	0.2	35.5
milk solid		0.1	0.5	0.4	0.2	0.3	0.2	0.2	35.5
Skim Milk									
Evaporated: retail wt.	0.0	0.1	0.2	0.9	0.6	0.2			16.8
milk solid		0.02	0.03	0.2	0.1	0.1			87.1
Condensed: retail wt.	0.4	0.4	0.3	0.3	0.2	0.1			17.4
milk solid	0.1	0.1	0.1	0.1	0.07	0.3			52.7
Powdered: retail wt.		2.3	2.6	3.4	5.6	6.9	7.1	7.6	34.1
milk solid		2.2	2.5	3.3	5.4	6.6	6.9	7.4	35.5
Buttermilk									
Condensed: retail wt.	0.0	0.0	0.2	0.2	0.1				17.4
milk solid			0.1	0.1	0.0				52.7
Powdered: retail wt.						0.4	0.4	0.6	34.1
milk solid						0.4	0.4	0.6	34.1
Whey: milk solid							2.1	1.8	(100)
Miscellaneous: milk solid							0.8	1.0	(100)
Total milk	49.9	52.0	64.0	58.7	61.0	66.4	60.5	59.7	
Soft Drinks (gallons)		4.7	4.3	7.5	8.0	9.0	10.3	12.5	94 (per gallon)
Alcoholic Beverages									
Spirits (proof gallons)	.65	1.09	.89	.83	.98	1.16	1.38	1.76	2,017 (per proof, gal.)
Beer/ale (gallons)	5.04	6.35	10.24	12.37	13.30	13.20	14.21	14.97	250 (per gallon)
Wines (gallons)	.34	.46	.36	.38	.39	.50	.61	.67	923 (per gallon)
Tobacco									
Cigarettes (number)	491	682	1,422	1,277	1,599	1,952	2,223	2,263	2 (per cigarette)
Cigars (number)	11	15	17	15	16	18	26	21	
Tobacco (lbs. smoking, chewing, snuff)	2.2	2.7	2.4	2.2	1.6	1.3	1.0	0.9	1,000 (per lb.)

TABLE 2 (continued)

B. Food Indexes (1961 = 100)

	1935	1940	1945	1950	1955	1960	1965	1968	Value in Dollars 1961
Meat	83	87	105	90	108	105	109	116	107.73
Eggs	102	91	97	89	107	108	94	94	8.94
Poultry	45	50	61	50	72	90	118	127	16.31
Pulses & nuts	127	174	152	132	125	96	156	162	4.58
Oils & fats	144	143	117	131	124	99	106	111	18.73
Potatoes	125	134	103	115	95	88	99	107	7.69
Cereals	130	119	144	117	110	101	107	92	37.07
Sugars	104	110	89	111	105	100	104	104	11.00
Vegetables	(74)	74	89	95	96	100	97	97	17.39
Fruit	(84)	84	107	103	116	107	107	111	51.6
Fish	(91)	91	89	106	107	102	111	101	5.27
Milk & cheese	77	78	95	86	88	102	87	88	67.31
Coffee	36	39	50	67	73	100	97	108	10.80
Tea	133	150	175	167	113	100	100	104	1.77
Food index	89	91	104	96	103	102	104	106	366.37
Soft drinks	(43)	51	47	83	89	99	116	138	9.07
Alcohol	47	69	77	84	93	100	113	130	61.03
Tobacco	59	76	98	88	90	97	104	102	56.38
Food index including soft drinks	88	91	102	96	103	102	104	107	375.43

TABLE 2 (continued)

C. Appliances

	1935	1940	1945	1950	1955	1960	1965	1968	1961 Price (Dollars per Unit)
Stoves									
Electric (no. per th. of pop.)	2.2	2.8	1.8	11.9	14.1	12.5	15.1	15.9	137.85
Gas (no. per th. of pop.)	2.2	3.0	2.2	4.3	3.8	2.8	2.5	2.2	123.06
Vacuum cleaners (no. per th. of pop.)	3.3	5.1	1.4	15.5	15.3	15.6	20.9	26.5	47.70
Refrigerators (no. per th. of pop.)	3.1	6.9	0.3	16.6	23.8	16.7	18.0	22.5	172.72
Radio receiving sets									
(no. per th. of pop.)	17.6	43.3	4.2	57.4	72.6	77.0	120.2	169.6	42.27
T.V. sets (no. per th. of pop.)				2.4	51.7	20.0	26.8	37.6	164.66
Washing machines (no. per th. of pop.)	7.3	11.5	4.8	21.1	19.4	17.9	21.0	23.0	120.30
Home freezers (no. per th. of pop.)					3.9	5.6	8.6	8.8	173.92
Toasters (no. per th. of pop.)	11.4	15.0	11.8	23.8	21.8	16.7	33.2	33.3	8.54
Electric flat irons (no. per th. of pop.)	16.2	20.5	14.9	37.8	38.3	22.2	38.3	39.7	9.05
Clothes dryers (no. per th. of pop.)					3.1	7.7	10.3	11.5	135.05
Th. of incandescent lights (no. per head)	2.1	2.5	3.7	5.1	5.4	5.0	5.6	6.0	0.19
Water heaters (no. per th. of pop.)		4.8	7.6	19.9	25.6	30.8	36.5	37.3	48.00
Value per capita	3.13	5.95	1.99	12.64	24.03	18.23	23.78	29.25	
Index (1961 = 100)	17	32	11	68	129	98	127	157	

TABLE 2 (continued)

D. Clothing: Shipments by Canadian Manufacturers

	Unit	1935	1940	1945	1950	1955	1960	1965	1968	1961 Price Dollars per Unit
1. Aprons	No./Person	.0842	.1814	.2685	.2093	.2128	.1777	.1442	.1084	.62
2. Bathing suits	"	.0616	.0757	.1037	.1263	.1203	.1602	.1830	.1346	2.81
Shipment + import − export	"							.1902	.1571	
3. Bathrobes	"	.0532	.0957	.1423	.0837	.0880	.1207	.2129	(.2873)	4.25
4. Blouses	"	.0918	.1160	.5119	.5587	.6726	.6818	.7650	.5898	1.87
Shipment + import − export	"							1.0412	.8911	
5. Regular model coats	"	.2080	.2004	.2609	.2338	.2189	.1707	.2013	.1906	21.30
Shipment + import − export	"							.2217	.2369	
6. Fur coats	"	.0078	.0113	.0173	.0146	.0135	.0116	.0092	.0092	229.87
7. Fur-lined coats	"	.00005	.00035	.00031	.00037	.00024	.00004	.00010	.0000	103.18
8. Jackets	"	.0075	.0064	.0572	.0065	.0773	.0728	.1017	.0863	10.59
Shipment + import − export	"							.1307	.1699	
9. Raincoats	"	.0572	.0731	.0519	.0571	.1155	.0716	.1199	.1531	8.88
Shipment + import − export	"							.1564	.2767	
10. Short coats	"	.1140	.1179	.1690	.2097	.2904	.3584	.5351	(.5868)	6.84
Shipment + import − export	"							.5365	(.5875)	
11. Dresses	"	1.124	1.134	1.382	1.190	1.077	0.870	0.892	0.957	6.78
Shipment + import − export	"							.9179	1.0167	
12. Footwear	Pair/Person	3.378	4.070	4.737	3.578	3.249	3.1512	3.462	2.921	4.18
Shipment + import − export	"							3.860	4.581	
13. Foundation garment	No./Person	0.277	0.319	0.599	0.728	0.895	0.970	1.293	1.269	1.82
Shipment + import − export	"							1.318	1.288	
14. Gloves & mittens	Pair/Person	.989	1.148	2.105	1.659	1.384	1.165	1.278	1.567	0.76
Shipment + import − export	"							2.282	1.646	

15. Headwear	No./Person	1.3937	.9728	1.1819	.9408	.8675	.7305	.7417	.7620	1.71
Shipment + import − export	"							1.6360	1.2356	
16. Hosiery	Pair/Person	6.849	8.641	8.442	8.086	7.051	9.122	10.632	10.538	0.34
Shipment + import − export	"							10.533	10.558	
17. Nightdresses, nightshirts	No./Person	.1447	.1522	.1782	.1841	.2339	.2071	.3119	.3557	1.82
18. Pants	"	.2467	.2646	.3886	.3613	.3276	.3204	.5009	.4684	4.75
Shipment + import − export	"							.8349	.9937	
19. Playsuits	"	.1015	.0322	.1752	.0829	.1208	.1026	.1722	.0177	1.27
20. Pyjamas	"	.2128	.2245	.3353	.3356	.3871	.5254	.5313	.5339	1.74
17. & 20. Sleepwear	"							.8432	.8898	
Shipment + import − export	"							.9842	1.1334	
21. Scarves	"	.0862	.1599	.2455	.2625	.2490	.2015	.1920	(.8989)	0.75
Shipment + import − export	"							.2836	(.1650)	
22. Shirts	"	1.270	1.466	1.277	1.498	1.887	1.764	1.7139	2.2815	1.85
Shipment + import − export								1.1683	3.1089	
23. Ski suits & snowsuits	"	.0108	.0211	.0538	.0456	.0367	.0867	.1179	.0604	3.09
24. Skirts	"	.0365	.0485	.1256	.1846	.3205	.3231	.2809	.2593	3.40
Shipment + import − export	"							.2832	.2627	
25. Slacks and jeans	Pair/Person	.0246	.0115	.0621	.1371	.2852	.4195	.7475	.8210	2.12
Shipment + import − export	"							.8676	.9846	
26. Sport shorts	"	.0132	.0132	.1310	.1375	.1438	.1503	.2075	.2542	1.32
Shipment + import − export	"							.2906	.4122	
27. Suits	No./Person	.1722	.1716	.3594	.2120	.1717	.1369	.2293	.2221	31.27
Shipment + import − export								.2336	.2334	
28. Sweaters	"	.3657	.6923	.8330	1.1086	.8123	1.0125	1.2273	1.0356	3.10
Shipment + import − export	"							1.3937	1.0876	
29. Underwear	"	3.268	3.796	4.133	4.242	4.716	4.666	5.005	4.9584	0.67
Shipment + import − export								5.146	5.3567	
Clothing index (1961=1.00)		.83	.93	1.24	1.05	1.02	.97	1.16	1.14	

TABLE 2 (continued)

E. Housing

	1931	1941	1951	1955	1960	1965	1968	1961 Price Dollars per House
Number of dwellings								
1 room(s)	84	65	64	51	55	51	56	2,180
2	151	151	166	143	120	119	138	5,200
3	198	255	344	373	386	389	466	8,250
4	312	422	669	787	858	845	932	11,504
5	343	438	673	856	1,060	1,260	1,363	14,851
6	418	508	662	803	967	1,097	1,176	17,617
7	286	310	371	408	466	531	621	18,685
8	213	218	239	252	263	305	358	21,050
9	250	209	221	199	229	259	284	26,591
Total	2,253	2,576	3,409	3,872	4,404	4,853	5,394	
Number of dwellings with running water								
hot and cold			1,940	2,530	3,472	4,243	4,907	
cold only			584	532	468	312	272	
total		1,559	2,524	3,062	3,940	4,555	5,179	
Number of dwellings with flush toilets		1,450	2,187	2,751	3,469	3,820	5,044	
Number of dwellings								
with installed bath or shower		1,270	1,938	2,483	3,375	4,171	4,861	

Dwellings per thousand people							
1 room(s)	8.09	5.6	4.6	3.2	3.1	2.6	2.7
2	14.55	13.1	11.8	9.1	6.7	6.1	6.7
3	19.08	22.2	24.6	23.8	21.6	19.8	22.5
4	30.07	36.7	47.8	50.1	48.0	43.0	44.9
5	33.06	38.1	48.0	54.5	59.3	64.1	65.7
6	40.29	44.1	47.3	51.2	54.1	55.8	56.7
7	27.56	26.9	26.5	26.0	26.1	27.0	29.9
8	20.53	18.9	17.1	16.1	14.7	15.5	17.3
9	24.09	18.2	15.8	12.7	12.8	13.8	13.69
Total	217.17	223.8	243.5	246.7	246.4	247.7	260.1
Value of dwellings in 1961 dollars per head	3,385	3,413	3,646	3,701	3,743	3,828	3,738
Index of value of housing per head	85.8	90.3	96.3	98.8	100.0	101.2	106.4
Quality of housing							
% running water (P_1)		.64	.74	.79	.89	.94	.96
% flush toilet (P_2)		.56	.64	.71	.79	.79	.94
% bath & shower (P_3)		.49	.57	.64	.77	.86	.90
Quality index [a]		.83	.87	.89	.93	.95	.98
Revised housing index [b]		78.9	88.2	92.5	97.9	101.3	109.8

[a] Quality index = $.6 + 1P_3 + 1P_2 + 2P_1$.
[b] Revised housing index = housing index × quality index (based 1961 = 100).

TABLE 2 (continued)

F. Health

	Unit	1935	1940	1945	1950	1955	1960	1965	1968	1961 Price Dollars per Unit
Physicians in active fee practice	No. per 1,000 people	.7184	.7434	.7463	.7445	.7687	.8102	.8379	.8795	26,000
Dentists in active fee practice	No. per 1,000 people	.3572	.3474	.3495	.3183	.3217	.3068	.3025	.3017	24,000
Graduate nurses in hospitals	No. per 1,000 people	.6415	.7097	.8087	1.2757	1.5321	1.8931	2.1914	2.5248	25,000
Hospital beds	No. per 1,000 people	8.526	9.952	9.381	10.179	10.688	10.345	10.478	10.220	3,590
Value	$ per head	73.80	80.26	81.74	95.51	104.45	112.73	121.53	129.85	
	1961 = 100	68	75	75	88	96	104	112	120	

TABLE 2 (continued)

G. Education

	1935	1940	1945	1950	1955	1960	1965	1968	Cost Inclusive of Forgone Earnings 1961 Dollars
Number of students ('000s)									
Primary	1,877	1,818	1,735	1,956	2,184	3,234	3,818	4,127	300
Secondary	277	329	307	349	387	715	1,150	1,324	1,600
Undergraduate	33	36	38	69	65	95	164	237	3,600
Graduate	1.5	1.6	1.7	5.3	4.9	9.1	21.9	35.2	8,000
Students per 100 people									
Primary	17.31	15.97	14.39	14.26	13.91	18.43	19.44	19.89	
Secondary	2.55	2.89	2.54	2.55	2.47	4.00	5.85	6.38	
Undergraduate	.30	.32	.31	.50	.41	.53	.83	1.14	
Graduate	.0138	.0141	.0141	.0387	.0312	.0509	.1115	.1700	
Expenditure $ per head at 1961 prices	104.85	106.68	96.32	104.71	98.57	4.52	190.96	216.55	
Index (1961 = 100)	69	71	64	69	65	95	127	144	

TABLE 2 (continued)

H. Transport and Communication

	Unit	1935	1940	1945	1950	1955	1960	1965
Transport								
Civil aviation	Passenger miles per capita	.732	3.617	13.184	42.577	81.622	159.318	257.865
Railroad	Passenger miles per capita	146.11	191.24	528.51	205.38	184.21	126.68	135.71
Motor buses	Passengers carried per capita	5.24	5.73	8.26	9.81	5.10	3.43	2.65
Urban transport	Passengers carried per capita	103.39	116.14	127.57	113.80	77.47	57.59	50.11
Automobiles (stock)	Number per capita	.091	.108	.096	.139	.187	.230	.269
Motorcycles (stock)	Number per capita	.0010	.0012	.0012	.0032	.0023	.0019	.0038
Communication								
First-class letters	Number per capita	(34.87)	(34.87)	(34.87)	38.00	(41.06)	45.40	45.20
Telephones	Number per capita	.057	.064	.078	.110	.145	.221	.270
Telegrams	Number per capita	.882	.989	1.305	1.351	1.139	.768	.587
Cablegrams	Number per capita	.120	.145	.182	.123	.143	.142	.155
Automobile & motorcycle								
Value		40.36	47.90	45.58	61.77	82.95	101.95	119.36
Index	(1961 = 100)	38	46	41	59	79	97	114
Purchased transport								
Value		28.97	32.37	45.06	37.09	26.96	23.17	25.91
Index	(1961 = 100)	127	142	198	163	118	102	109
Transport inclusive of automobiles								
Value		69.32	80.26	87.65	98.86	109.91	125.12	144.27
Index	(1961 = 100)	54	63	69	77	86	98	113
Communication								
Value		9.96	11.01	13.44	15.97	18.02	22.53	25.57
Index	(1961 = 100)	42	47	57	68	77	96	109
Transport & communication								
Value		79.29	91.27	101.09	114.83	127.93	147.66	169.84
Index	(1961 = 100)	52	60	67	76	85	98	112

	Unit	1968	1961 Price Dollars per Unit	Percentage Not attributable to Business Use	Imputed Price Dollars per Unit
Transport					
Civil aviation	Passenger miles per capita	388.273	0.0557	67	0.0371
Railroad		123.10	0.0312	75	0.0234
Motor buses	Passengers carried per capita	2.89	0.81	100	0.81
Urban transport		50.81	0.20	100	0.20
Automobiles (stock)	Number per capita	.302	553.32	80	442.66
Motorcycles (stock)		.0068	92.22	80	73.78
Communication					
First-class letters	Number per capita	50.33	0.05		
Telephones		.302	75.63		
Telegrams		.426	3.90		
Cablegrams		.196	3.90		
Automobile & motorcycle					
Value		134.19			
Index	(1961 = 100)	128			
Purchased transport					
Value		29.79			
Index	(1961 = 100)	131			
Transport inclusive of automobiles					
Value		163.97			
Index	(1961 = 100)	128			
Communication					
Value		27.78			
Index	(1961 = 100)	118			
Transport & communication					
Value		191.76			
Index	(1961 = 100)	127			

TABLE 2 (continued)

I. Quantity Indexes for the Main Categories of Expenditure

	1931	1935	1940	1945	1950	1955	1960	1965	1968	Value in 1961 $ per Head	Growth Rate
Food (including soft drinks)		88	91	102	96	103	102	104	107	375.43	0.6
Alcohol		47	69	77	84	93	100	113	130	61.03	3.2
Tobacco		59	76	98	88	90	97	104	102	56.38	2.9
Housing (no. of rooms)	86					99	100	101	106		
Housing (with quality index)		(73)	(78)	(83)	(88)	93	98	101	110		0.6
Automobiles		38	46	41	59	79	97	114	128	105.05	3.6
Purchased transport		127	142	198	163	118	102	109	131	22.79	0.1
Communication		42	47	57	68	77	96	109	118	23.54	3.1
Appliances		17	32	11	68	129	98	127	157	18.68	6.8
Education		69	71	64	69	65	95	127	144	150.79	2.2
Health		68	74	75	88	96	104	112	120	104.48	1.7
Clothing		83	102	127	105	102	97	116	114	59.56	0.9
Total Consumption		67	74	84	85	94	99	111	120	1,538.30	1.8

NOTE: All time series are from other parts of Table 2. The value shares used in computing total consumption on the last line are not those in this table but are, instead, taken from the national accounts and reproduced in the first column of Table 1. In estimating total consumption, index numbers of recreation and miscellaneous are incorporated from the national accounts because there are no quantity data on these items.

TABLE 2 (continued)

J. Quality Indexes (1961 = 100)

	1935	1940	1945	1950	1955	1960	1965	1968	% Growth Rate
Food (including soft drinks)	78	86	97	96	93	100	100	100	0.8
Alcohol	70	63	85	101	101	99	99	90	0.8
Tobacco	64	63	86	92	91	100	100	97	1.3
Housing					81	97	115	127	1.5
Automobiles	84	91	29	122	115	102	121	114	0.9
Purchased Transport	41	44	58	68	84	98	102	94	2.5
Communication	83	83	91	100	103	100	110	119	1.1
Education	59	60	76	89	100	89	127	142	2.7
Health	92	102	120	121	127	152	100	107	0.5
Clothing	71	68	82	83	89	104	90	94	0.9
Total Consumption	76	80	87	95	98	103	104	103	0.9

NOTE: All quality indexes are ratios of "Quantity Indexes Implicit in the National Accounts" and "Quantity Indexes for the Main Categories of Expenditures."

TABLE 2 (concluded)

K. Quantity Indexes Implicit in the National Accounts (1961 = 100)

	1935	1940	1945	1950	1955	1960	1965	1968	Value in $ per head	Growth Rate
Food	69	79	99	93	96	102	104	107	266.37	1.4
Alcohol	33	44	66	85	94	99	112	118	51.49	3.8
Tobacco	38	51	85	81	82	97	105	99	40.79	2.9
Housing (inclusive of fuel, rent, furniture, appliances, household operation)	51	57	60	71	85	97	117	130	355.96	2.8
Actual and imputed rents	48	50	58	65	81	97	117	135	248.77	3.2
Automobiles	32	42	12	72	91	99	139	146	126.38	4.6
Purchased transport	52	63	115	112	100	100	112	124	34.27	2.6
Communication	35	39	52	68	79	96	120	140	20.67	4.2
Education	41	43	49	62	65	85	162	205	13.82	4.9
Health	63	76	90	107	122	159	113	129	56.80	2.2
Clothing	59	70	103	88	91	101	105	107	124.79	1.8
Recreation	45	55	64	81	104	96	116	126	182.38	3.1
Miscellaneous	44	45	73	70	91	99	118	138	222.56	3.5
Miscellaneous (minus unallocated sales tax)	47	48	77	71	94	101	114	129	207.30	3.1
Total consumption	51	59	73	81	92	102	115	124	1,377.34	2.8

Further Notes to Table 2

The numbers in parentheses are quantities per head which, for the want of data, are interpolated or extrapolated from the rest of the series of which they form a part. Except where stated otherwise, prices are either from records of Statistics Canada or are current prices deflated to 1961 by a component of the consumer price index. Publications of Statistics Canada are identified by the letters DBS, standing for Dominion Bureau of Statistics, which was the name of Statistics Canada when these publications were released.

Food: The quantity data are from *Food Consumption in Canada,* DBS 32-226. This publication presents the data as pounds per head of domestic disappearance, and only minor adjustments were necessary in transferring the data to Table 2. For the years prior to 1955, eggs were converted from dozens to pounds at a rate of 1.53. Chickens are converted from dressed to eviscerated weight at a rate of .76 and from eviscerated to edible weights at a rate of .71; these conversions are made for other poultry at rates of .85 and .79; and prices are adjusted accordingly. Though Table 2 contains data on fresh, canned, frozen, and dried vegetables separately, all quantities are expressed in "fresh equivalents," and all prices are "fresh equivalent" prices; that is, either prices of fresh vegetables or prices of other forms of vegetables adjusted by the same factors used to convert pounds of canned, frozen, or dried vegetables to a fresh equivalent basis. Conversion factors between canned, dried, or frozen vegetables and fresh equivalents are contained in *Food Consumption in Canada.* The same principle is applied in converting quantities of fruit to fresh equivalents and in converting quantities of dairy products into pounds of milk solids. Quantities of flour were evaluated at the price of bread because most flour is consumed in that form. The apparent fall in the quantity of grapes consumed between 1955 and 1958 is due to the fact that the early figures refer to the fresh equivalent of grapes consumed in all forms—as fresh fruit, jams, preserves and raisins—while the later figures refer only to fresh fruit, and grapes consumed as jams, preserves, etc., are included as "unspecified."

Alcohol, Tobacco, Soft Drinks, Clothing, Appliances: Quantities consumed of alcohol, tobacco, soft drinks, and appliances are estimated as domestic disappearance, shipments of domestic firms plus imports minus exports, and the sources of data are indicated in Table 4. However, consumption of clothing is estimated from domestic shipments alone because data on international trade in clothing are unavailable for the years prior to the revision of the trade classification in 1961.

Prices of clothing and appliances are unit values of shipments. These are satisfactory surrogates for retail prices if wholesale prices of imported and exported items are the same as prices of items domestically produced, and if retail margins are the same for imported items as for domestically produced items. If these conditions hold, it does not matter that items are valued at wholesale prices because growth rates of consumption in each major category are aggregated by value shares of expenditure in constructing the total growth rate of real consumption in Table 1. Prices of alcohol, soft drinks and tobacco were obtained from local distributors in Kingston.

Transport and Communication: Quantities of transport and communication in Table 2 are estimated from these sources: DBS publications 51-202, 52-210, 53-215, 53-D-20, 53-216, 53-219, 56-203 and 56-201. Data on passenger-miles ought to refer to miles traveled by Canadians but they do not; they refer to passenger-miles supplied by Canadian carriers. I have made rough guesses as to shares of the different means of transport attributable to business and personal use. Urban transport includes buses, trolley cars, streetcars, charter buses, and subways. Unfortunately there are no data on number of fares prior to 1946; the numbers in the table were gotten by supposing that total use of urban transport is proportional to nonagricultural employment (M.C. Urquhart and K. Buckley, *Historical Statistics of Canada,* series C59 and C66). The estimate of the number of pieces of first-class mail is based on data supplied by the Post

Office supplemented by data from Urquhart and Buckley, *Historical Statistics of Canada*. There are no data on amounts of first-class mail in the first decade of our period but estimates for the years 1900 to 1915 in Urquhart and Buckley suggest that we are not too wide of the mark in guessing that the number of letters sent grew in proportion to population.

Prices of purchased transport and communication are unit values, revenues divided by quantities, in the year 1961. Use prices of automobiles are imputed by dividing the estimate of total private expenditure on automobiles in the national accounts by the number of automobiles in the year 1961. In this calculation motorcycles are counted as sixths of automobiles.

Medicine: Numbers of physicians and dentists are from Urquhart and Buckley, (B108 and B111) p. 44, supplemented for the years after 1960 with data from *Earnings of Physicians in Canada*, Health Care Series #21 and #25, Department of Health and Welfare, and *Earnings of Dentists in Canada*, Health Care Series #26, Department of Health and Welfare. The number of graduate nurses in hospitals (DBS 83-212, Hospital Statistics III, Hospital Personnel) is combined with the number of hospital beds (DBS 83-210) to serve as a surrogate for the remainder of medical expenditure. Consequently, the imputed price of nurses is not the actual wage but a substantially higher figure, and the value imputed to hospital beds is the total value of medical services over and above the imputed value of doctors, dentists, and nurses in 1961. This measure of real consumption in medicine shares with the measure in the national accounts the defect that it is of inputs to medicine rather than outputs of health.

Education: The number of students are from Urquhart and Buckley, Section 5, with additional information supplied by S. Zsygmond of the education division of DBS and some interpolation to fill in gaps in the data. Estimates of cost are based on communications from Barry Lacombe of the Economic Council and David Dodge of the Ministry of Finance, Ottawa.

Housing: The data on numbers of dwellings subdivided according to numbers of rooms and on numbers of houses with running water, flush toilets and installed bath and shower are from *Household Facilities and Equipment*, DBS 64-202 for the years from 1953 to the present. The earlier data are from the census: *Census of Canada, 1931, Volume I, Summary*, Chapter XX, p. 329; *Census of Canada, 1941, Volume IX, Housing*, Table 6b, p. 20; *Census of Canada 1951, Volume III, Housing and Families*, Table 12, p. 12. Prices of new houses are used as surrogates for rents. These prices are supplied by Dev Khosla of Statistics Canada and they are from a so far unpublished survey of house characteristics and house values. The surrogates are adequate if rents are proportional to house prices.

In principle, a quality index could be devised along the lines followed in constructing hedonic price indexes. I have instead constructed an index with arbitrarily chosen weights and designed to be multiplied with the index of housing based on number of rooms. The index gives a value of 1 to a house with running water, flush toilets and installed bath and shower, and a value of 0.6 to a house of the same size with none of these.

Table 2 as it stands is a condensation of a larger table in which quantities are presented for every available year from 1935 to 1968. The full table is available from the author on request. See Tables A and B for sources of data.

TABLE A
Sources of Data: Alcohol, Tobacco and Appliances

Commodities	DBS Catalogue Number	Table Name (1935–1951)	DBS Catalogue Number	Table Name (1952–1960)	DBS Catalogue Number	Table Name (1961–1968)	Import Number 1935–1960 in *Trade of Canada* 65–203	Export Number 1935–1960 in *Trade of Canada* 65–202	Import Number 1961–1968 in *Trade of Canada* 65–203	Export Number 1961–1968 in *Trade of Canada* 65–202
Alcohol										
Spirits	32-206	Production	32-206	Production & Sales Excluding Sales Tax and Other Duties	32-206	Production & Sales Excluding Sales Tax & Other Duties	1511-1516	1020, 1030, 1040	17360, 17310, 17320, 17330, 17340	17320, 17340, 17399
Wine	32-207	Production of Wine	32-207	Shipments of Own Manufacture (Matured Wines)	32-207	Shipments of Own Manufacture (Matured Wines)	1530, 1531	1060	17230, 17250	17299
Beer	32-205	Statistics of Products Made in Brewing Industry	32-205	Shipments of Goods of Own Manufacture	32-205	Shipments of Goods of Own Manufacture	1501	1010	17220	17220

(continued)

TABLE A (continued)

Commodities	DBS Catalogue Number	Table Name (1935–1951)	DBS Catalogue Number	Table Name (1952–1960)	DBS Catalogue Number	Table Name (1961–1968)	Import Number 1935–1960 in *Trade of Canada* 65–203	Export Number 1935–1960 in *Trade of Canada* 65–202	Import Number 1961–1968 in *Trade of Canada* 65–203	Export Number 1961–1968 in *Trade of Canada* 65–202
Tobacco										
Cigarettes	32-225	Production of Domestic Cigarettes	32-225	Factory Shipments of Domestic Cigarettes	32-225	Factory Shipments of Domestic Cigarettes	1785	1560	18330	18330
Cigars	32-225	Production of Domestic Cigars	32-225	Factory Shipments of Domestic Cigars	32-225	Factory Shipments of Domestic Cigars	1784	1550	18350	18350
Appliances										
Electric Stoves	43-201	Number & Selling	43-201	Factory Shipments	43-204	Factory Shipments	5716		66115	
Gas stoves	43-201	Value of Stoves Made in Canada	43-201	of Stoves Made in Canada	43-204	of Stoves Made in Canada	5717		66211	
Washing machines	43-201	Production of Domestic Washing Machines	43-201	Factory Shipments of Domestic Washing Machines	43-204	Factory Shipments of Domestic Washing Machines	5450, 5451	5611	69805, 69809	69809

Vacuum cleaners	43-201	Production of Electric Vacuum Cleaners & Parts	43-201	Factory Shipments of Electric Vacuum Cleaners & Parts	43-203	Factory Shipments of Electric Vacuum Cleaners & Parts	5590	5442	69209	
Refrigerators	43-201	Production of Electric Refrigeration Equipment	43-201	Factory Shipments of Household Refrigeration Equipment	43-204	Factory Shipments of Household Refrigeration Equipment	9079, 9080	9190	65541, 65543	65054
Radio sets	43-201	Production of Complete Radio Receiving Sets	43-201	Factory Shipments of Complete Radio Receiving Sets	43-205	Factory Shipments of Complete Radio Receiving, Sets	6175	6450	63035, 63036	63038
TV sets	43-201	Production of Television Sets (Commences in 1949)	43-201	Factory Shipments of Television Sets	43-205	Factory Shipments of Television Sets	6174		63937	63037
Home freezers	43-201		43-201	Factory Shipments of Home Freezers	43-204	Factory Shipments of Home Freezers	9092		65546	
Toasters	43-201	Production of Electric Toasters	43-201	Factory Shipments of Electric Toasters	43-204	Factory Shipments of Electric Toasters			66159	
Electric ironers	43-201	Production of Electric Flat Irons	43-201	Factory Shipments of Flat Irons	43-203	Factory Shipments of Flat Irons	5454		69835	
Clothes dryers	43-201		43-201	Factory Shipments of Clothes Dryers	43-204	Factory Shipments of Clothes Dryers	5448		69829	

(continued)

TABLE A (concluded)

Commodities	DBS Catalogue Number	Table Name (1935–1951)	DBS Catalogue Number	Table Name (1952–1960)	DBS Catalogue Number	Table Name (1961–1968)	Import Number 1935–1960 in *Trade of Canada* 65–203	Export Number 1935–1960 in *Trade of Canada* 65–202	Import Number 1961–1968 in *Trade of Canada* 65–203	Export Number 1961–1968 in *Trade of Canada* 65–202
Incandescent light bulbs	43-201	Production of Electric Lamps (Bulbs)	43-201	Factory Shipments of Electric Lamps (Bulbs)	43-210	Factory Shipments of Electric Lamps (Bulbs)	6148		68202	
Water heaters	43-201	Production of Electric Water-Tank Heaters	43-201	Factory Shipments of Domestic Water-Tank Heaters	43-203	Factory Shipments of Domestic Water-Tank Heaters	5732		65353, 65369 65371	
Soft drinks	32-208	Production of Carbonated Beverages (All Industries by Province)	32-208	Shipments of Own Manufacture	32-208	Shipments of Own Manufacture			17199	17199

TABLE B

Sources of Data: Clothing

DBS Catalogue Number		Title of Source		Table Name		Imports Vol. III *Trade of Canada* (65-203) Annual (1961–1968: Table 3)	Exports Vol. II *Trade of Canada* (65-202) Annual (1961–1968: Table 3)
1935–1960	1961–1968	1935–1960	1961–1968	1935–1960	1960–1961		
31-201	31-211	Manufacturing Industries of Canada	Products Shipped by Canadian Manufacturers	Alphabetical List of Products Manufactured in Canada–Year	Products Shipped by Canadian Manufacturers –Year	Underwear & sleepwear No. 78119-78199 Outwear No. 78304-78390 Outwear knitted No. 78404-78489 Apparel Accessories No. 78921 Hosiery No. 78522-78549 Headwear, Gloves and Mittens No. 78618-78635; 78649-78683 Footwear No. 79012-79099	Underwear No. 78009 Sleepwear No. 78019 Outwear No. 78022, 78037, 78045, 78093, 78094 Hosiery No. 78055-78059 Headwear, Gloves and Mittens No. 78065-78069 Footwear No. 79012–79099

all items of food consumption included in Table. 2. However, the list of foods in Table 2 is not quite complete. It excludes salt, spices, and I do not know how much else. To compensate for the missing items in Table 2, I have assessed the share of food in the growth rate of Total Consumption in the last row of the right-hand column of Table 1 by weighting the estimated growth rate of food consumption by the value share of food consumption in 1961 in the national accounts, rather than by the corresponding value share derivable from Table 2. This procedure would yield the correct result if consumption of items of food excluded from Table 2 grew at the same rate as consumption of the items included in the table.

A much more important instance of missing data is that the quantity of clothing is measured by shipments of domestic producers rather than by shipments plus imports minus exports, because the data on quantities exported and imported are only available for the final decade of the series. My weighting procedure compensates for the missing data on exports and imports if, and only if, the proportion between shipments and consumption of clothing has remained constant over time. As we have no quantity data on fuel and furniture, I assume the growth rates of consumption of fuel and furniture to be the same as the growth rate of consumption of the services of houses; the value of housing in Table 1 includes fuel and furniture, but the quantity data pertain to housing alone.

Missing data for particular years within a time series were interpolated or extrapolated; interpolated or extrapolated data are put in parentheses to distinguish them from genuine quantity data.

(ii) The choice of the base year. The year 1961 was chosen as the base year because it is the most recent base year in the Canadian national accounts and because Statistics Canada has a good deal of price data for that year. Though it would be interesting to compare my measure of real consumption with one constructed from prices of an earlier year, I have not done so because prices have proved difficult to obtain. An attempt to measure the rate of growth of food consumption using 1935 prices, obtained for the most part from advertisements in newspapers, showed that the change of base year had no appreciable effect. The choice of the base year has a significant effect on the measure of the growth rate of the quantity of purchased transport, because there has been a substantial shift over time from trains and buses to airplanes, and a gradual fall in the relative price of air transport and surface transport.

(iii) Public and private consumption. The attempt to specify outputs

of health and education gives rise to two interesting problems in pure accounting. The first problem is one which is latent in the measurement of real consumption by deflation, but which is brought into the open when one measures consumption from quantity data. The issue is simply that health and education are provided partly in the public sector and partly in the private sector. Expenditure on health is not looked upon as a unity in the national accounts, because the first and fundamental division of expenditure in the accounts is between the public and private sectors, and as it turns out in the Canadian accounts, private expenditure on health and education is included in personal consumption, and public expenditure on these items is included in total government consumption but not presented separately anywhere in the accounts. One can discover from the accounts how much private individuals spent on health and education in current dollars or in 1961 dollars, but one cannot find out how much was spent in total or whether society's total real consumption of these items is increasing or not. For growth accounting, one needs statistics of gross national expenditure subdivided in the first instance by commodities, objects or purposes, rather than by agents, so that public and private expenditure on the same or closely connected objects might be combined. The need is especially acute when the dividing line between the public and private sectors is changing over time. This information is not now provided in the Canadian national accounts.

The second accounting problem concerns the distinctions between consumption, investment, and intermediate products. It is a convention in the national accounts that with certain exceptions which need not concern us here, all public expenditure is counted as final product, and any public expenditure that does not lead to the creation of tangible capital is counted as public consumption. This convention evolved at a time when the main purpose of the accounts was to serve as a tool of stabilization policy, and the convention is reasonable in that context. The convention is less reasonable in the context of measuring economic growth, for as has often been observed, a large part of what the accounts classify as government consumption might be classified instead as public cost of production. No one derives direct enjoyment from the activity of the Ministry of National Revenue. The collecting of taxes is not a consumption good. It is intermediate, and its contribution is as a prerequisite to the production of goods and services already included in the accounts.

A very crude classification by purpose of combined public and private expenditure is presented as Table 3. The first column entitled "cost of

TABLE 3

Expenditure by Purpose, 1961
(Millions of Dollars)

	Cost of Production (1)	Consumption (2)	Gross Investment (3)	Consumption + Gross Investment (4)
Food, alcohol, and tobacco		6,541		6,541
Clothing		2,276		2,276
Housing				6,329
Rents & imputed rents		3,656		
Fuel		412		
Electricity		347		
Gas		122		
Residential construction			1,792	
Furniture		1,955		1,955
Recreation		1,157		1,157
Miscellaneous consumption		4,059		4,059
Transport [a]				2,130
Purchase and use of automobiles	1,138	1,137		
Other (private)	208	417		
Construction of roads and bridges			874	
Public current expenditure	214			
Communication [b]				598
Telephone (private)		324		
Post and telegraph (private)		53		
Public expenditure	116	221		
Education [c]				2,877
Private expenditure	←	252	→	
Forgone earnings of students	←	1,053	→	
Public current expenditure	←	1,248	→	
Public capital expenditure			356	

TABLE 3 (concluded)

	Cost of Production (1)	Consumption (2)	Gross Investment (3)	Consumption + Gross Investment (4)
Medicine [d]				2,159
Services of doctors, etc.	←	580	→	
Hospital care (private)	←	207	→	
Drugs (private)	←	310	→	
Other (private)	←	39	→	
Public current expenditure	←	845	→	
Public capital expenditure			178	
Research [e]				859
Government			135	
University			51	
Business			141	
Government n.e.s. [f]				409
Defense	1,647			
General government	571			
Natural resources	605			
Public safety	489			
Foreign aid		67		
Public investment n.e.s.			342	
Industrial Investment [g]			6,619	
Total (with current expenditures on education and health included as consumption)		27,327	10,489	38,833

NOTE: Entries in column (1) refer only to costs of production borne by consumers or by government and counted as final product in the official accounts.

Further Notes to Table 3.

Except where stated otherwise, the data are from unpublished and preliminary estimates by Statistics Canada of personal consumption expenditure and of capital formation in the public sector. The reader should be warned that my attempt to apportion public expenditures among purposes is crude, that some items of expenditure may have been overlooked, and that there may be some double counting.

[a] To convert transport to work from a final product to an intermediate product, one-half of private expenditure on automobiles and one-third of other private expenditure on transport are attributed to cost of production rather than consumption. Public expenditure on road maintenance is counted as cost of production, a procedure consistent with the treatment of maintenance and repair in the private sector. Ideally the accounts should include as part of consumption an imputation for the services of roads. Public current expenditure on transport in Table 3 is the difference between total public expenditure on transportation (1,088 million) as estimated in *A Consolidation of Public Finance Statistics 1961*, DBS 68-202, Table 2, and total gross capital formation on roads and bridges.

[b] Public expenditure on communication is estimated from the source cited in *a;* one-third is assumed to be the cost of production.

[c] Public current expenditure in education is the residual when private expenditure (252 million), scholarships (12 million), current expenditures on research in universities (65 million), and capital formation in schools and universities (356 million) are deducted from total expenditure (1,913 million) as estimated in *Survey of Educational Finance 1961*, DBS 81-208, Table 1. Expenditure on research in universities is included elsewhere in Table 3.

[d] Total public expenditure on health is from *A Consolidation of Public Finance Statistics 1961*, DBS 68-202, Table 2. Public current expenditure is this total less capital formation in hospitals.

[e] *Industrial Research and Development Expenditure in Canada*, DBS 13-532, Table 2 of Section 4. Values for 1963 are reduced by 22 per cent, for it has been estimated that expenditures on research have been growing at 11 per cent a year.

[f] See note *a*.

[g] Total investment by firms less capital expenditures by firms on research (27 million dollars).

production" includes only those intermediate products (or what I choose to call intermediate products) which are counted as final products in the accounts. It is supposed that half of private expenditure on automobiles, one-third of other transport, all public expenditure on transport, and all of defense and "general government," are costs of production, in that they contribute to welfare indirectly through the intermediary of other goods and services. Similarly, both current and capital expenditures on research are counted as investment, because benefits from these expenditures accrue in the future and not in the current year. Health and education are not classified as cost of production, or as consumption, or as investment exclusively, because they share attributes of all three categories. Education is net investment when it leads to an increase in the stock of human capital. Education is

cost of production (analogous to maintenance and repair of physical capital) when it preserves the stock of human capital by replacing skills of men who leave the labor force. Looked at from a different point of view, education is consumption, like going to the movies or reading a newspaper or hiring a baby-sitter. I have been conservative in adjusting values of consumption in Tables 1 and 2 because I wished to emphasize the contrast between deflation and revaluation, and not accounting problems per se. No private expenditure was shifted from consumption to cost of production, but private consumption was enlarged to include current public expenditure on health and education, for the quantity series pertain to health and education as a whole.

(iv) Quality and quantity. This distinction is by no means absolute, for the rate of quality change depends on what aspects of a good or service one is able to, or chooses to, record as quantity data. The shift over time from cereal consumption to meat consumption is quality change if the quantity of food is measured in calorific equivalents but not if cereals and meats are treated as separate goods. In Table 2, the shift from cereals to meats is recorded as an increase in the quantity of food consumed, but any improvement over time in the processing of food is unaccounted for in the quantity data and thereby assessed as part of quality change.

The available data on education would seem to permit us to measure the quantity of education either as numbers of students or as numbers of teachers and other inputs to the educational process. In conformity with its general procedure for expressing services in real terms, the national accounts deflate the value of education by a price index of inputs. We have chosen instead to measure the quantity of education by the number of students, subdivided into primary, secondary, undergraduate, and graduate, and evaluated at the cost per student in 1961 dollars inclusive of earnings forgone. Numbers of students has the advantage as a quantity indicator that it is an aspect of output rather than input, but it has the disadvantage that it fails to account for improvements in the quality of education resulting from changes in student-teacher ratios. Neither measure of the quantity of education captures the really important quality change manifested in the expansion of knowledge over time. Since we have no data on the output of health comparable to numbers of students as measures of the output of education, we follow the accounts in assessing output by input. The quantity index of health contains four items: numbers of doctors, numbers of dentists, numbers of graduate nurses in hospitals, and numbers of hospital beds. Services of doctors and dentists are evaluated

at their gross incomes. Graduate nurses in hospitals and numbers of hospital beds are together considered as surrogates for all other aspects of medicine, including drugs and services of medical equipment. Nurses' services are evaluated in Table 2 at a price substantially higher than the nurse's wage, and the value of the services of hospital beds is measured as the difference between total expenditure on medicine and estimated expenditure on doctors, dentists, and nurses. This measure of real consumption of medicine has little to recommend it other than the availability of data. But it is important to recognize that the problem of choosing measures of real output of health and education is not circumvented when real consumption is measured by deflation, for difficulties inherent in the choice of quantities are also inherent in the choice of a price index, and a true price index cannot be constructed unless one can specify exactly what it is that is being priced. The quantity indexes of health and education in Table 2 may not be much worse than corresponding quantity indexes implicit in the Canadian national accounts.

Housing is the one category for which I have adjusted original quantity data for what might be called quality change. The original data are numbers of dwellings subdivided according to numbers of rooms and evaluated according to the purchase price of dwellings in 1961, on the assumption that house rents are proportional to house prices. This time series of the quantity of housing is then adjusted for the percentage of dwellings with running water, flush toilets, baths, and showers to obtain the series used in measuring real consumption in Table 1. It is significant that the rate of quality change, the difference between real consumption assessed by deflation and real consumption assessed by revaluation, is much higher for housing than for any other category. This may be genuine quality change or it may be the outcome of errors of measurement in one or both of the time series.

(v) Stocks and flows. Ideally, real consumption should be a flow of services, and the increase over the year in the stock of consumer durables should be counted as investment. Housing is treated in this way in the national accounts, for rent is counted as part of real consumption and the purchase of new houses is counted as investment. Purchases of durables like automobiles, furniture, and appliances are counted as consumption rather than as investment, and no attempt is made to impute values of the services of these items. In measuring the quantity of services of automobiles, we assume that the flow is proportional to the stock, but we follow the national accounts in treating purchases of appliances as consumption, and in not imputing for services of the

stock. In connection with its forecasting models, the Bank of Canada has attempted to revise the measures of consumption and investment in Canada by treating the purchase of consumer durables as investment.

A COMPARISON BETWEEN THE TWO MEASURES OF REAL CONSUMPTION

The principal result of my calculations, as shown on the bottom line of Table 1, is that the rate of growth of real consumption per head is a full percentage point less when measured by revaluation of quantity data than when measured by deflation, 1.8 per cent per year as against 2.8 per cent per year in the national accounts. Part of the 1.0 per cent difference is undoubtedly quality change, part is due to conceptual differences between the series, and part is due to errors of measurement. Though we cannot apportion the 1.0 per cent among these factors, some insight can be obtained from the time series of quality change at the end of Table 2 and in the accompanying charts. A substantial improvement in the quality of food has been concentrated in the period prior to the end of World War II. Quality change ceased abruptly in 1947, and since then the deflated and revalued time series of real consumption have grown at about the same rate. I would be inclined to speculate that the apparent quality change before and during World War II is spurious, and that the revalued series is a fair representation of what should have been measured in the deflated series. The food series is the best of the quantity series. The coverage is detailed and comprehensive. The choice of 1961 as a base year does not seem to make much difference to the growth of the series; in fact, contrary to expectation, a very crude attempt to weight quantities at 1935 prices actually lowered the overall rate of growth. There may have been some improvement in the processing of food prior to World War II, but it is hard to see why the improvement should have been greater before the war than afterwards, considering that the introduction of frozen food occurred in the latter period. Tobacco and alcohol show a very rapid rise in quality between 1940 and 1945, and one cannot help suspecting that these quality changes are spurious too. On the other hand, the obviously spurious zigzags in the alcohol quality series prior to the war are transmitted from the quantity series, where they probably reflect my failure to adjust for changes in inventory. The rate of growth of quality of housing seems high, but it may be that there was a steady improvement over and above the qualities already incorporated into the quantity index. Part of the growth of the quality of housing is a

consequence of the gradual movement of people from farms and small towns, where housing is cheap, to the city, where housing is dear. This shift is counted as an increase in real consumption of housing in the deflated series but not in the revalued series. One can have very little confidence in the quality index of clothing because the coverage of the revalued series is incomplete. The quality indexes in medicine and education are almost meaningless, because the deflated series refer to private expenditure and the revalued series refer to total—public and private—expenditure. The bump in 1961 in the deflated and quality series is a consequence of a reclassification of certain hospital expenditures from the private to the public sector.

The very rapid growth of quality of purchased transport is implausible, but it is difficult to compare the accuracy of the deflated series and revalued series because of some very serious index number problems that arise in any attempt to construct real series in this category. From 1935 to 1968, air transport increased rapidly while urban transport, rail transport, and bus transport all declined. A crude attempt to reweight the time series of the components of the index of purchased transport at 1947 prices increased the rate of growth of the revalued series but not nearly enough to account for the growth in quality. Except for the war years, the deflated series and the revalued series for automobile services grew at about the same rate, so that the overall growth of the quality series is negligible. The apparent decline in quality of automobile services during the war is a consequence of our decision to measure the flow of automobile services by the stock of cars. The corresponding series in the national accounts includes purchases of new cars as well as operating expenses. During the war, the flow of new cars was cut off and gasoline consumption was reduced sharply, but the decline in the stock of cars was only moderate by comparison. The surprising feature of the automobile chart is that improvements commonly believed to have taken place in the quality of automobiles—improvements such as the automatic clutch, larger engines, and safety features—are not reflected in the quality series. It should perhaps be stressed that the quality series in automobiles, as in every other category of expenditure, is strictly a relation between the two quantity series. A genuine quality change not reflected in the time series of real consumption assessed by deflation would be excluded from our quality series as well.

Though the task of data collection in preparing this paper was considerable, the work itself is no more than a pilot study designed to elucidate the relation between indexes of real consumption, and to

illustrate in a very rough way the orders of magnitude of their growth rates. I doubt whether a really good set of quantity data will emerge until Statistics Canada takes a hand in creating it and makes an effort to attach quantity series to as many as possible of the items in the accounts.

[Appendix figures begin on the following page.]

APPENDIX: GRAPHS OF REAL CONSUMPTION AND QUALITY CHANGE

FIGURE 1

Total Consumption

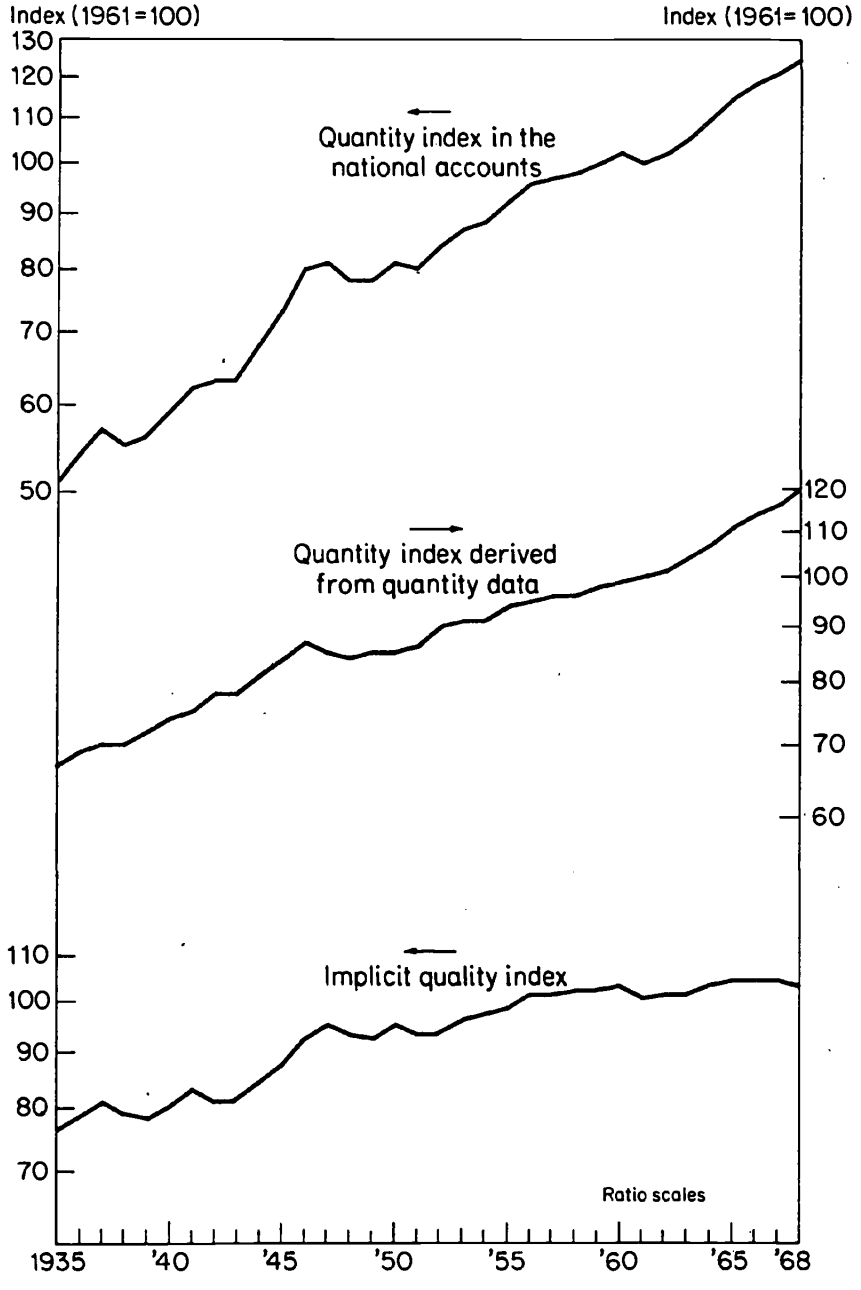


FIGURE 2

Food

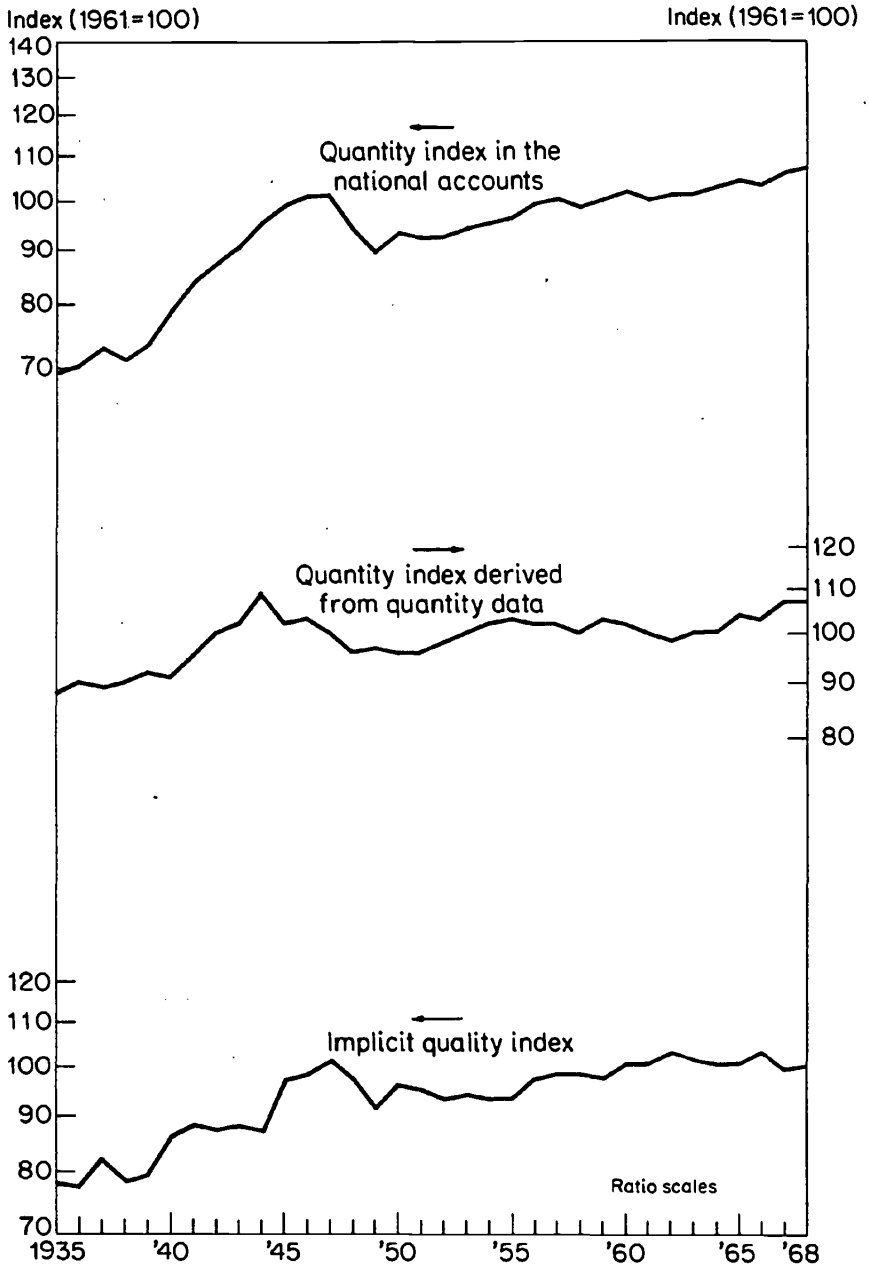


FIGURE 3

Alcohol

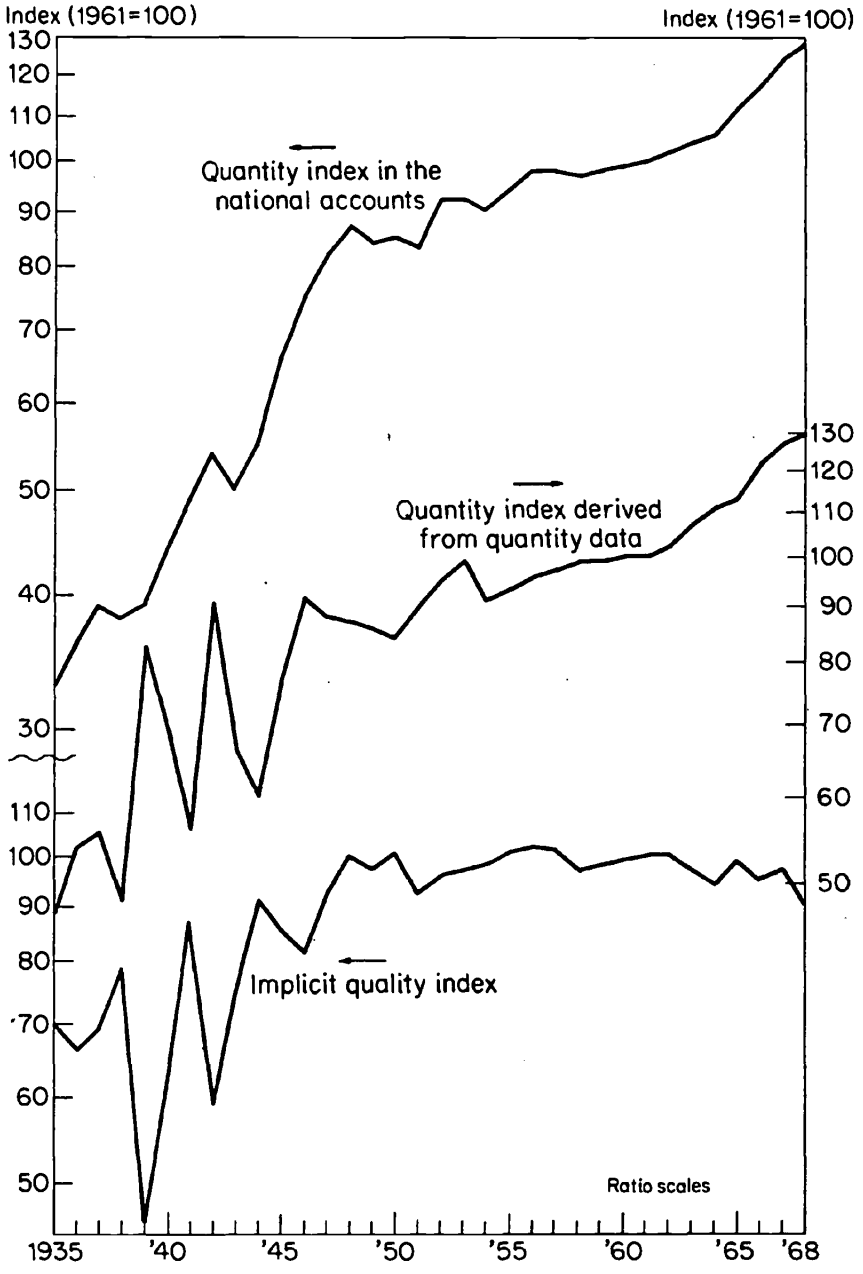


FIGURE 4

Tobacco

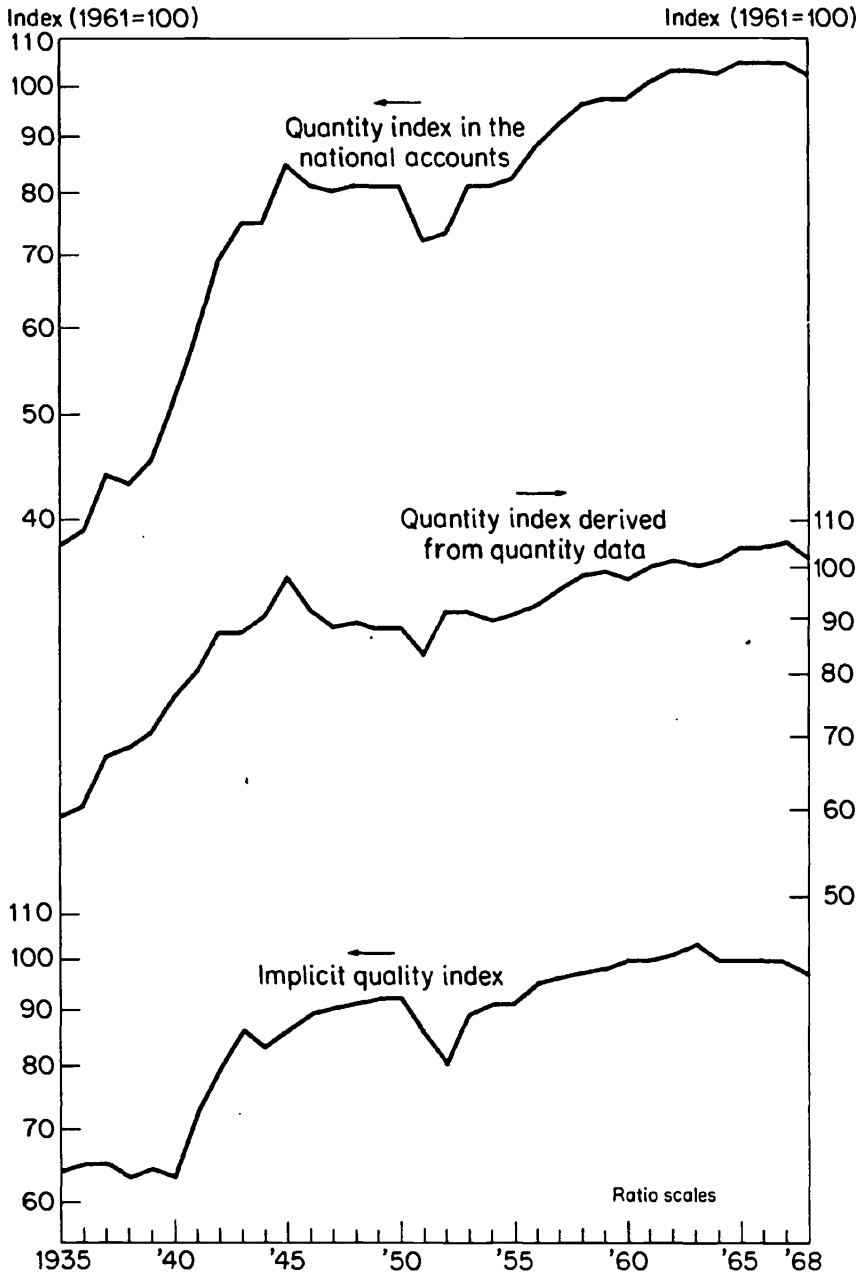


FIGURE 5

Clothing

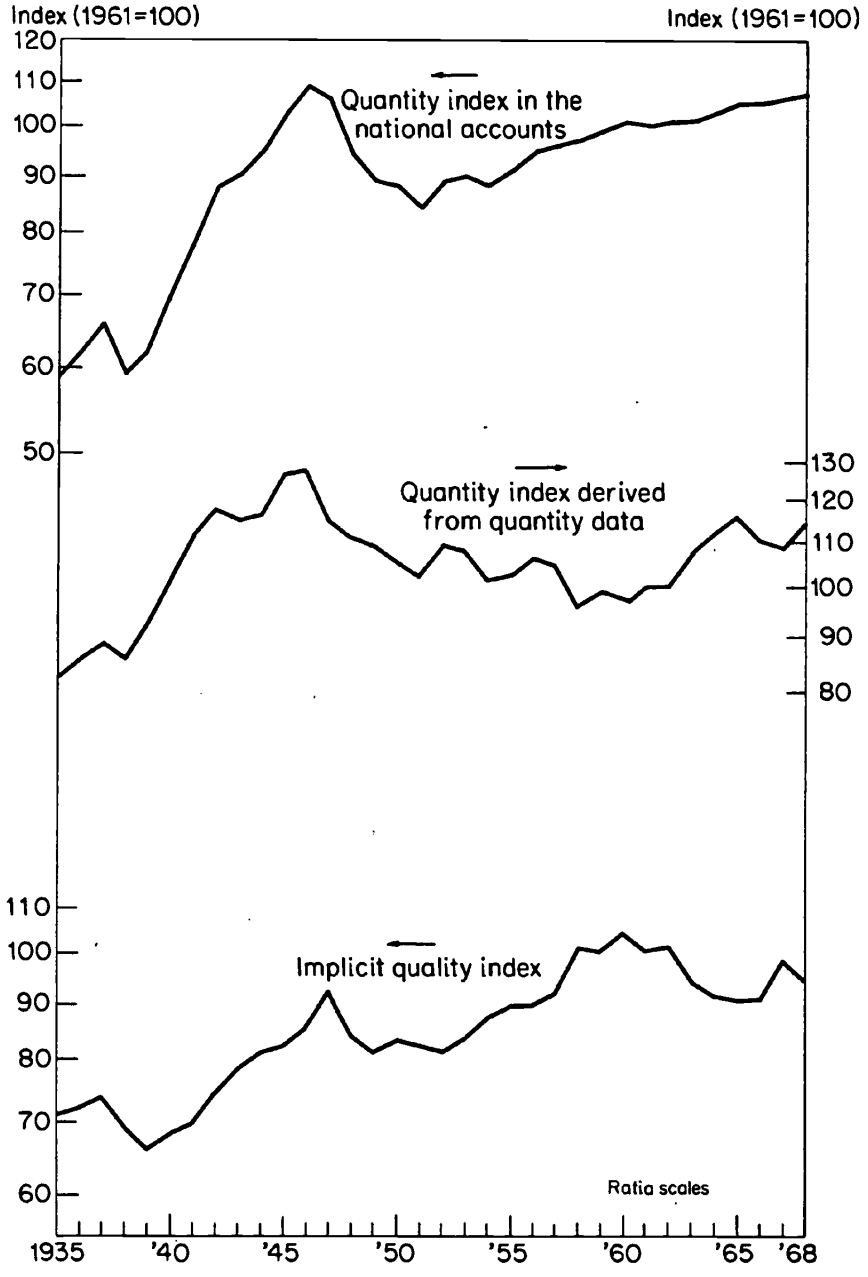


FIGURE 6

Housing

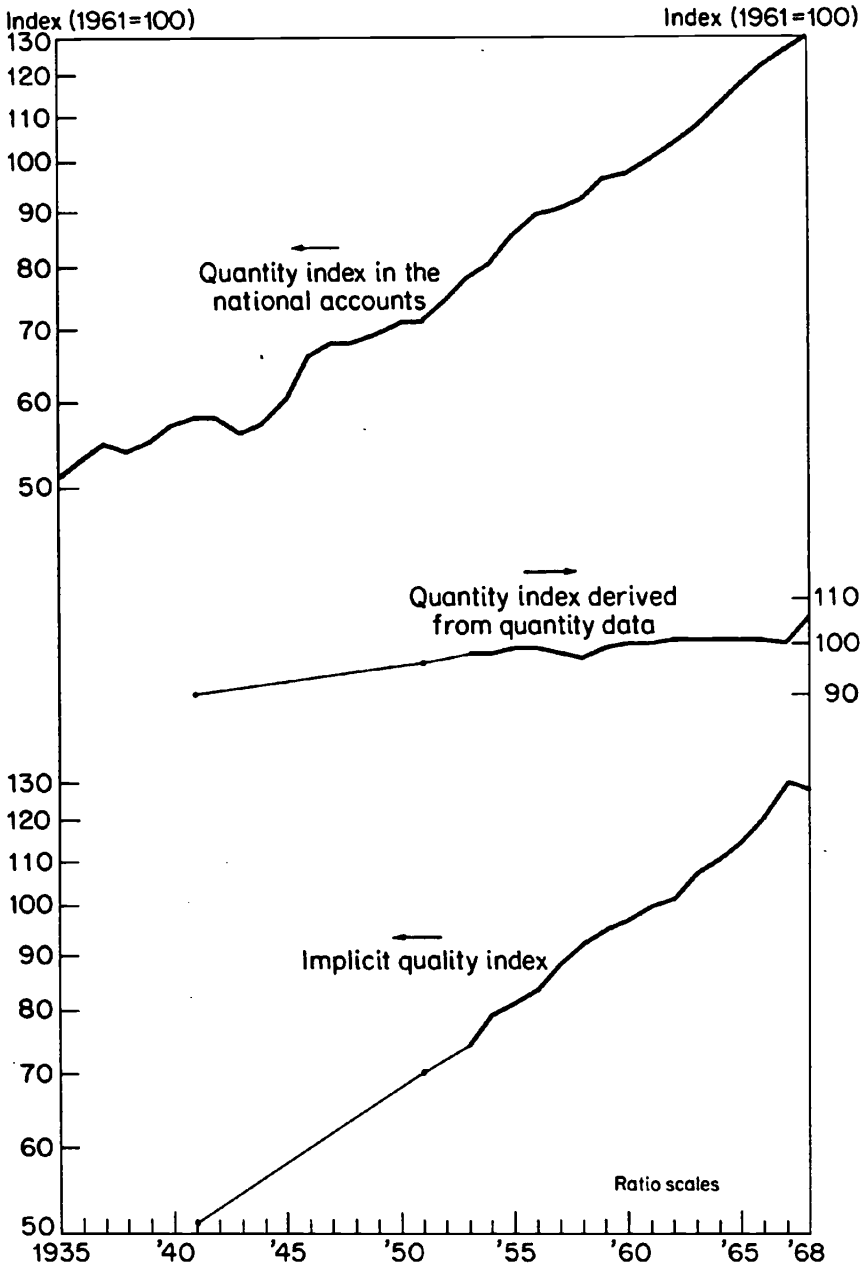


FIGURE 7

Medical Services

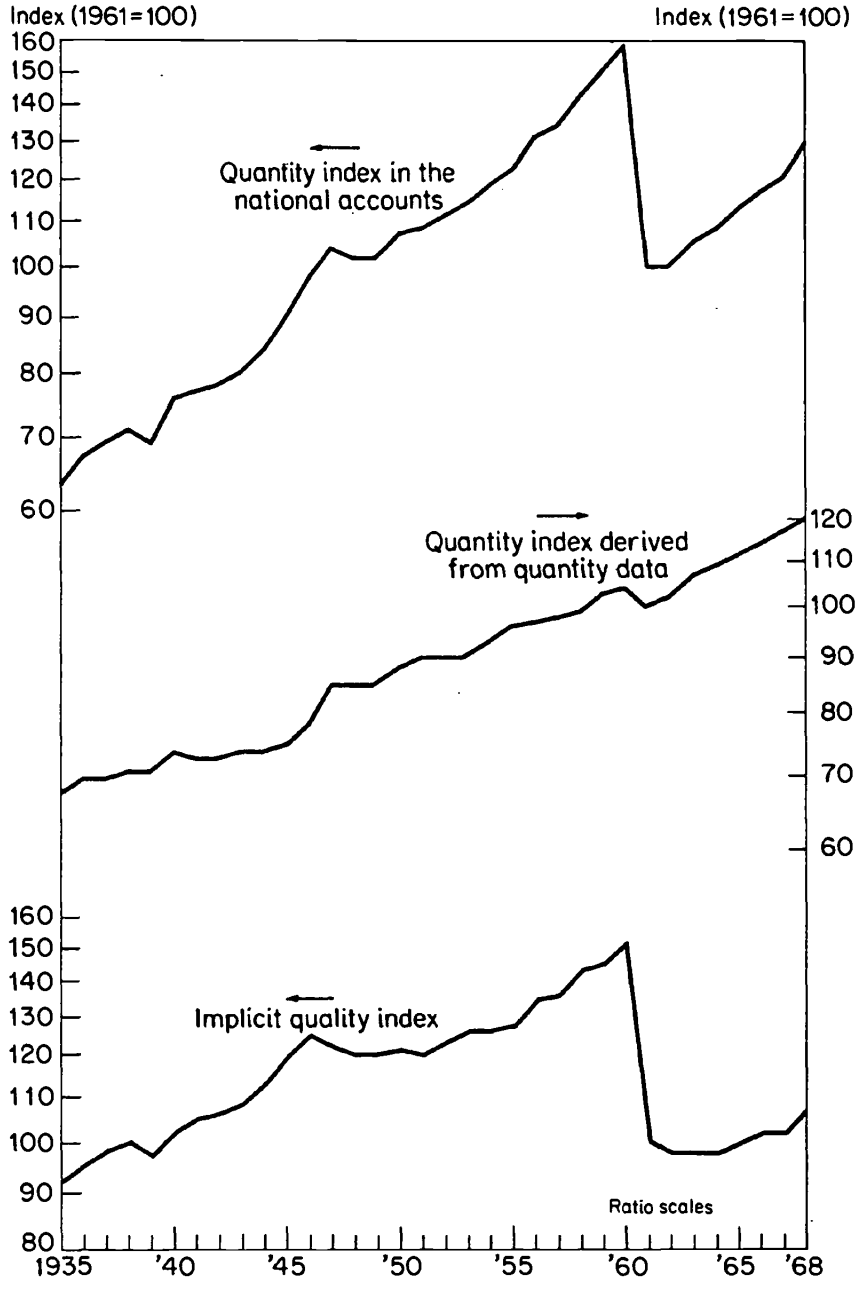


FIGURE 8

Purchased Transport

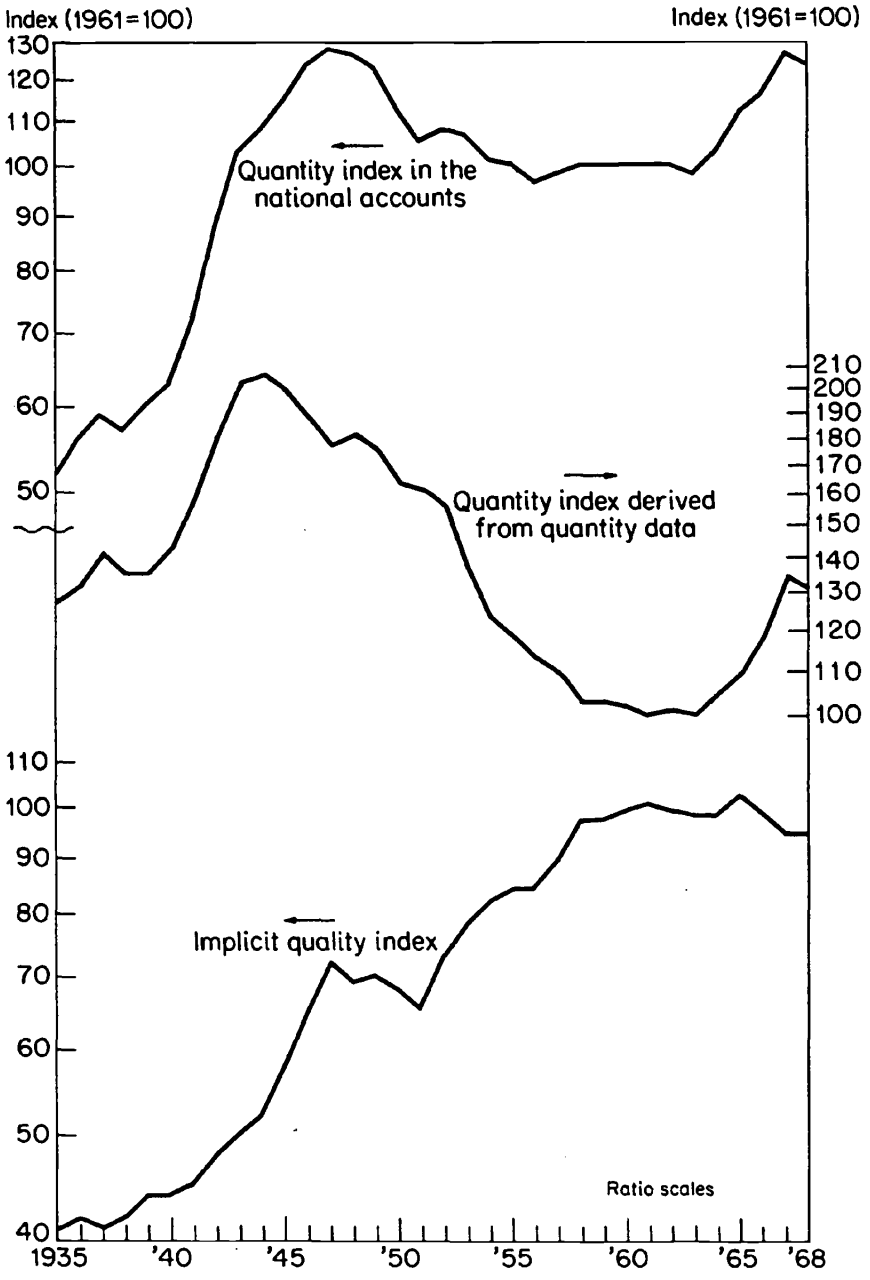


FIGURE 9

Automobiles

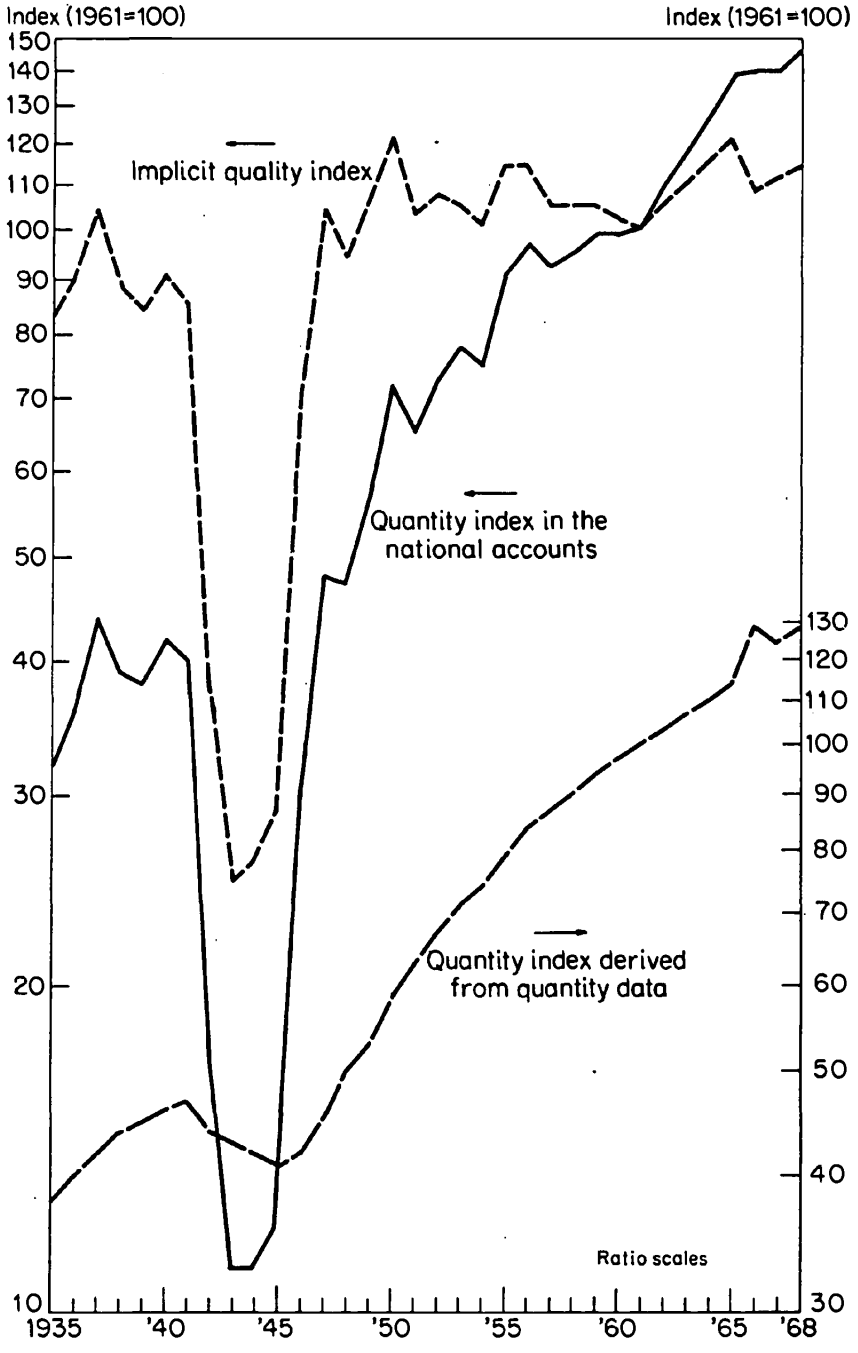


FIGURE 10

Communication

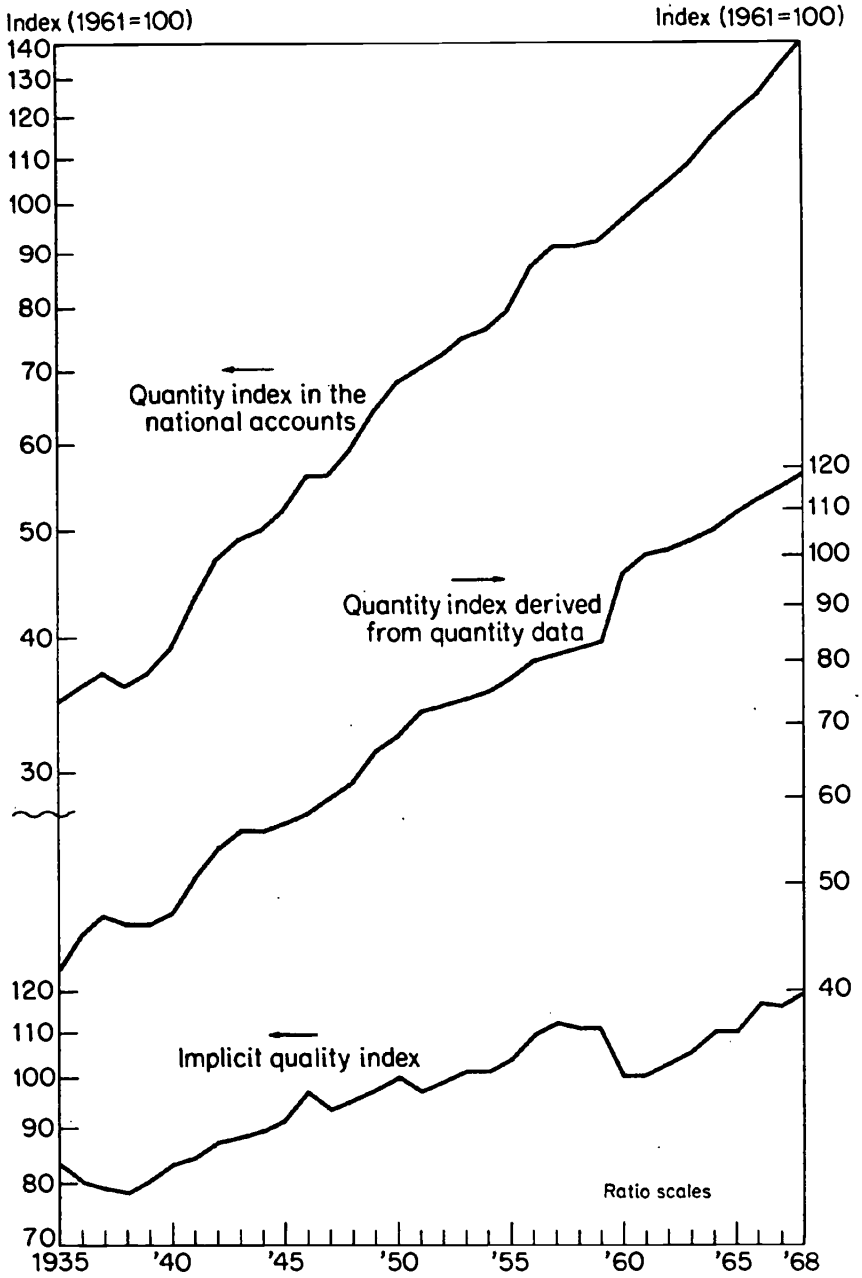
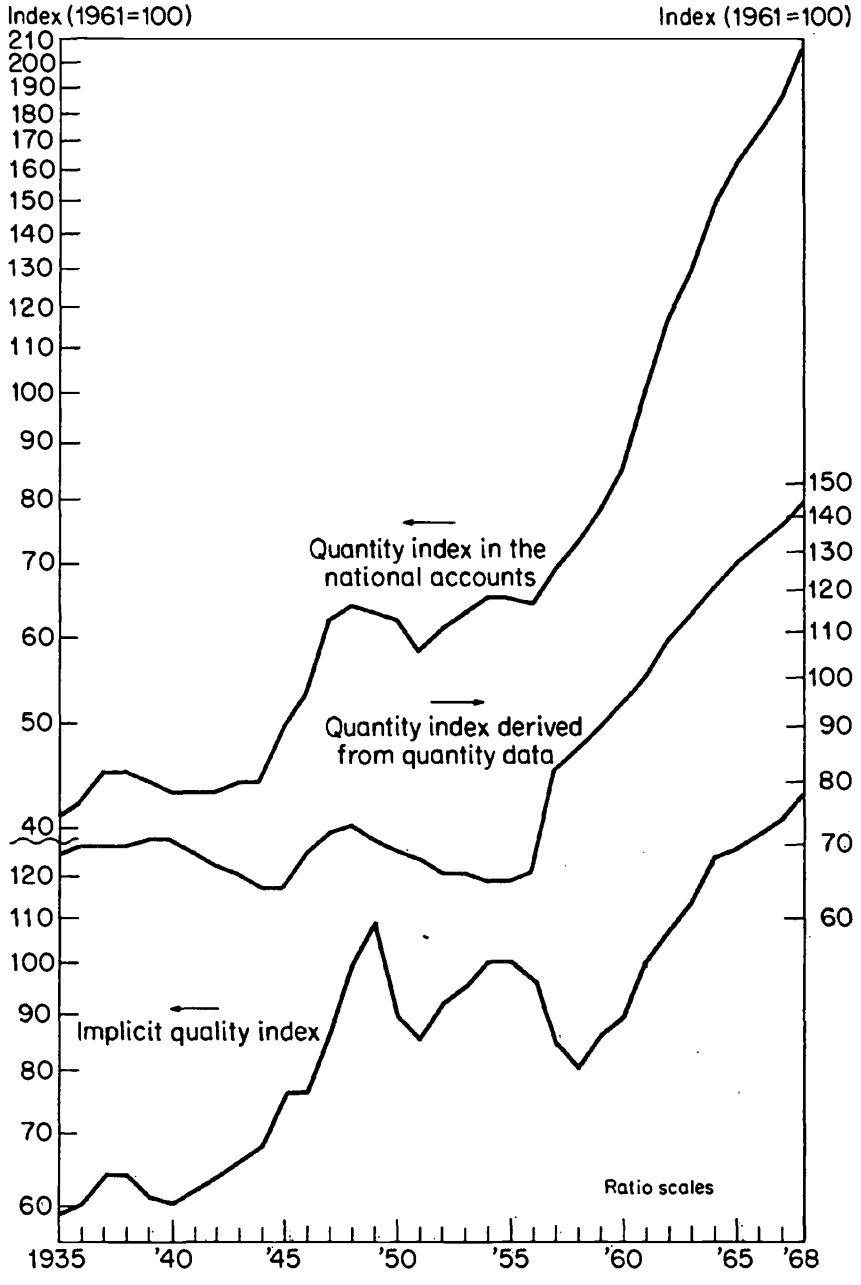


FIGURE 11

Education



Comments on "Measuring Real Consumption from Quantity Data, Canada 1935–1968"

MARGARET G. REID

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DAN USHER is to be commended for the attention he has given to the shortcomings of data available for estimating secular change of total quantity of consumption. His review of them provides a useful introduction to prospective users of annual estimates of national consumption expenditures. At the same time, it seems likely to assure agreement with his doubts "whether a really good set of quantity data [for Canada] will emerge until Statistics Canada takes a hand in creating it and makes an effort to attach quantity series to as many as possible of the items in the accounts" (p. 631).

The estimates presented are likely to stimulate discussion along several lines. My comments will deal with a few of these. I must at the outset confess that I have only limited knowledge of the national accounts of Canada and my knowledge of the construction of corresponding accounts of the United States is far from complete. I am a user of consumption data, not a compiler, and am more acquainted with their imperfections than with techniques for their improvement. Usher's discussion does, however, deal more with their imperfection than with improvement.

The title of this paper refers to measuring real consumption from quantity data. Indexes of "quality" of categories of consumption and of "total" consumption are, however, presented and receive considerable discussion. These represent change of price-deflated consumption expenditures not explained by the quantity indexes developed. Quality indexes, thus, are subject to the errors of the expenditure series, of the price indexes used to deflate them, and of the estimated quantity indexes. Usher notes that the elimination of the quality change from the price index is still a matter of considerable concern. This is only one of the biases affecting the measures pre-

sented that are relevant to their interpretation. How is a quality index to be interpreted that aggregates addition to expenditures due to "factory preparation of TV dinners, cloth for tea bags, tin for cans, ice for freezing, paper for packaging, or labor cost of washing, peeling, grinding, or mashing food before it enters the home" (p. 590). There will, however, be agreement with Usher that "One would like to know what proportion of the 1.4 per cent increase is food and what proportion is paper and tin. On this matter, the accounts are silent. The increase might be food, packaging, or any combination of the two" (p. 590). The accounts are likely to remain silent until the quantity index is derived from characteristics of food that identify the marketing services utilized.

Stimulus for improvement of estimates of quantity of products consumed will come from an awareness of their contribution to knowledge of demand and welfare. Improvement of many series of quantity of products and their prices seems likely. There seems less reason to expect an increase in demand for quantity indexes of broad categories or products. Presently, demand appears to be for less, rather than more, aggregated quantity series.

Usher seems to regard quantity indexes of the type he describes as being more indicative of welfare than are price-deflated expenditures, because they fit better with the social indicators of justice, equality, education, health, and other "noneconomic" indicators of welfare. His discussion presents meager support for this argument. It leaves untouched the matter of what we would have to know about the association between average and distributive change. Surveys of food consumption and dietary adequacy do make such a contribution. Aspects of food consumption associated with adequacy of diets are, however, represented more by Usher's indexes of quality than quantity.

He notes, for example (p. 589), that price-deflated expenditures for food per head show an increase of consumption of 50 per cent between 1939 and 1968. He inquires whether we can infer that Canadians are eating more or better food in 1968 than in 1935. His answer is that "nothing in the national accounts indicates, or is intended to indicate, whether consumption is evenly distributed; but one may ask whether all Canadians would have adequate diets if consumption were evenly distributed." He continues to point out that to all of these questions the answer is the same. "We do not know and cannot find out, even when examining the primary data that enter into the construction of the

national accounts." Information on consumption is, however, not limited to the national accounts.

Usher's quantity index of food shows an increase of about 20 per cent between 1939 and 1968. He does not dwell on its relevance to the quality of diets but does note that the quantity index of food excludes the additional cost of out-of-season fruits and vegetables, prices of which tend to be relatively high, and also the cost of chemical enrichment of foods, much of which was of flour, bread, and milk. Consumption of out-of-season fruits and vegetables tended to increase the consumption of vitamin C, and the chemical enrichment of flour and bread added appreciably to the consumption of iron and the B vitamins, nutrients below recommended allowances in many diets, as indicated by dietary surveys of the United States of the mid-thirties. The effect of enrichment is apparent in average consumption of nutrients added to flour and bread, products of greater quantity in low- than high-cost diets. This enrichment by itself seems likely to have had little effect on the quantity of flour and bread consumed, its percentage addition to cost was small, its effect on flavor and texture of products insignificant, and mandatory enrichment restricted consumer choice. Between 1935 and 1968 per capita consumption of the chemical nutrients added to flour and bread increased about 30 per cent (statistics of the U.S. Department of Agriculture); and dietary surveys of the mid-fifties indicated an appreciable increase in the proportion of adequate diets, in spite of a decrease in the consumption of flour-bearing enriched foods. A weighted index of nutrients per capita of the national food supply would have greater relevance to welfare than a quantity index of foods. Knowledge of this relevance would, however, be increased by information provided by surveys on the distribution of foods and their nutrients among consumers.

Indexes of average consumption, no matter how perfected, will not contribute to knowledge of distributive change unless they are supplemented by microdata that reveal the conditions that generate it, and that can be shown to be associated with average consumption. We are very far from knowledge of this type.

Much of the discussion of this paper implies that the quantity indexes describe real consumption. There is surely need for more specificity of terms for the analysis of consumption. Precise thinking and measurement call for precise concepts. To consumers, quality is a component of real consumption. Usher notes that quantity of products, such as number of units, may be substitutes for less or more units,

depending on the combination of their characteristics. His quantity indexes will thus be biased by change in such substitution. The theory of consumption of characteristics of products developed by Lancaster provides a frame of reference for interpretation of real consumption. Usher recognizes this, and his indexes of quantity of housing and education identified some of their characteristics. Their identification is, however, very crude compared to that of many cross-section studies of housing and education. Such investigations may provide better identification of characteristics of housing and education in time series to come.

Broad categories of products, such as food, clothing, and others, differ greatly in the extent to which their quantity indexes represent a constant mix of characteristics. This mix is more homogeneous for food than for transportation, appliances, and clothing; or for housing and education, for which some identification of characteristics was made. Increase of consumption with income is chiefly a substitution of a product of higher for one of lower quality. A quantity index is homogeneous in characteristics if these are identified by the items priced, or if their mix in the items priced changes little. Many of the food items of Usher's series identify the substitution associated with increase of income; and for others, little change occurred in the mix of characteristics. Meats, such as beef and pork and lamb, include a wide range of qualities, but their joint production ensures little change in the mix of characteristics: the ratio of sirloin steak to pot roasts tends to be stable.

An important aspect of real consumption has been overlooked by Usher; namely, the contribution to real consumption of the household economy. The distribution of productive resources between the household and the market has been changing. How is this change to be represented? That increase of food expenditures due to increase of processing, including TV dinners, represents an increase in the quality of food seems likely to be doubted by many persons, even when they agree that a shift of the provision of meals from the household to the market has occurred. Many other substitutions of productive resources between the household and market economies have occurred and further shifts seem likely. Increase of women in the labor force has been, and seems likely to continue to be, a powerful stimulus.

Price-deflated expenditures accurately measured should yield indexes of change in real consumption identical to the quantity-weighted consumption of the products represented. Usher reported no

such correspondence. Conditions contributing to their disparity are many. Some are more easily corrected than others. Greater correspondence of the two series will come from improvement in the estimates of deflated expenditures or in those of the quantity of consumption they represent. At best, many questions raised by Usher will remain unanswered. A balance may best be achieved by improvement of price-deflated series of consumption expenditures, and supplementary estimates of interactions between the money and household economies, and of welfare series of average and distributive change.

The Conference on Household Production and Consumption: A General Comment

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THE hallways of this conference room seem to have been haunted by an uninvited guest, one bearing the insignia: tastes, value systems.

I do not mean to say, of course, that value systems have been entirely excluded in the sense of being locked into the ceteris paribus attic. Indeed, this is not at all typical of recent work in consumer economics. Direct consideration has been given to the values implicit in attention to permanent income and to wealth. These are primarily economic. But even psychosocial values have been recognized as influencing spending. The relative-income hypothesis is a case in point, in which community standards are recognized; this notion of a social norm is likewise implicit in regional and national differentiation in consumption and saving patterns. The most far out of these con-