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SEASONALLY ADJUSTED ECONOMIC INDICATOR

Seasonally adjusted economic indicators are an important part of the output of the Dominion Bureau of Statistics. The seasonally adjusted series published at present in the Canadian Statistical Review include the components of Gross National Product, National Income and Personal Income an a quarterly basis, and some 70 economic indicators on a quarterly or monthly basis. Recently the Bureau has been extending the scope of its programme of seasonal adjustment and new seasonally adjusted series will become available as time and resources permit. Series now in the course of preparation include: manufacturing inventories and shipments, additional monthly detail of the labour force series, and a revised retail trade series with a shipping day adjustment. The revised Index of Industrial Production will be released very shortly. Considerable progress has been made in the seasonal adjustment of economic time series by means of an electronic computer, using a technique developed by the Bureau of the Census in the United States.[1] This method makes feasible a larger number of seasonally adjusted series and a more elaborate technique of adjustment than the cost of hand processing permits. In view of these developments it seems opportune to set out the basic principles of seasonal adjustment and to discuss the analytical usefulness of seasonally adjusted series.

The Nature of Seasonality

Seasonality in economic activity is in part a natural phenomenon and in part a consequence of human and institutional factors. The changing seasons bring variations in temperature, precipitation and the length of the day and these in turn affect the conditions of supply and demand for many commodities and services. Agriculture is the most conspicuous example but production in fishing and trapping is also dependent upon weather and in construction and forestry the season can only be extended at a considerable increase in cost. The demand for fuel and clothing and many other commodities is obviously associated with changing temperature.

Custom, tradition and other human factors also impose a seasonal pattern on economic activity. Behaviour in social and business life often follows established usage; holidays and religious festivals are established by law and tradition; the calendar itself, which makes February 10 per cent shorter than January and April nearly 3 per cent shorter than March, is a pervasive seasonal influence on economic time series. Thus conventional seasons are super-imposed on climatic seasons to produce fluctuations recurring year after year. Seasonality at any stage of the economic process, from the supply of the raw material to the sale of the final product, gives rise to corresponding variations in a chain of inter-dependent activities.

In few countries are the seasonal swings in economic activity so wide as in Canada. The measurement of seasonal variations is therefore of interest in its own right, and not only as an aspect of the analysis of cyclical behaviour. Total production normally shows a one-third increase from its low point in the first quarter of the year to its peak in the third quarter. That the seasonal variation is so large as to obscure the underlying cyclical movement, is illustrated in the following table which shows the average monthly United States economic amplitude of the cyclical, seasonal and irregular components of five major U.S. economic indicators and four major Canadian economic indicators.

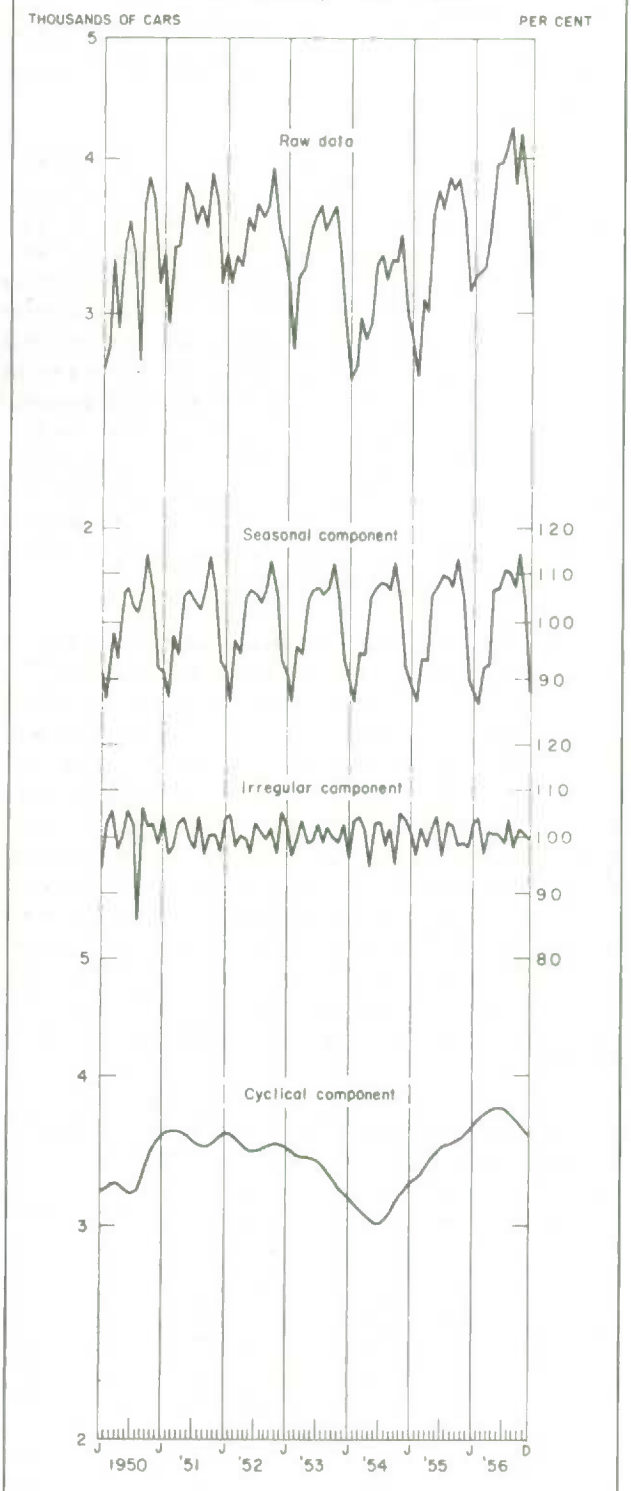
[1] The method of seasonal adjustment by electronic computers is described in, "Electronic Computers and Business Indicators" Julius Shiskin Occasional Paper 57 New York, National Bureau of Economic Research, 1957.

Average Monthly Amplitude of the Cyclical, Seasonal and Irregular Components, Selected Monthly Indicators, U.S.A. 1947-1956 and Canada, 1945-1956

Series	Cyclical	Seasonal	Irregular	Seasonal to Cyclical
United States:				
Non-Agricultural Employment	0.3	0.8	0.2	2.7
Unemployment, total	3.0	9.3	3.9	3.1
Bank debits, outside New York City	0.8	6.1	3.0	7.7
Freight carloadings	1.2	5.0	3.2	4.2
Industrial production	0.7	2.3	0.7	3.0
Canada:				
Employment, industrial composite	0.4	1.2	0.3	2.9
Persons without jobs and seeking work	2.9	14.1	3.5	4.9
Freight carloadings	0.8	5.1	3.6	7.3
Industrial production	0.6	2.1	0.6	3.4

Source: "Seasonal Variations and Business Expectations", a paper presented by Donald J. Daly, Economics Branch, Department of Trade and Commerce, at a joint meeting of the Econometrics Society and American Economic Association, Philadelphia, 1957.

THE RAW DATA AND THE SEASONAL, IRREGULAR AND CYCLICAL COMPONENTS, TOTAL REVENUE CARS LOADED, 1950–1956



The table shows that for these broad indicators the seasonal variation in Canada was from about 3 to 7 times as large as the cyclical. The computations for the United States show that for comparable economic indicators the ratios of seasonal to cyclical are not much lower than in Canada, in spite of their less severe winter. Individual industries, commodities or regions characteristically show much larger seasonal swings than national aggregates, since some seasonal variations by industry and by region are inevitably offsetting in any comprehensive measure of economic activity. Thus the measurement of the seasonal factor is a matter of concern to the economist or the businessman who wishes to interpret current economic conditions and form his views on the future course of economic events, whether for the economy as a whole or for his particular business or region.

The Analysis of Time Series

Economists have long viewed economic time series as a composite of four analytically distinct type of economic change.[1] These are known as secular or trend, cyclical, seasonal, and random or irregular. The secular or trend factors are smooth, regular, long-term movements in a statistical series whose persistence is associated with some basic underlying characteristic; since month-to-month changes in trend are small by definition trend is often not distinguished from cycle in short-term analysis. The cycle is a recurring fluctuation, with alternating periods of expansion and contraction, each phase cumulative and preparing the way for the next; cycles are uneven in pattern, varying in amplitude, and irregular in duration, some lasting more than one year and others lasting from two to ten years. Seasonal movements are fluctuations within the year, recurring every year with broadly similar patterns of timing and amplitudes. Random or irregular movements occur from time to time with no clear pattern of timing or amplitude; they are essentially accidental from a theoretical point of view; floods and strikes are examples of incidents causing irregular fluctuations in economic time series.

Seasonally adjusted time series are time series which have been adjusted to remove the average seasonal variation. Since seasonal fluctuations in many time series are much larger than

[1] This, the traditional approach to trade cycle analysis, is not accepted by all economists. Some recent theorists reject or question the central assumption implicit in it, namely that the four types of change are independent of one another. They argue that trend and cycle are inter-related; that the process of growth is essentially irregular and hence the irregularities in a time series are not always accidental.

the cyclical movement the economist or businessman using unadjusted time series is often at a loss how to assess recent developments, which adds to the difficulty of forming a judgement on the course of future events. At the national level decisions to stimulate or damp down a cyclical movement involve an assessement of the cyclical forces at work. The businessman who is confronted with large seasonal movements in his own industry will find seasonally adjusted statistics useful in his day-to-day decisions on production, sales, inventories and pricing policies, since they will give him a much clearer indication than will raw data whether his business is in an expanding or a contracting phase.

Method of Seasonal Adjustment

All methods of seasonal adjustment are based on the fundamental idea that seasonal fluctuations can be measured and separated from the composite of trend, cyclical and irregular fluctuations by some process of averaging. The technique used by the Dominion Bureau of Statistics is a combination of the graphic and ratio-to-moving-average technique. The method is described in detail in the D.B.S. Reference Paper No. 77, "Seasonally Adjusted Economic Indicators", and is only presented in outline here.

A twelve-month moving average is run through the raw data, which gives a first approximation to the trend-cycle and separates out the seasonal and random or irregular factors. The seasonal-irregular factors are then analyzed and in this analysis the statistician brings to bear informed judgment on how special events may have influenced the movement of the series. An attempt is then made to separate out the seasonal factor from the seasonal-irregular, using moving averages and graphic methods. The trend-cycle is derived as a second approximation by applying the derived seasonal factors to the raw data. More elaborate techniques of seasonal adjustment by electronic computers involve essentially this process of successive approximation to the trend-cycle.

This method assumes that seasonal factors are stable through time, though not necessarily constant. Seasonal patterns can and do change. For example, the gradual adoption of paid vacations is bound to affect the seasonal fluctuations in a number of economic series. The statistician must be on the alert to detect any tendency for the seasonal factor to shift through time and where this tendency exists past trends may be extended to derive the appropriate current seasonal ratios. The method of adjustment used by the Bureau implicitly provides for shifting seasonals through the use of moving averages.

Before a series is adjusted for seasonality it is usual to eliminate, so far as possible, the effects of calendar variation. That is to say, the unadjusted data are put on a basis that makes all months equivalent to a daily average. It is not always easy to make a simple, satisfactory, working-day adjustment. For example, if consumers are in the habit of doing most of their shopping in the latter part of the week, all shopping days will not be of equal importance and the best approach would be to weight each day by it's relative importance to sales.

Methods can be devised for dealing with abrupt year-to-year changes in the seasonal pattern. The classic example of a change in timing is the shifting date of Easter but a number of other examples can be cited: shifts in the timing of new models in the automobile industry, in the opening and closing of the shipping season, in the cutting season in forestry, etc. The amplitude of seasonal swings may also vary widely from year to year. The problem of adjusting for varying amplitude arises most commonly in agricultural series.

The Advantages of Seasonally Adjusted Series

Where a significant element of seasonal variation exists in any economic process it is difficult to draw conclusions on the non-seasonal movements. Simple techniques for eliminating the seasonal factor are commonly used by financial writers and businessmen and less frequently by economists and statisticians.

One such method commonly used is what is known as year-to-year links. Same-month-year-ago comparisons are made by dividing the figure for a given month by the figure for the same month a year ago.[1] This method has the disadvantage of obscuring turning points. When a cyclical downturn occurs, it usually takes several months before the figure for the current months falls below that of the same month a year ago. Assume that the cycle is a smooth symmetrical curve. While the curve is rising same-month-year-ago comparisons will show on increase, but they will continue to show an increase for five months after the curve has turned down because the level of the second year is above that of the first. Similarly, signs of recovery will only become apparent six months after recovery began. Thus, same-month-year-ago comparisons show turning points six months late in the case of

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[1] It can be shown that a year-to-year comparison is analogous to the mathematical procedure of taking the first difference of a twelve-month moving total, the result being centred back six months. (See, Frederick R. MacAulay, "The Smoothing of Economic Time Series", New York, National Bureau of Economic Research, 1931, p.p. 134-135).

a smooth symmetrical cycle. Even more belated recognition of turning points may occur when the cycle is asymmetrical. Only when a series falls very sharply from the peak or rises very sharply from the trough will this type of comparison show turning points accurately.

It is perhaps worthwhile to consider the implications of same-month-year-ago comparisons. In this type of comparison a cycle-trend-seasonal-irregular for each month is divided by a similar composite for the same montn a year ago.(The trend can usually be disregarded since its influence is small from year to year and in any event it can be assumed to affect each month in the same way.) If the seasonal factor is constant, division will eliminate seasonal variation but if the seasonal pattern is changing through time some residual seasonal will remain. The figure arrived at by dividing one set of irregular factors by another is a third set of irregular factors and is virtually meaningless. It is reasonable to suppose that irregular factors 12 months apart are not related. Therefore, the quotient of the two is likely to have more variability than the irregular factor itself.

When the cyclical component of one year is divided by the cyclical component of another, the resulting figures reflect two cyclical movements. If the shape of the curve is the same in both years the same-month-a-year-ago comparisons will give a straight horizontal line; if the pattern is reversed between the two years the cyclical pattern of the second year will be accentuated; if the first year is a curve and the second a straight line the comparison will show the pattern of the first year in inverted form. Rates of change in the two years will also affect this type of comparison. One can conceive of a situation in which a year when the series shows little change is followed by a year of pronounced cyclical movement, which in turn is followed by another of relative stability. The same-month-a-year-ago comparisons will show the cyclical movement in the second year but in the third the curve will reflect the previous year's cyclical movement in inverted form. In essence the same-month-a-year-ago gives a new cyclical pattern made up of portions of the same series 12 months apart.

Some users of this type of comparison detect turning points not by reference to a change in sign, but by reference to rates of change. That is to say, they construct a time series of same-month-a-year-ago comparisons and consider a change in the rate of change as a possible turning point. The logic of this approach is that most economic processes slow down before they change direction. However, it is difficult to draw conclusions on the underlying direction of change. A slowing down in the rate of increase in a moving 12-month comparison may be associated with a variety of developments in the corresponding seasonally adjusted series – a slowing down, a cessation or an actual decline.

Less commonly, economists abstract from seasonality by comparing the current unadjusted data with that for several years past, using a type of tier chart, a simple line chart or by setting out an array of year-to-year changes. While this is an improvement on the last two years' comparison, it does assume a fixed seasonal; it gives no precise measure of seasonality because the series for each year has some cyclical movement in it; it works only for those series where changes are sufficiently large to be visible in chart form.

The superiority of seasonally adjusted series in recognizing turning points promptly and assessing rates of change is illustrated in the following table, which shows the unadjusted index of industrial production, 1952 to 1957, with the year-to-year differences in absolute and percentage terms, and the seasonally adjusted series.

When the economy was going into a recession in 1953, the analyst who based his interpretation of the course of events on year-to-year links might have selected March of that year as the turning point since the differences were then at their maximum. Alternatively he might have interpreted the narrowing gap in the year-to-year comparisons as a falling off in the rate of increase and not recognized a turning point until the end of the year when the year-to-year comparison turned negative. Similarly, he might have selected April, 1954, as the trough of the cycle or he might have failed to recognize signs of recovery until the year-to-year comparison turned positive in the closing quarter of the year. In the seasonally adjusted series the peak was reached in July of 1953, although the movements were erratic after April, and the trough in March of the following year. In the light of subsequent events, it is clear that the recession was short-lived and that the forces of recovery had gained considerable momentum by the end of 1954. Thus, the year-to-year links were either ambiguous or misleading as a guide to action. Likewise in the recent recession the seasonally adjusted series shows a downward turning point in February of 1957, some months in advance of the appearance of negative differences in the year-to-year links.

It is not the intention in this article to underestimate the difficulties of arriving at a good seasonal adjustment of economic time series, particularly where current data are concerned. It requires a mass of computation as well as solutions to a number of technical problems and the exercise of informed judgment. Electronic computers economize

on time and effort, but do not eliminate the need for professional analysis. At best, the adjusted series are an approximation of non-seasonal movements, based on an average of past experience. A current situation may be evolving according to a somewhat different pattern and only time will reveal its peculiar characteristics, however much the statistician may scrutinize the series to try to detect a change in the basic seasonal pattern. It is, however, argued that seasonally adjusted series are indispensable statistical tools for the analysis of business conditions and particularly so in Canada, where seasonal variations are so pronounced and so pervasive.

Index of Industrial Production by Months 1952 to 1957

Unadjusted	1952	1953	1954	1955	1956	1957
January	212.9	232.1	229.1	238.2	257.7	272.0
February	218.6	242.0	239.4	248.0	266.4	281.9
March	222.2	246.8	236.8	251.9	277.5	283.0
April	230.7	254.6	242.4	259.2	277.4	285.3
May	234.6	254.8	245.6	267.4	283.3	289.9
June	238.3	257.5	252.5	276.8	298.7	297.1
July	228.3	247.1	238.5	263.7	285.5	283.7
August	234.2	248.6	246.7	271.7	288.6	286.8
September	244.1	257.1	253.7	281.2	298.8	292.2
October	248.1	254.5	256.0	284.0	300.7	289.6
November	248.1	250.6	254.4	283.7	298.2	285.8
December	235.7	235.5	240.6	264.3	279.4	261.1

	Difference 1953/52		Difference 1954/53		Difference 1955/54	
	Absolute	Per cent	Absolute	Per cent	Absolute	Per cent
January	+19.2	+ 9.0	- 3.0	-1.3	+ 9.1	+ 4.0
February	+23.4	+10.7	- 2.6	-1.1	+ 8.6	+ 3.6
March	+24.6	+11.1	-10.0	-4.1	+15.1	+ 6.4
April	+23.9	+10.4	-12.2	-4.8	+16.8	+ 6.9
May	+20.2	+ 8.6	- 9.2	-3.6	+21.8	+ 8.9
June	+19.2	+ 8.1	- 5.0	-2.0	+24.3	+ 9.6
July	+18.8	+ 8.2	- 8.6	-3.5	+25.2	+10.6
August	+14.4	+ 6.1	- 1.9	-0.8	+25.0	+10.1
September	+13.0	+ 5.3	- 3.4	-1.3	+27.5	+10.8
October	+ 6.4	+ 2.6	+ 1.5	+0.6	+28.0	+10.9
November	+ 2.5	+ 1.0	+ 3.8	+1.5	+29.3	+11.5
December	- 0.2	- 0.1	+ 5.1	+2.2	+23.7	+ 9.9

	Difference 1956/55		Difference 1957/56	
	Absolute	Per cent	Absolute	Per cent
January	+19.5	+ 8.2	+14.3	+5.5
February	+18.4	+ 7.4	+15.5	+5.8
March	+25.6	+10.2	+ 5.5	+2.0
April	+18.2	+ 7.0	+ 7.9	+2.8
May	+15.9	+ 5.9	+ 6.6	+2.3
June	+21.9	+ 7.9	- 1.6	-0.5
July	+21.8	+ 8.3	- 1.8	-0.6
August	+16.9	+ 6.2	- 1.8	-0.6
September	+17.6	+ 6.3	- 6.6	-2.2
October	+16.7	+ 5.9	-11.1	-3.7
November	+14.5	+ 5.1	-12.4	-4.2
December	+15.1	+ 5.7	-18.3	-6.6

Adjusted	1952	1953	1954	1955	1956	1957
January	226.3	246.6	244.1	254.7	276.2	290.9
February	223.9	247.9	245.8	255.6	275.1	291.9
March	223.4	248.6	239.0	256.9	281.2	290.7
April	228.9	251.6	240.6	259.0	279.7	287.5
May	230.8	250.5	242.0	263.3	279.4	286.7
June	230.0	248.9	243.3	266.5	287.0	284.0
July	232.7	252.0	242.9	267.0	288.4	285.2
August	235.0	249.5	245.8	270.4	286.7	284.0
September	237.2	249.1	244.9	270.5	289.1	282.2
October	239.7	245.8	246.8	273.0	288.6	278.3
November	243.3	246.1	249.1	276.9	288.4	275.9
December	244.5	245.0	250.4	274.8	291.1	272.0

THE REVISED INDEX OF INDUSTRIAL PRODUCTION

The Dominion Bureau of Statistics has been publishing a monthly index of industrial production since the early 1920's. The present revision, the second major revision since the end of the war, covers the period 1935 to 1957, and has a reference base 1949 = 100, in place of the previous reference base 1935-39 = 100. The new index, together with a complete description of concepts, sources ond methods, is published in a D.B.S. reference paper[1].

The new index forms part of a larger project which is still in the developmental stages. The purpose of this project is to measure reol Gross Domestic Product by industry.[2] The industries covered by the Index of Industrial Production account for about one-third of Canada's total domestic product and are therefore an important part of the measure of aggregate real output. The method of constructing the new index and its relation to the comprehensive measure are discussed briefly in the following pages.

Need for Revision

A previous revision of the index was published early in 1953 and retained the 1935-1939 weight-reference bose. The main feature of this earlier revision was the development of onnual bench-mork indexes from comprehensive and detailed data derived from the censuses of industry which are carried out annually in Canada. From the available commodity data on products, materials, fuel and electricity, it was possible to develop measures of the volume of *net* output (i.e. census value added in constant dollars) for approximately one-half of the manufacturing universe. The remainder were based on the volume of gross output, materials and man-hours. However, it was not possible at that time to extend the majority of the census bench-mark levels beyond the period 1935-1947.

Since 1947, the annual levels of the old index had been the averages of the monthly series. Available resources did not permit us to make regular revisions to the old index from census data while, at the same time, carrying out the major recomputation of the new index on the 1949 base. In the old monthly index, a large proportion of the manufacturing industries (about 43 per cent of the total manufacturing weight) was represented by man-hours. At the time of the last revision it had not been possible to acquire measures of the post-war trends in output per man-hour and the man-hour data used after 1947 in the old monthly index to represent output had not been adjusted. As a result, the old index had been developing a downward bias equivalent to the increase in productivity in those industries represented by man-hours. This bias was particularly important during the sharp advance in industrial output in 1955 and 1956 so that the old index, although reflecting odequately changes in the month to month movements of industrial output, had been understating the extent of the accumulated trend increase, especially since 1954. The corrective measures adopted to minimize this type of discrepancy are described in a later section. The coverage, classification and conceptual framework of the new index are reviewed briefly below.

Coverage, Classification and Concepts of the New Index.

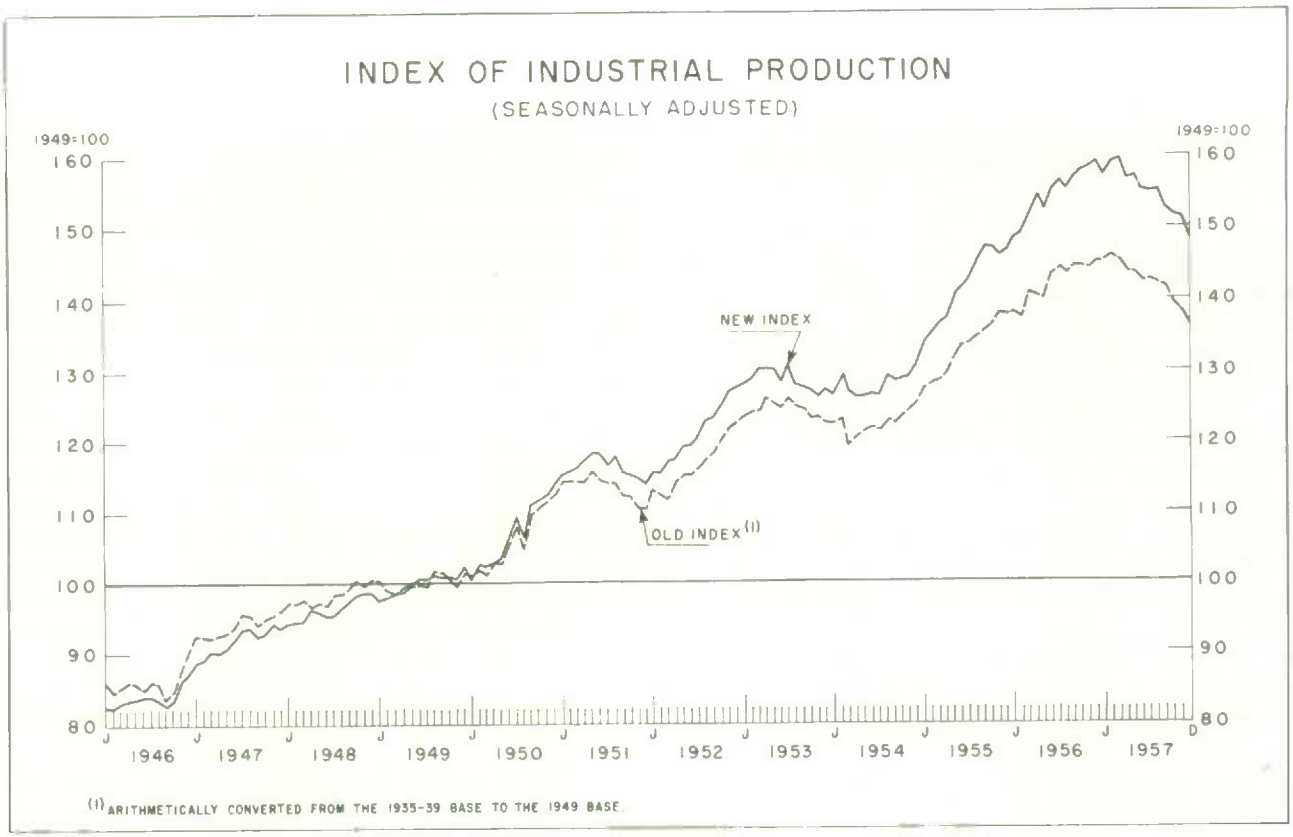
The Canadian Index of Industrial Production covers mining, manufacturing and electric and gas utilities. The United Nations' recommendation that industrial production be defined to include construction is accepted in principle. However, because of the difficulty at present of obtaining a satisfactory monthly measure of the volume of construction, this industry group is excluded.

The framework of the index is based on the D.B.S. Standard Industrial Classification which subdivides manufacturing into 17 major groups. For purposes of the index these major groups are re-combined into two broad categories of durables and non-durables, ond individual components are shown separately under these major headings.

In the development of the total real output estimate by industry, the concept to be measured is Gross Domestic Product at Factor Cost. This is equivalent to Gross National Product at Market Prices less indirect taxes plus subsidies, and adjusted for interest and dividends paid to and received from non-residents. It is seldom possible, in practice, to measure this concept perfectly. It would be possible to measure it residually on an annual basis via the so-called "census value added" approach if such costs as advertising, insurance, communications, etc., purchased from other businesses, were collected on census establishment returns. At present, available census data are limited to products, materials, fuel and electricity. The deduction, in constant dollars, of materials, fuel and

[1] The Revised Index of Industrial Production, Catalogue No. 61-502, Queen's Printer, Ottawa, Canada.

[2] This project is discussed at length in "The Estimation of Real Domestic Product, by Final Expenditure Categories and by Industry of Origin", V.R. Berlinguette and F.H. Leacy, presented to the Conference on Research in Income and Wealth, October, 1958.



electricity from products in constant dollars provides a measure of census value added in constant dollars that is still gross of purchased business costs. If it were possible to deduct these additional cost items in constant dollars from the census value added aggregate at factor cost, the residual would consist of real factor incomes and capital consumption allowances, and represent gross domestic product at factor cost in constant dollars.

In the absence of all the complete information required for the annual compilation of this ideal measure by the residual method described above, gross domestic product at factor cost originating by industry was estimated directly for one year (the 1949 base period) by adding for each industry the factor incomes and capital consumption allowances. These estimates were developed for purposes of the 1949 Inter-Industry Flow Table[1] and provided G.D.P. detail for 30 manufacturing and 6 mining categories, and the electricity and gas industry, all on an establishment basis. Below this level of detail, individual industry contributions were assumed to be proportional to census value added. These G.D.P. estimates in the 1949 base period constitute the weights of the new index. The physical production indicators for each industry subdivision are designed to approximate the G.D.P. concept as closely as available data permit. These volume indexes weighted with the corresponding G.D.P. factors produce the Index of Industrial Production which can be described as an estimate of real G.D.P. originating in the industrial sector.

During the course of the work, two experiments were carried out to determine the effects of using different concepts as the basis for the index weighting system. A test was made whereby the existing industry volume indexes were assigned market price weights in order to compare the results with the factor cost system. The results of this test for the manufacturing division of the index indicate that at the total level, the effects are largely offsetting and the choice of using factor costs or market prices matters little in practice. At finer levels of detail, however, differences can be significant.

The other test concerned the effects on the index of using census value-added weights rather than gross domestic product at factor cost weights. Here also the effect was negligible at the total manufacturing level, although, as in the first test, some differences occurred in certain of the component indexes.

[1] The Inter-Industry Flow of Goods and Services, Canada, 1949. D.B.S. Reference Paper No. 72, Ottawa, 1956.

Bench-mark Indexes

As noted earlier, it is not at present possible to calculate each year a complete quantum measure of G.D.P. originating in the industries covered by the index, and efforts were concentrated on deriving the nearest approximation. The measure that comes closest to representing the desired concept is the volume of "census value added" described earlier and which will hencefarth be referred to as "net" output for purposes of this paper. It is only possible to measure this net concept on an annual basis from industrial census data on products, materials, fuel and electricity, and then only in those industries for which the data are appropriate and sufficiently complete.

In the construction of indexes from census data, statistics for individual industries on recorded quantities of products or materials, or both, were first edited for inconsistencies and then compiled in terms of 1949 dollars.

Where both the constant dollar aggregates of products and materials were judged accurate enough for the measurement of annual indexes of net output, the summed inputs of materials, fuel and electricity were deducted from the summed outputs of products and the resulting value added aggregate was indexed. These net indexes were then used as bench-marks in the revised series. Where the data were not suitable or sufficiently complete for the measurement of real net output, alternative indicators were used. On the basis of the 1949 weights, 42 percent of G.D.P. originating in the industries covered by the total index is represented in the annual census bench-mark series by net output indicators and 35 percent is represented by gross output indicators. Of the remaining 23 percent, indexes based on the volume of materials account for 8 percent, on deflated value of output or materials for 14 percent and on employment for 1 percent.

Volume of "Net" Output Indexes

There are a number of factors which influence the level of net output as distinct from that of gross or materials used. Vertical integration of the manufacturing process, which occurs more often in industries turning out highly processed goods, is an important influence; a firm producing cotton cloth, for instance, may decide to make its own yarn from the raw fibre, instead of buying it from yarn manufacturers; the measurement of gross cloth output will not reflect this increased fabrication. Again, a sugar manufacturer may install machinery that permits him to extract a greater proportion of sugar per pound of raw material. Although the index based on sugar production will reflect an increase in output, it will understate the increase in net output since inadequate account is taken of the proportionate gain in processing.

Our experience so far indicates that the most important factor concerns changes in "product mix" where an industry making a variety of products shifts some of its output to goods requiring a higher or lower degree of fabrication. During the war, for instance, in the meat packing industry, the production of canned and cured meats increased greatly relative to that of fresh meats, which require less processing. As a result, the net index rose substantially more during this period than the gross index. The opposite movement occurred in the immediate post-war period when foreign demand for canned and cured meats dropped to a more normal level. In the tobacco products and brewing industries, the relatively greater increases in the production of cigarettes and bottled beer were reflected in the sharper upward trend of the net indexes compared with the gross measures; smoking tobacco and bulk beer require a proportionately lower amount of processing than cigarettes and bottled beer.

Not all industries, however, show a higher net output trend. Some, like the flour and feed milling industry, show an opposite movement. To a certain extent the difference was due to a progressively larger production of a cheaper type of flour and a relative decline in the output of better grades. For many industries, the net and gross indexes showed similar movements.

It should be noted that the degree of divergence between net and gross output often depends on the degree of homogeneity of the industry measured. All other things being equal, the net output index of a one-product industry will move parallel to its index of gross output. The more diversified the production of an industry, the more sensitive the net output index to the influence of product mix. This is particularly true of those industries with a high input-output ratio (i.e. those in which materials account for a large proportion of the value of products, e.g., meat-packing, dairy products, flour and feed mills) where even slight changes in the composition of production have a considerable effect on the net measure. In these cases a high degree of accuracy in the data reported is necessary since the net aggregate is very sensitive to even small errors in either products or materials. Accordingly, the data were subjected to a careful scrutiny; where the net index diverged markedly from the gross indicator and the movement could not be reasonably explained (for instance by changes in product mix or integration), the original establishment returns were examined and advice sought from D.B.S. industry specialists. Often it was apparent that the data

had been erroneously reported or that the errors were missed in the editing process and it was possible to apply proper adjustments. In some cases special correspondence with major producers helped to correct important inconsistencies. When serious doubts as to the suitability of the data for purposes of the net indexes could not be eliminated, alternative indicators were substituted.

At the total manufacturing level, the differences between the gross and net indexes are largely offsetting in the post-war period. During the war, however, increased demand by the armed services and foreign countries for goods requiring a higher degree of processing affected the input-output ratios of many industries with the result that, on balance, the net indexes showed a moderately greater increase than the corresponding gross series during this period.

Canadian experience so far suggests that, in normal times, the use of gross output indicators will not, on balance, significantly affect the overall index. At the individual industry level, however, the use of gross output indicators can often understate or overstate the real increase in net output, and for purposes of industrial analysis and productivity measurement at this level, the net series are clearly superior. An additional advantage of the net output approach is that it provides an excellent check on the adequacy of the basic data and permits a critical examination of related industrial statistics. It thus plays an important part in the improvement and integration of these statistics.

The Use of Man-hours in the Monthly Indexes

As pointed out earlier, the use of unadjusted man-hours together with the lack of census bench-mark adjustments was the major cause of the downward bias in the old production index in recent years. For the period subsequent to the last census indexes, about two-thirds of the total weight of the index is projected on the basis of monthly physical production or related data and the remainder on man-hours. The use of man-hours is restricted to the manufacturing division of the index since the mining and electricity and gas industries are well represented by monthly commodity data.

In the manufacturing division, the indexes of the industries for which production or related data are available monthly showed generally close agreement with the corresponding census bench-mark levels in the earlier period. Where unadjusted man-hours were used, however, differences between the man-hour indexes and the production bench-mark series were often considerable. The result is that, between 1949 and 1957, the old total manufacturing index showed an increase of only 29 per cent whereas the new index showed an increase of 42 per cent.

For the period subsequent to the last census bench-marks, in industries represented by man-hours, adjustment factors designed to offset the downward bias present in the old index were developed as follows: output per man-hour ratios were obtained in the years for which bench-mark indexes were available. An average annual rate of growth was computed from these ratios for each industry and a fitted straight line was plotted on a monthly chart. In a few cases where the past trend of the ratios was relatively smooth and not seriously affected by variations in the volume of production, output per man-hour ratios for the current period were based on the extension of the fitted line. Where the past trend of the output per man-hour ratios was affected by changes in the volume of output, the projected monthly ratios are subject to adjustment. It was observed that for many industries affected by a period of contraction the trend of output per man-hour generally tends to flatten out or even decline, while in periods of expansion it will tend to increase at a more rapid rate. In 1957 and 1958, for instance, when many manufacturing industries suffered a decline in output, it appeared appropriate to modify many of the projected adjustment ratios. Where the past trend of the ratios was erratic, a special effort was made to obtain the latest available census bench-mark data in order to reduce the possibility of accumulated errors.

A running check on the ratios is maintained by compiling up-to-date preliminary bench-marks from a survey on the value of manufacturing shipments and inventories which is carried out monthly by D.B.S.; the derived value of production for the industries involved is deflated with the most appropriate available price indexes. Because of the problem associated with the deflation of inventories on a monthly basis, it was considered too hazardous, for the present, to use the deflated value series on manufacturing shipments and inventories as direct indicators of production except for a very limited number of industries. Rather it was judged preferable to use these data on a semi-annual or annual basis to check the reasonableness of the current adjusted man-hour indicators.

It is planned to incorporate revised census bench-mark levels in the index at regular intervals as census of industry data become available. Thus the indexes represented by adjusted man-hours will not have to run too long without revision. It is expected, accordingly, that future revisions to these indexes will not be as large as in the past.

The New Seasonally-adjusted Index

In the old index, seasonal adjustment was carried out by the "hand" method at the major group level only and detailed analysis of the series was

considerably handicapped. The revised series incorporate the latest developments in seasonal adjustment techniques.

For purposes of seasonal adjustment the new index was broken down into 97 industry components. These were first adjusted for variations in the length of the work month and for major irregular occurrences such as strikes. The indexes were then forwarded to Washington for the calculation of the seasonal adjustments according to the electronic computer programme developed by the U.S. Bureau of the Census. It would have been impractical to develop and maintain by hand the seasonally-adjusted series on the detailed basis required for the new index.

After careful examination of the results, the computer adjustments have been found satisfactory in the majority of cases. At the ends of the series however, where, by nature of the computing method, the results are more tentative, especially at cyclical turning points, it was found that approximately 20 per cent of the series required special treatment. This involved retaining the computer factors up to the year in which distortion first appeared and then extending these factors by means of the hand approach.

Even though it was decided to obtain seasonally-adjusted composites for industry groups and the total by adding the seasonally-adjusted components rather than by adjusting the composites directly, the composite indexes were processed on the computer along with the industry components in order to determine the extent of differences between the two approaches. No significant differences in timing or magnitude of movements were observed. A running camparison of the two approaches will be maintained to check on any divergences that may develop. The method of summing components to totals was chosen since it provides an exact measure of the point contribution of each component series to the composite totals, which is an important advantage in the detailed analysis of the series.

The principal problem is in keeping the seasonal factors up-to-date. The computer helps a great deal by projecting the factors one year ahead. However, in order to ensure as much as possible the accuracy of current factors, adequate tests of the data must be maintained to correct for any sudden shifts in seasonal patterns. This problem is minimized by the annual re-run of the "raw" indexes on the computer.

Appraisal of results

The new Index of Industrial Production is considered to be an improvement over its predecessor. More comprehensive coverage of commodity data, a more up-to-date weighting system, new bench-mark levels, more accurate seasonal adjustment, the introduction of man-hour adjustments, etc., all contribute to a better and more reliable index. There is no method of determining the absolute accuracy of the index. There can be little doubt, however, that some individual industry indexes are more accurate than others, the margin of error depending chiefly on the quantity and quality of the output indicators available. It is probable that errors did occur but it is also probable that they occurred in both directions thereby offsetting each other to some extent. The composite index, therefore, can be assumed to be more accurate than any of the major groups and these, in turn, more accurate than the indexes of their industry components. It is not believed that any recent changes in the weighting structure can have any substantial influence on the reliability of the overall results.

RECENT DEVELOPMENTS IN THE WORK OF THE DOMINION BUREAU OF STATISTICS[1]

Public interest in statistics has grown in the past few decades and more and more statistical measurement is coming to be used as a basis of decision-making by governments, business and others. At the same time, the development and systematization of sampling theory has made possible the adoption of new techniques of measurement. Recently, the use of electronic computers has opened up new possibilities in the way of ease and economy in complex and large-scale computations. The work of the Dominion Bureau of Statistics is changing in response to these needs and potentialities. Each year usually brings some new projects, further progress on those already under way, the adoption of some new methods, and expansion in scope and improvement in quality of existing series. It is the purpose of this article to inform readers of new developments in the Bureau's work in the past year.

The article will refer only incidentally to current publications. Many of them will be familiar to readers and in any event they are listed in the Bureau's catalogue of *Current Publications*. This catalogue was revised in the past year and the revision included a new subject grouping and a permanent code number for all publications.

The Census and Social Statistics

The Census Division was occupied during the year with planning for the 1961 Census. The questionnaires are to include the traditional questions but the need for new statistics has led to elimination of some items and extension of others. The use of electronic computers is expected to speed up tabulation of the returns and to facilitate greater cross-classification.

A major re-organization of criminal and correctional statistics is the most important new development in the general field of social statistics. The inadequacy of existing data was first pointed out by the Archambault Commission in 1938 and subsequent commissions and committees continued to emphasize the need for a sound statistical service. Government agencies having administrative responsibilities in this field have stressed the importance of more and better factual information as have individuals and organizations concerned with problems of crime and punishment.

The objective of the new programme is to develop comprehensive, integrated and improved statistics. The establishment of uniform definitions, records and reporting procedures is a first step. When this stage of the work has been completed, the programme of publications calls for annual analytical reports for Canada and regions on selected criminal and correctional statistics and for studies of selected offences.

The introduction of hospital insurance under joint Dominion-provincial sponsorship is leading to an expansion in hospital statistics; the new programme calls for more complex submissions by the hospitals and far greater promptness in processing by the Bureau. Another matter of interest concerns hospitals for the tuberculous and the mentally ill; detailed censuses of these institutions will soon be available.

Economic Statistics

The results of a sample survey of farm and farm-family expenditure and income covering the year 1958 are now being processed but they are not likely to be available until mid-1960. The survey is intended to provide bench-marks for farm finance statistics, up-to-date weights for the construction of indexes of prices paid by farmers, better figures of net income from farm production, and estimates of income of farmers from non-farm sources.

The coverage of the monthly series on manufacturing shipments has been improved to the point that a provincial breakdown for total shipments can be published. Likewise in merchandising statistics, further area breakdowns have become available, in that the retail sales series now provides statistics for each of the Maritime Provinces. Plans were made for a bench-mark survey of wholesale trade, covering the year 1958, and surveys of manufacturers' trading outlets and of agents and brokers, both covering the year 1957, were completed, these surveys being the first since 1951.

The historical revision of the estimates of labour income was completed and a reference paper will soon be published. Monthly reports now show seasonally adjusted labour income by regions, and some industry sub-totals; provincial estimates and further industry detail are available quarterly.

The Bureau is instituting a study of labour mobility, the first such study attempted in Canada. This study is based on a sample of records of the

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[1] This article was published in a somewhat condensed form in the November issue of the *Canadian Journal of Economics and Political Science*.

insured population secured once each year. The location, occupation, industry and age of insured persons have been tabulated for the years 1952 to 1956 inclusive, and similar data for later years will also be examined.

This year the Bureau inaugurated an experimental sample study of initial claims for unemployment insurance benefits. Initial claims, which represent about 70 per cent of total claims, are believed to be of special interest insofar as changes in this group anticipate future changes in total claims. The sample was selected with special attention to the need for provincial data on characteristics of claimants.

A new type of wholesale price index is being added to the Bureau's range of price statistics and a reference paper on this subject will soon be published. The new series, to be known as the *Manufacturers' Selling Price Indexes*, differs from the Wholesale Price Index in that the scope is more restricted and the classification is by industry rather than by commodity. The new index is part of the programme of compiling statistics within the framework of an internally consistent and analytically meaningful classification. An industrial classification of wholesale prices takes account of complex and highly fabricated products and is better suited to the nature of the economic organizations that intervene between the producer and the retailer. The base-period weighting system (1953) and the base-period reference period (1956) are updated from the base of the wholesale price index (1935-1939). The new series supplements but does not displace the present index of wholesale prices.

Three price indexes for investment goods are being developed – industrial machinery and equipment, highway construction, and thermal and hydroelectric generating installations. The first project is well advanced and the other two are at a preliminary stage.

A variety of new developments in the area of transportation and public utilities can be reported.

Some of these new or expanded series will provide data for study of competition between various forms of transport. The results of a survey of inter-city truck traffic based on a revised sample, showing commodity detail comparable with that shown for rail transport, are now available quarterly. Statistics will be issued next year on ton-miles of cargo carried in coast-wise shipping. A sample survey of passenger air traffic between Canada and Europe was started this year. Civil aviation statistics are to draw together data on traffic flows, both passenger and cargo, by origin and destination.

Two gaps in the existing data on rail and water transport are now filled with the recent inclusion of piggy-back traffic in railway freight statistics and of cargo loadings and unloadings at non-customs ports in shipping statistics.

In 1960, a sample survey of passenger car travel is being inaugurated. This survey will secure data on miles travelled and fuel consumed on a provincial basis. At the same time, statistics of motor vehicle registrations will be put on a quarterly basis.

A census of Electric Power Equipment as of December, 1958, covering thermal and hydraulic installations, was completed this year. This census, the first in many years, will be taken every five years.

A new series on gas pipelines was started, and monthly and annual reports are to be published shortly. Monthly statistics on distribution by gas utilities, on an expanded basis, are now being collected; the published detail for 1959 will include domestic, industrial and commercial uses, by provinces.

Finally, reports on radio and television broadcasting are being resumed, after having been interrupted for some years. The series is being resumed as of the year 1957.

The report *Research-Development Expenditures in Canada* will include, for the first time, Federal Government outlays; this project is carried out jointly with the National Research Council.

Up to the present, reports on pension plans have been limited to the financial aspects of trusteed plans. In view of the growing importance of pension schemes as a medium of personal savings, steps are being taken to include non-financial aspects and to cover funds other than the trusteed type.

An analysis of Canada's short-term external assets and liabilities has been completed and a reference paper on this subject is scheduled for publication soon. Hitherto the annual reports on Canada's balance of international payments have lacked analytical detail on short-term assets abroad and have not been comprehensive in that they excluded data on short-term receivables and payables. The new work makes it possible to complete the estimates of Canada's international assets and liabilities for the years since 1945 and provides some special analysis for the year 1956.

Research Projects

The development of inter-related price-volume-value data for the quarterly National Accounts is an important aspect of the work of the Research and Development Division. Two approaches to this problem are being followed: the direct measurement of real output by industry and the deflation of expenditure along conventional lines.

Implicit price deflators on an annual basis are published annually in the National Accounts, with the caution that they must be interpreted with care since they have current rather than fixed weights and thus reflect changes in the product mix as well as pure price changes. This qualification applies even more forcibly to the quarterly estimates which have radically different weighting patterns from quarter to quarter as a result of seasonal factors. Accordingly, a Laspeyere-type base-weighted price indicator is being developed which will be free from the influence of quarterly shifts in weighting. This programme should culminate in publication, quarterly, of the disposition of real output by main expenditure categories and the changes in real output by industry of origin, seasonally adjusted.

The other research projects of the Division are in the fields of income-size distribution, financial statistics, the inter-industry flow of goods and services (commonly known as input-output) and the stock of fixed capital.

A sample survey of non-farm families was undertaken in May and June, 1959, to obtain data on incomes, liquid assets and indebtedness. It is expected that the results will be published late in 1960. Income-size distributions for non-farm families and individuals for 1957 were published in July in *Distribution of Non-Farm Incomes in Canada by Size, 1957* (Catalogue No. 13-512). Another survey developed to obtain similar income-size distribution is planned for the spring of 1960.

An inter-departmental committee on financial statistics has begun to study the steps which might be taken to present available financial statistics in an integrated form and to fill important gaps in the existing data. Immediate attention will be given to statistics which throw light on the financing of capital formation by corporations.

The inter-industry flow table for 1949, published in *The Inter-Industry Flow of Goods and Services, Canada, 1949* has been revised to take account of more up-to-date data. At the same time, the method of tracing commodities from producer to user was changed so that the revised table is at producers' prices. This revised table, together with its inverse matrix and other supplementary tables, will be published late this year. Plans are being made for the construction of another table for the year 1961.

The perpetual inventory method is being used to prepare estimates of the net and gross stock of fixed capital in constant and current dollars. The estimates will be extended backwards for as many years as data on gross capital formation, length of life of assets, and prices permit. It is hoped that an important by-product will be estimates of capital consumption allowances for calculation of net capital formation.

Standard Classification Systems

A revised issue of the *Standard Industrial Classification Manual (1948)* has recently been completed and will be issued about the end of the year. The revised classification distinguishes some 300 industries in 11 industry divisions. It is expected that most of the Bureau's industrial series (e.g., Census of Industry, Population Census, Monthly Employment Statistics) will produce statistics at substantially this level of detail. It is planned to implement the revised classification in 1961. The 1961 Censuses of population and of merchandising will use the new system.

The *Standard Commodity Classification Manual* is now well advanced and the first of the three volumes has already been printed; the others will be available in the near future. The implementation of this classification will produce co-ordinated commodity statistics. The principal sources of commodity statistics are exports and imports, manufacturers' shipments, materials and supplies used and wholesale prices. At present each operation has its own system of grouping and presenting the data and the various systems of classification in use are uneven in quality from a technical point of view.

The need for a more meaningful classification of trade and production statistics has been evident for some years. The present schedule calls for the adoption of the Standard Commodity Classification for exports in January, 1960 and for imports in January, 1961.

Training Programme

An Inter-divisional Sampling Studies' Committee was appointed early in 1959. Its immediate task was

to take stock of the Bureau's needs and resources in the field of sampling and its ultimate aim is to achieve a co-ordinated programme of sampling for the Bureau as a whole.

In order to develop talent for implementing sampling methods in various subject matter fields, the committee established a training programme for subject matter specialists who are involved in sampling operations in their respective divisions. The first half of the programme was devoted to the basic principles of sampling and the second half to problems of application as they arose in the Bureau's operations.

Electronic Computers

An electronic data processing centre is being established in the Dominion Bureau of Statistics to serve the many and varied computational needs of the Bureau and to act as a service centre for the work of other departments of government. An IBM 705 Model III Electronic Data Processing System, including a document reader, will be in operation at the beginning of 1961. Initially, the main emphasis will fall on the 1961 Census but the computer is also to be used from the beginning for suitable non-census work. Seasonal adjustment, employment and pay-rolls, imports and exports, the labour force surveys and the consumer price index are among the series which appear to be most suited for programming at this stage of planning.

STATISTICS OF EDUCATION

Under Section 33 of the Statistics Act, 1918, the D.B.S. is empowered to collect, compile, analyse, abstract and publish statistics of public and private elementary and secondary schools, vocational institutes and trade schools, colleges and universities, libraries and museums and adult education activities. The principal data collected and reported annually cover the number and types of establishments; numbers, salaries and qualifications of staff members; numbers, levels and activities of those enrolled; and revenues and expenditures. Essentially the Education Division provides quantitative and other factual information in suitable publications and assists other agencies such as Unesco, to prepare their publications.

To perform its functions the Education Division is organized in five sections: Elementary and Secondary, comprised of schools and finance units; Higher Education; Vocational Education; Adult Education, Museums and Libraries; and Research and Development.

Rapidly increasing enrolments, demands for more accommodation and many more qualified teachers, combined with rapidly increasing costs have greatly increased the demands for additional series and for more timely statistics. To meet these demands insofar as possible most of the reports have been overhauled and new ones have been established. Considerable effort has been brought to bear on the problem of publishing current statistics and present coverage is being carefully scrutinized and altered to meet current needs.

Although statistics of education are predominantly social rather than economic, the economic importance of each series must be recognized when it is realized that the expenditure on education in 1958 for all Canada was $1,150,000,000. Expenditure on education accounts for 26 per cent of funds raised at the municipal level, 23 per cent of funds raised by the province, and 3 per cent of the federal budget.

Schools and Teachers

Data on publicly-controlled schools has always been obtained from the provincial Departments of Education. Each Department collects information from the schools and publishes an annual report with information on teachers and pupils, etc. Many of the forms used are designed co-operatively by the D.B.S. and provincial Departments to ensure some degree of uniformity in reporting across Canada. These forms provide data for the use of both the province and the D.B.S. and may be compiled by either the province or the D.B.S. or by both. At present, a fall report form provides data on enrolment and on teachers' qualifications and salaries; and an end-of-the-year report gives data on schools and pupils by age, grade, subjects studied in high school, and certificate, experience and tenure for teachers.

Data for private schools is in most provinces obtained directly from the schools by D.B.S. but two Departments of Education collect data on forms prepared by the D.B.S. Information obtained is similar to that shown for public schools.

Universities and Colleges

Annual returns, obtained directly from universities and colleges, are incorporated in the Survey of Higher Education. Tables show full-time undergraduate and graduate students of university grade by province and faculty, part-time and short course students by grade of work, degrees and diplomas granted. Trends are indicated by retrospective tables on enrolment by faculties, degrees and diplomas granted, teaching staffs and finances. A bibliography of articles and publications is given.

Salaries and Qualifications of Teachers in Universities and Colleges gives distributions of salaries for deans, professors and instructors according to field, geographic region, size of institution, faculty, subject, and highest degree obtained and experience. Other publications include *Canadian Institutions of Higher Education* giving name, address, courses offered, requirements and fees, *University Entrance Awards* and *Awards for Graduate Study and Research* and *Fall Enrolment in Universities and Colleges.*

Vocational Education

In 1958-59 the chief of the Vocational Education Section co-operated with the Canadian Vocational Training Branch, Department of Labour to produce *Vocational Training Program in Canada, A. – Technical and Trade Training, Publicly-Operated; B. – Commercial, Home Economics, Art, Service Trades, Fishing, Forestry, Landscaping, Marine Engineering and Navigation, Publicly-Operated; C. – Vocational Education in Agriculture.* The information and series designed for these reports will be continued in D.B.S. publications from 1960 on, and additional publications on privately-operated vocational and trade schools will be produced annually. Series on private business colleges have been published for many years and will be continued.

Adult Education and Libraries

Biennial surveys of libraries were issued from 1931 to 1957 when the series was put on an annual basis. The 1957-58 survey reports on 1,459 public libraries, including 132 urban libraries in centres of 10,000 and over, 37 regional, co-operative, travelling and open shelf libraries, and data for 32 university and college libraries.

The first report covering adult education conducted by universities, Departments of Education and school boards of cities of 10,000 and over covered the year 1950-51. The first of an annual series will be issued in 1960 and it is planned that the scope, which is similar to that of the 1950-51 series, will be increased from time to time to cover other areas which contribute to adult education.

Research and Development

The Research Section undertakes surveys and studies in one or more of the fields of education of interest to Canadians generally or to educational or other organizations. Among the topics reported on to date are the following. *Statistical Review of Canadian Education, Census 1951.* Each decennial census includes questions on education from which data are obtained on years of schooling and attendance at school which can be related to other census data on occupations and industries, country of origin, age, etc. Some of these data act as a check on figures obtained otherwise; the others provide information not available elsewhere. *A Bibliographical Guide to Canadian Education, University Student Expenditure and Income in Canada, 1956-57* and a report on *The Organization and Administration of Public Schools in Canada, 1960* are among the publications released.

Uses of Education Statistics

Statistics of education are used by several departments of the federal and provincial governments and many municipal governments; by associations of parents, teachers and trustees; by business firms, and by research students and writers. Increased interest has followed from increased automation, greater urbanization, as well as from a surge of new entrants from elementary schools up and now in the universities, with consequently greater demands on high schools and universities. Data produced by the D.B.S. is used in forecasting the numbers likely to be enrolled during the next 10 or 20 years and the number of professors and teachers needed, the number of new or enlarged institutions and roughly the amount of money needed for current expenditure and capital outlay.

An interest in available manpower related to education level is of particular interest to the Department of National Defence, the Department of Labour and the National Employment Service as well as industrial firms. Data on the numbers receiving trade, technical and professional training is a necessary adjunct to this information considering the well-being of the nation and staffing of the armed forces.

Data showing the number of full-time students of university grade are collected and used as a basis for computing federal grants to universities, allocated to the provinces by the Department of Finance and at present distributed by the Canadian University Foundation.

Provincial Departments of Education are in constant need of more factual information as policies are appraised and usually revised only after consideration of statistical data. Data on teachers' salaries and qualifications, losses to the profession and present and future supply, are in constant demand. Increased operating costs and stepped-up building programs whether due to increased enrolment, higher salaries and other costs, affect provincial budgets and grants.

At the municipal level, more detailed statistics on teachers, pupils and finances are equally important in the administration of education. Here authorities carefully watch increases in costs, insurance, pensions, special education, evening courses, and salary schedules. Comparative data from other municipalities and provinces are used in the formulation of policy.

Business firms use these statistics for consideration of labour supply and markets; publishing firms and supply houses are more interested in relating these data to market potentialities.

Professors, students in research, and writers use education statistics as source material for a variety of topics and guidance personnel use the data in assessing trends and in advising clients.

Teachers' associations make use of data on training of teachers, teaching load, salaries, tenure and experience, while trustee associations use information related to costs, educational trends, teacher qualifications, teacher supply and demand and forecasts of needs in planning for the future. Statistics of age-grade placement, pupil progress, teacher training and qualifications and school finances are of interest to parent groups.

An increased interest in comparative education requires that comparable education statistics be prepared for all Canada and that both historic and current data be provided for Unesco and a number of international yearbooks, the Departments of External Affairs and Trade and Commerce. Interest in Canadian high schools, colleges and universities is on the increase, and the number of requests for such information from outside the country is indicative of increasing international interest.

THE DEVELOPMENT OF CONSUMER CREDIT STATISTICS IN CANADA

Available statistics on consumer credit emanate from various D.B.S. surveys and the records of certain other government departments. Balances outstanding (in most cases at the month-end and calendar-year-end) on account of transactions mainly of the nature of consumer credit are published monthly in the Bank of Canada *Statistical Summary*. In the case of the so-called sales finance companies repayments and new paper purchased are also shown. Publications of the Dominion Bureau of Statistics carry most of this information in greater detail.

A problem in the production of comprehensive consumer credit statistics is to define the phrase "consumer credit". The usual definition would probably include any indebtedness which has been contracted for the purpose of purchasing consumer goods or services for personal use.[1] In many cases, however, the purpose of the loan is not really known; it is merely inferred from the type of borrower; for example, policy loans and bank loans contracted by persons maybe classified with consumer credit because it is assumed that the proceeds are used to finance personal purchases, although in fact they may be used to finance business transactions. In other cases, the indebtedness is contracted in the course of actual purchases of goods which are apparently consumer goods but it is by no means certain that they are intended for personal rather than business use.

One of the most important surveys in this latter category is carried out by the D.B.S. in the field of retail trade. In 1941 a temporary wartime agency began collection, on a restricted basis, of credit extended by a small sample of retail stores. The D.B.S. took over this sample after the War and enlarged it until in 1949 it included some 2,500 stores in 16 different trades. Separate statistics were collected, annually and quarterly, on credit sales and accounts receivable, each subdivided into instalment and charge account. In 1955 a larger and much improved sample was designed subdividing the field into three main classes (with subdivisions in each): (a) department stores, (b) chain stores in credit trades[2] and (c) independent stores in credit trades. As a result of vexing difficulties in defining and reporting credit sales the quarterly survey was recently reduced in scope to cover accounts receivable only. A monthly series covering certain trades was added. The annual survey continues to secure credit sales as well as receivables.

Another major DBS survey in this field covers the activities of sales finance companies. This survey had its origins in 1935 in a monthly survey which was confined to new motor vehicle sales and the financing of these vehicles by sales finance companies. After commencement of this survey there was evidence of increasing interest in the total activities of sales finance companies. Such a survey was started in 1941 but was discontinued the following year until 1948, when it was resumed on a regular basis, first as an annual survey only but later also on a quarterly and more recently on a monthly basis. This monthly survey covers 15 of the largest companies accounting for some 90 per cent of the total business. The monthly estimates are adjusted once a year to the annual totals which cover all Sales Finance Companies (except those which are subsidiary to a merchandising organization financing only the sales of that organization). Indebtedness incurred for the purchase of consumer goods is shown separately from that incurred for the purchase of commercial and industrial goods. In each of these major categories separate data are shown for motor vehicles[3] and "other goods".[4] In addition to balances outstanding, the amount of paper purchased is collected and repayments are estimated by subtracting the net change in balances outstanding during a period from the paper purchased.[5] (The figures on repayments therefore include cancellations and any other adjustments to the two reported series).

The other sources of information on consumer credit may be summarized briefly:

(a) Small loan companies and licensed money lenders

An annual report of the Department of Insurance on small loan companies and licensed money lenders shows considerable detail of each company's yearly business, including accounts outstanding at the end of the year. Monthly surveys are carried out by D.B.S. on balances outstanding at the end of each month.

(b) Chartered banks

The chartered banks provide quarterly data on secured and unsecured loans to persons, and home improvement loans to persons. (Loans to finance the purchase of Canada Savings Bonds are also supplied but these are excluded from the consumer data tables.)

(c) Credit unions

The annual data secured from credit unions show only total loans, with no other details.

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[1] Mortgage debt on houses would, presumably, be included only if it was used to finance consumer purchases.

[2] For example, food, chains and variety stores which do not sell for credit were excluded. Sales in all non-credit trades were classified as cash sales and added to the cash sales of credit stores.

[3] All passenger cars are classified as consumer.

[4] Other goods are further broken down into a variety of classes for those respondents who can provide the detail.

[5] In addition, data on average repayment terms on retail paper purchased are collected.

(d) Life insurance companies

Complete data are available annually on policy loans from the Department of Insurance. Monthly data for 12 large companies are used in conjunction with the annual data to provide monthly estimates of policy loans outstanding.

(e) Quebec savings banks

Monthly data on the loans outstanding of Quebec savings banks are available as part of their published material.

(f) Miscellaneous

Annual surveys were initiated in 1958 by the D.B.S. on credit extended to individuals by utility and transportation companies. At present it appears that these companies cannot supply information on a more frequent basis. Quarterly surveys of oil company credit to individuals have been carried out for some years.

Credit statistics not available may also be briefly listed:

(a) Service credit

Very little is known about credit extended by professional people such as doctors and dentists, by hotels, and credit card companies. The last two fields, however, are under study at the present time.

(b) Individual loans

Very little is known about loans by individuals to individuals and no special surveys are being planned.

A number of outstanding problems in the preparation of a comprehensive set of consumer credit statistics may be outlined briefly:

(a) As already indicated, a portion of the credit classified as consumer credit is probably used for business rather than for personal purposes. A practical but incomplete way of reducing this problem is by publishing separate data for the different trades so that those in which business credit is likely to be unimportant can be studied separately. Examples of retail trade in which business credit is important are implement, fuel, and hardware. In addition, charge accounts of motor vehicle dealers are classified as business for purposes of analysis by the Bank of Canada.

(b) New developments in the field of credit are continuously taking place making it more difficult to maintain meaningful historical series. For example, in the past few years additional chartered banks have entered the sales finance field so that the data obtained from sales finance companies provide a decreasing proportion of the available credit paper. Another development impairing comparability is the appearance of credit card companies in several areas of Canada. These companies discount the receivables of retailers; the retailers receive cash (discounted) and the credit card companies assume all risk of collections. Thus some concerns which formerly carried receivables on their own books do not have them now as the receivables are on the books of the credit card companies.[6] As already intimated, it is planned to start a survey of these companies in the near future.

(c) The historical information is complicated further by changes in the terms on which credit is granted. Large stores, especially department stores, have started combining recently their different credit accounts into a single "all-purpose" credit plan. At the time of billing they do not know if the customer is planning to pay the amount outstanding in one lump sum or spread it over a number of months. Under the new arrangement customers are billed and a service charge made each month which is based on the unpaid portion of the account, replacing the instalment contract (widely used in the past) where the carrying charges are added after the time of repayment has been agreed upon (usually at the date of purchase). This development is becoming quite widespread and the breakdown between charge and instalment hitherto collected may be eliminated in the near future. Thus the annual data in the future will be classified into cash sales and credit sales and the monthly and annual data will show a single total only covering all receivables.

(d) As mentioned earlier, the breakdown of sales between cash and credit has been eliminated from the quarterly and monthly data mainly because firms had continuous difficulty in treating down payments and trade-in allowances and it was felt that the resources involved in straightening out these problems in the current surveys were better employed elsewhere.

(e) Except for instalment finance companies, only amounts outstanding at the end of the period are collected at the present time with no information available currently on new loans and repayments. For analytical purposes it is of course very useful to have separate information on new loans and repayments as well. The possibility of obtaining such information on a current basis will probably be studied shortly by the interdepartmental committee referred to at the beginning of this memorandum.

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[6] The figures of receivables shown in the reports of retail dealers exclude the amount of paper sold to sales finance companies.

CANADIAN FINANCIAL STATISTICS

Until recently there has been no central co-ordination of financial statistics in Canada. Whereas the Dominion Bureau of Statistics is the central federal statistical agency for the collection of statistics in many fields such as prices, employment, agriculture, manufacturing, international trade, education, health and welfare, the responsibility for the production of financial statistics has been divided among a number of government departments and agencies. For example, the Department of Finance publishes statistics on various aspects of the financial operations of the Federal Government. The Department of Insurance collects statistics on life and other insurance companies, small loan companies and certain trust and loan companies; the Department of Agriculture obtains data on credit unions; the Department of National Revenue collects balance sheet and other data from business; the Central Mortgage and Housing Corporation prepares estimates on the financing of new residential construction; the Bank of Canada produces a large volume of financial statistics, pertaining mainly to banking and the securities and foreign exchange markets; and the Dominion Bureau of Statistics obtains figures on the capital account of the balance of payments, consumer credit, pension plans and provincial and municipal finance. The statistics which these various agencies produce are in most cases designed to provide them with information which they need for discharging their specific administrative responsibilities. They have not been developed within any overall framework and consequently are difficult to fit together for financial and economic analysis.

Perhaps more serious is the fact that there are important areas where statistics are either lacking or inadequate; in others, where the coverage may be good and classification reasonably adequate, the time lags involved in collection and publication are so great as to make the figures of limited usefulness for current analysis. As far as their own responsibilities are concerned, the various administrative agencies have, in general, not felt any particular need for improving or speeding up the statistical information they have been collecting in these areas.

The lack of an adequate coverage of financial statistics is by no means a situation unique to Canada. However, in a number of other countries considerable progress is now being made in the development of this field.

In view of the demand for better financial statistics, not only for studying financial developments but also for their usefulness in economic analysis generally it seemed desirable to set up an informal interdepartmental committee on financial statistics. The Committee, which started its work in the Spring of 1959, was given the responsibility for reviewing the state of financial statistics and making recommendations on what action might be taken to bring about improvements. It is composed of representatives of the Department of Finance, the Department of Trade and Commerce, the Bank of Canada, the Central Mortgage and Housing Corporation and the Dominion Bureau of Statistics.

The Committee had available to it the results of substantial investigation and reworking of financial statistics in Canada which had been undertaken in connection with two major projects, namely, the "direct" estimates of personal saving (in which personal saving was estimated by subtracting changes in personal liabilities from changes in personal assets); and, more important, the so-called National Transactions Accounts. The former project had been undertaken by the Bank of Canada, in cooperation with the Dominion Bureau of Statistics, and culminated in its publication in the *Statistical Summary* of the Bank of Canada; publication was discontinued mainly because of weakness in some of the underlying statistics. The National Transactions Account had been constructed for the years 1946 to 1954 for the Royal Commission on Canada's Economic Prospects to provide a statistical description of post-war capital markets in Canada.

The National Transactions Accounts represented a most useful standard classification system for the development of meaningful financial statistics which would be consistent internally as well as with available national income aggregates. It was agreed that the focal point of the Committee's efforts should be to fill in the gaps which would make it possible to answer important practical questions, such as, for example, how capital investment is financed.

The available information was examined from this point of view and it was concluded that the most serious gap is the lack of current balance sheet data of non-financial corporations. The only corporate balance sheet information now available appears in *Taxation Statistics*, published by the Department of National Revenue, which, while very useful, is inevitably late in preparation and not entirely satisfactory in classification. As a result there is inadequate current knowledge about changes in corporate liquidity or about the activities of the corporate sector in financial markets. Accordingly, it was decided to initiate a quarterly survey of corporate assets and liabilities, beginning with non-financial corporations. Pilot surveys have been carried out this year to test public reaction to the contemplated questionnaire. The results of these surveys indicated that quarterly surveys on a regular basis would be feasible.

Meanwhile, statistics available from financial institutions had been studied and it appeared evident that, with some exceptions, particularly the banks, current balance sheet information was lacking; and while in most cases the annual information was adequate it was much too late in coming out. The

banking system is reasonably well documented on an up-to-date basis although there are a number of problems. Most of the other financial intermediaries are pretty well covered on an annual basis but, except for a monthly sample of life insurance assets, and some quarterly data on instalment and other finance companies, there is little information on a current basis. While the annual information for insurance and trust and loan companies is fairly good it is very late in becoming available. In some cases little use has been made of the available data owing mainly to the fact that the information has not been organized in the most useful form for financial analysis.

In the light of the above, a draft questionnaire designed to cover, on a quarterly basis, trust, loan, investment certificate companies, instalment and other finance companies has been prepared and is at present being studied. It is also planned to consider in the near future what the best method may be for improving the information on other financial intermediaries.

Turning to the government sector, there is a good deal of information available on Government of Canada transactions on a current basis but much work is necessary to obtain statistics that can be used in conjunction with those of other sectors of the economy. Sources of information on provincial and municipal finances are much less adequate and little is available on a current basis. In the important field of government-owned enterprises – which account for over 10 per cent of total fixed capital formation – information on either an annual or quarterly basis is quite inadequate. Resources have recently been secured to strengthen the statistics, including balance sheet information, of government enterprises and provincial and municipal governments.

Another field which is being studied is that of mortgage finance. A large proportion of total mortgage instruments are held by financial institutions which publish annual or more frequent reports, and projectors based on mortgage registrations and direct surveys are used to obtain up-to-date estimates. However, information on mortgages held by persons, unincorporated business and non-profit institutions is very scanty and poor. It is believed that one-third of total mortgage debt outstanding is held by these sectors. Accordingly the possibility of improving the information in this area is being studied.

While no attempt is being made at present to produce up-to-date tables along the lines of the National Transactions Account, the filling of the gaps listed above will go a long way towards rendering feasible the regular production of such tables. Not only will information become available which is in itself directly useful but, in addition, estimation as residuals of certain components which are difficult to secure directly through surveys, for example the holding of financial assets by persons will be rendered more practicable.

However, regular publication of an up-to-date National Transactions Account will, in addition, involve solution of certain technical and conceptual problems which at the moment are receiving marginal attention only. For a detailed description of these problems and the National Transactions Account reference may be made to Wm. C. Hood, *Financing Economic Activity in Canada*, Royal Commission on Canada's Economic Prospects (Ottawa 1958) Part VI; and for a summary of the issues John A. Sawyer and Frank W. Emmerson "Estimates of Saving Prepared from Financial Transactions Accounts in Canada" paper presented to the Sixth Conference of the International Association for Research in Income and Wealth.

RECENT DEVELOPMENTS IN THE WORK OF THE DOMINION BUREAU OF STATISTICS

The present article[1] brings up to date a previous article of the same title, which was published in the Canadian Statistical Review in November 1959. The purpose of these articles is to keep readers in touch with the evolution of statistical programmes in Canada.

The previous note outlined the work that was being undertaken to develop new statistics or to effect major improvements in established series. Much of that work is still in progress and will be referred to here only in so far as thinking and planning have been modified in the light of experience or as a distinct phase of development can be marked off. There is little new to report at present on the following projects: criminal and correctional statistics, hospital statistics, the survey of farm and farm-family expenditure and income, the indexes of prices of investment goods, pension plan statistics, the extension of the index of production to cover the whole economy, and the measurement of the stock of fixed capital. Recent developments have been mainly in the areas of labour statistics and statistics of government operations.

Organizational Changes

Statistics on various subjects should be designed so that they fit into an over-all plan with coherence among the various parts. To this end, a Central Research and Development Staff (later organized as a Division) was created in 1944. However, with the growth of the Division, it became increasingly difficult for it to carry out its integrating function and at the same time to prepare the large and complex body of statistics for which it was responsible. Accordingly, the Division has been split up into *(a)* a separate National Accounts Division, and *(b)* a Central Research and Development Staff. The latter, in keeping with the interdivisional nature of its duties, has been assigned to the Assistant Dominion Statistician for Statistical Integration.

Another interesting development is the creation of a Sampling Research and Consultation Service responsible to the Senior Mathematical Adviser. The Service is available to advise all divisions of the Bureau on the design and analysis of sample surveys; it will undertake research in the field of sample surveys and organize formal training courses in sampling techniques. Its attention will be directed initially to labour force problems.

The Decennial Census

The censuses of population, housing, and agriculture will be taken starting on June 1, 1961. For the first time an electronic computer will be used to compile the data. The use of the computer is expected to speed up the tabulation of the returns and facilitate cross-classification. As in the past, sampling is being used to obtain information on subjects where fine detail is not considered essential. Thus, a 20 per cent sample is being used to obtain information on money income from all sources, size of family, and movement of population. As in the past, questions on wage and salary income will be asked of all respondents. The census of distribution will be conducted early in 1962.

Economic Statistics

In response to the recommendations of an interdepartmental committee, resources have been requested in order to improve the existing statistics on employment and unemployment. One of the most important needs in this area is a comprehensive set of employment statistics which will provide major industry totals for each province. In order to provide these, the monthly establishment survey of employment will be extended to cover a sample of establishments usually employing less than fifteen workers. Since this survey at present excludes agriculture and some industries within the service group, it will also be necessary to use employment data collected from other sources in order to provide an adequate body of data for employment analysis.

It is also proposed to exploit more fully the potentialities of the Labour Force Survey so as to obtain from it statistics on the familial and educational characteristics of the unemployed, information on their previous pattern of employment, and data on those moving from job to job, from employment into unemployment, and on the flows into and out of the labour force.

The Committee on Unemployment Statistics, on which several federal departments and agencies including the Dominion Bureau of Statistics were represented, released a report in October, 1960.[2] The report discusses problems in the measurement of unemployment and examines the Labour Force Survey and the administrative statistics arising from the operations of the Unemployment Insurance Commission and the National Employment Service. As a result of the recommendations of the Committee, a definition of unemployment was adopted using data from the Labour Force Survey. The definition includes, in addition to "persons without jobs and seeking work," persons on temporary lay-off – a series which was formerly published as a separate category within the group "persons with jobs." This definition is comparable to that recommended by the International Labour Organization and is similar to that used by many other countries, including the United States.

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[1] This article was published in the February issue of the *Canadian Journal of Economics and Political Science*, and is reproduced here by kind permission of the Editor. Reprints of the article are available on request to the Information Services Division, Dominion Bureau of Statistics.

[2] Copies of the report may be obtained from the Information Services Division of the Dominion Bureau of Statistics and the Information Branch of the Department of Labour, Ottawa.

In February, 1960, the Dominion Bureau of Statistics completed an experimental study of labour mobility[1] based on the records of the Unemployment Insurance Commission. This was the first study of labour mobility conducted in Canada, and it covered the years 1952 to 1956 inclusive. A companion study is now under way covering the years 1956 to 1960 inclusive. It is hoped that at least preliminary results will be ready for release within the coming year.

The present study is expected to be an improvement on the first in several respects. It is based on a 1 per cent sample of the insured population in *each* year of the period and thus takes account of deaths, new entries, and withdrawals from the labour force. (The previous study was based on a 1 per cent sample in the *first* year of the period only.) The insured population is now being classified by marital status and by fine rather than broad age-groups, and the number of occupational and industrial groups to be tabulated is being enlarged. The previous study measured only average mobility whereas the present study measures the number of moves made by individuals during the survey years. In addition, the present study tabulates those who were unemployed on the insurance book renewal date each year and analyses their status in the preceding and succeeding years with a view to examining the relation between job-changing and unemployment.

For some years the Bureau has been endeavouring to fill the gaps in the existing statistics on government operations. Information on provincial and municipal finances are inadequate and little is available on a current basis. In the important field of government-owned enterprises, information is inadequate on either an annual or a quarterly basis.

A quarterly sample survey of municipal government employment and payrolls, to parallel the existing surveys of federal and provincial government employment and payrolls, is being established. (The federal government series has been published for some years, but the provincial government series, although used internally, was released for the first time in 1960.) In 1961 the Bureau plans to inaugurate a quarterly sample survey of municipal government expenditures in order to provide a current indicator of the trend of these outlays. The primary purpose is to improve the estimates for the government sector in the quarterly *National Accounts*.

A programme covering the financial statistics of the industrial and commercial enterprises operated by governments is being initiated. This is the first step in measuring those activities of government which lie outside the basic budgetary accounts; institutions, social security funds, and government pension funds are to be included eventually.

Finally, government revenue and expenditure tables on a quarterly basis have been completed and it is expected that they will be released within the coming year; they have been prepared in detail, by level of government, both on a seasonally adjusted and unadjusted basis. With the completion of these estimates quarterly national savings and investment accounts can be constructed. In recent years, the swings from surplus to deficit, particularly at the federal level, have been an important element in the trend of economic activity and have had considerable impact on financial markets. Thus the new tables should be useful for analytical purposes.

The responsibility for the collection of financial statistics in Canada is divided among a number of government departments; these statistics do not fit into an over-all framework, and coverage and timeliness are in some degree deficient. In view of this situation and the recent revival of interest in monetary policy, an informal interdepartmental committee on financial statistics was organized in 1959. The committee considered that the most serious gap was the lack of current balance sheet data on corporations. Accordingly, the Bureau carried out a quarterly pilot survey of assets and liabilities of corporations in 1960. The results indicated that quarterly surveys on a regular basis would be feasible and resources have been requested in order to start such surveys beginning with the year 1961. The committee is continuing to assess the problems in such areas as statistics of consumer credit, mortgage liabilities, and other financial areas.

The pronounced seasonal fluctuations characteristic of the Canadian economy make seasonally adjusted series a valuable analytical tool. The Bureau's objective is to publish seasonally adjusted data for a large number of the time series which are now published on an unadjusted basis in the *Canadian Statistical Review*. In addition to an expansion in the range of seasonally adjusted series, improvements are being made in the quality of existing series. The work of seasonally adjusting manufacturers' inventories, orders, and shipments is virtually complete, and it is expected that the series will be published by the end of 1960. Progress has been made in constructing a new seasonal adjustment of merchandise exports and imports. The new seasonally adjusted series is based on export and import data as revised in the manner described in the paragraph on external trade statistics (see below), and the break-down is on a country rather than a commodity basis; a working day adjustment is incorporated in it. The new series will have to be tested before any plans for publication can be formulated. The work of seasonally adjusting the components of the industrial composite employment index is going forward. (At present the seasonally adjusted employment series include the industrial composite, the manufacturing total and the durable and non-durable components, mining, and construction,

[1] "Movements within the Canadian Insured Population" (restricted), Feb., 1960; "A Study of Labour Mobility Based on Unemployment Insurance Records," *Canadian Statistical Review*, July, 1960, p. 2.

building, and general engineering.) It is expected that additional employment series will be ready for publication during the coming year.

The seasonally adjusted quarterly estimates of Gross National Expenditure and its components in constant 1949 dollars, mentioned in the previous note, have been completed. However, on testing the results it became apparent that there had been enough price dispersion and weight shifts between the base period and the current period to give significantly different results according to whether the base period chosen was near or remote in time. It therefore seemed desirable to recalculate the series using a more current base period, and experimental work on this project is now being carried out.

A historical summary of urban average retail food prices was published in 1960 under the title, *Urban Retail Food Prices, 1914-1959* (Catalogue no. 62-514 Occasional). This publication brings together in tabular and chart form a comprehensive review of some seventy food items which were priced in 1959 and for which continuous series are available for varying periods from 1914 to 1959. Price averages are shown annually for all years for which data are available and monthly for current years; price relatives are also provided on a 1949 base. Detailed explanations of methods of pricing, techniques of calculation, coverage, and price collection are provided.

In the spring of 1960 a sample survey of urban family expenditure and income covering the year 1959 was conducted in sixty urban centres, selected to represent all centres with populations of 15,000 and over. This survey was part of a continuing programme of small sample biennial surveys initiated in 1953 for the purpose of reviewing expenditure patterns of the families to which the Consumer Price Index refers. The 1959 survey was larger and wider in scope than the previous surveys; it covered all families and individuals, regardless of family size or income level, in a sample of about 3,000 selected households. The survey will provide, for a major portion of the non-farm population, material comparable to the data on family living expenditure for the farm sector which were gathered in the 1958 survey of farm income and expenditure.

A reference paper will shortly be published on Industry Selling Price Indexes. (These are the indexes described in the previous note and referred to then as Manufacturers' Selling Price Indexes.) In this new type of wholesale price index the classification is by industry rather than by commodity. The new indexes, which supplement but do not displace the present wholesale price indexes, have been prepared in response to a need for more precisely based price indexes relating to industries.

In order to bring the coverage of export and import statistics more closely into line with one another and with the adjusted trade totals used in balance of payments calculations, several adjustments were made as of January, 1960. The principal adjustments were the deletion from imports of goods to supply foreign diplomats and armed forces in Canada (already excluded from exports), tourist purchases (already largely excluded from exports), and settlers' effects and private donations and gifts (also deleted from exports). As of the same date, a new country classification of external trade statistics was adopted with a view to providing more up-to-date and usable country information. Plans for the adoption of the standard commodity classification for external trade statistics, the major new development in this area, are outlined below in the section, "Standard Classification Systems."

Following the publication late in 1959 of a reference paper of background material, *Canada's External Short-Term Assets and Liabilities* (Catalogue no. 67-504), further work was undertaken to extend basic Canadian banking statistics on international short-term movements of capital.

The revised inter-industry flow table for 1949 was published in January, 1960, in *Supplement to the Inter-Industry Flow of Goods and Services, Canada, 1949* (Supplement to Reference Paper no. 72, Catalogue no. 13-513). The supplement includes several new tables, one of which is the inverse matrix; it is a self-contained document in that all the relevant explanations of concepts, sources, and methods contained in the original reference paper are repeated. Plans are being made to construct another table for 1961.

The results of the second survey of incomes, assets, and liabilities, carried out in the spring of 1959, were released in the latter part of 1960, in *Incomes, Liquid Assets and Indebtedness of Non-Farm Families in Canada, 1958* (Catalogue no. 13-514). This report is similar in scope to an earlier report (Catalogue no. 13-508) covering incomes in 1955 and assets and debt-holdings early in 1956; the only additional information collected in 1959 was on the estimated market value of owner-occupied homes and the amount of the equity in home ownership. Another income survey was carried out in the spring of 1960; the results will be released in the spring of 1961. In addition to income data, families were asked to provide information on the number of cars owned, the make and age, the year of purchase, whether bought new or used, and, for cars purchased in recent years, the price paid.

The Bureau collaborates with the National Research Council in preparing statistics on expenditures for research and development. The programme moved one stage forward with the recent publication of the first report, *Federal Government Expenditures on Scientific Activities, Fiscal Year 1958-59* (Catalogue no. 13-515). (A third survey had already been carried out on research and development expenditures by industry.) Ultimately, it is hoped to complete the programme by bringing in the provincial governments and the universities.

Work on the development of regional statistics is being resumed after having been in abeyance for several years. An initial project will be to revise and republish the regional zoning system originally published by the Department of Defence Production under the title *Economic-Administrative Zoning in Canada* (now out of print). In keeping with an agreement made at the last Dominion-Provincial Conference on Economic Statistics, the Bureau will act as an information centre in this field, and serve as a clearing house for the exchange of information and for answers to inquiries.

A number of new developments in statistics on transportation are under way or planned for the near future; some of these will provide data for the study of competition between the various modes of transport. The *Classification of Financial Accounts of Motor Carriers of Freight in Canada*, first produced in 1947, has been revised and is now available for distribution. The motor vehicle report is being expanded to include for the first time information on provincial motor vehicle fees, licences, and regulations. The results of the Motor Transport Traffic Survey are to be produced on a quarterly as well as on an annual basis and will contain additional details on commodities. The proposed sample survey of passenger automobile travel which was to have been inaugurated in 1960 has been postponed until 1962. Another gap in the existing data on road transport has recently been filled by the inclusion of contract carriers of freight in the annual motor carrier report.

The publications on civil aviation are now being completely reviewed and it is expected that the 1960 editions will be considerably expanded. Additional information now being collected by the Department of Transport on airport traffic and origin and destination of passengers will become available for publication in the near future.

Statistics on ton miles of cargo carried in coastal shipping will become available in 1961. Data on the origin and destination of freight carried by water are now available on request and it is hoped that some of this material will soon be published.

Another comprehensive survey of prime mover and electric generating equipment is being planned for December, 1961, similar to the survey conducted in December, 1958. This survey is to be conducted at five-year intervals in the future. Arrangements have been made with the provinces concerned to collect statistics on gas distribution jointly so as to avoid having two sets of figures on the same subject. This procedure takes effect at the beginning of 1961. The first annual statistics on the transport of gas by pipeline and on its distribution were collected and published for the year 1959.

Standard Classification Systems

The revised *Standard Industrial Classification Manual* is now being printed. In the meantime, much work has been done towards implementing it in the various statistical surveys made for the purpose of obtaining information from industry. When the classification was being revised, a good deal of attention was paid to the question of developing a uniform definition of "establishment." In most cases, the establishment is the unit from which information is obtained and, therefore, a standard definition facilitates the obtaining of data from the same respondents on different surveys such as the census of manufactures, and employment statistics.

A further move toward the integration of industrial statistics from different sources is the "Standard List of Establishments." This project consists of matching the lists used on existing surveys and eliminating inconsistencies so that the coverage of each survey can be described as a certain segment of the standard list. The matching of manufacturing and mining establishments has been completed and work is now proceeding on other industry divisions. In manufacturing, it is planned that the new definition of establishment will be applied to 1961 data. Thus, there will be a break in the series and steps are being taken to ensure that a desirable degree of historical continuity is preserved.

Two volumes of the *Standard Commodity Classification* have been published and it is expected that the third volume, an alphabetical index, will be issued during 1961. The details of materials used and shipments on the census of industry schedules are being brought into line with the standard classification. Since all schedules will undergo a major revision for 1961 data, those that are not already on the standard basis will be made to conform at that time.

A programme for implementing the Standard Commodity Classification in external trade statistics is well advanced. Exports will be put on the new classification beginning January, 1961. Tests have been made and the new classification has been printed. A first draft of the classification for imports is now ready and is being examined by those most immediately concerned to ensure that it is practicable and that it provides the best possible data. A second draft will be ready in the spring. Barring unforeseen obstacles, the new classification system will be used for imports beginning January, 1962.

The classification of occupations to be used for the 1961 census, and also to be used widely for other statistical series, has been revised and is now being indexed. The classification manual will be available before the middle of 1961.

INDUSTRY SELLING PRICE INDEXES – A TECHNICAL NOTE

The Dominion Bureau of Statistics recently inaugurated a new series of wholesale prices, which supplements, but does not displace, the present General Wholesale Price Index. The new series is the subject of a Reference Paper entitled, *Industry Selling Price Indexes, 1956-1959.*[1] It will also be carried currently in the monthly publication, *Prices and Price Indexes.* It is the purpose of this note to outline the reasons for broadening the basis and increasing the range of wholesale prices indexes and to describe briefly the nature of the new series.

The General Wholesale Price Index is chiefly designed to measure the movements of prices of raw and semi-processed products. Manufactured products are inadequately represented; for example, there is no wholesale price index for automobiles or tractors. There is keen interest, among users, in price statistics relating to industries, particularly manufacturing industries, augmented by commodity series for more manufactured goods. The new series is intended to meet these needs.

The Industry Selling Price Indexes are organized according to the Standard Industrial Classification. This system groups manufacturing establishments into industries according to the principal product produced. The Standard Industrial Classification has been developed to facilitate the compilation of different statistical series within a systematic and uniform system. The Bureau's programme calls for bringing all the industrial series collected within the system. This system provides a useful framework for price analysis, since industrially classified price series can be related to other series so classified. It facilitates an assessment of the immediate effects of price changes on other elements in the economy and of the probable direction and extent of their repercussions.

The new Industry Selling Price Series was inaugurated in the Manufacturing Division of the Standard Industrial Classification, because of the evident interest in this area of price statistics; because it is the largest division in terms of its contribution to Gross National Product; and for the purely practical reasons that detailed records are available and the concentration of industry such as to make it feasible to collect data by means of small samples.

The new indexes are weighted according to the value of shipments in 1953 as reported to the Industry and Merchandising Division of the Bureau. The year 1953 was not abnormal and was acceptable as a weight base. Moreover, it was the latest year for which data were available at the time of the inception of the project. However, the year 1956 was chosen as the reference period (equalling 100) because of the difficulty of obtaining accurate information on prices prior to that year.

The series now published cover about 100 manufacturing industries, but it is hoped eventually to provide indexes for almost all industries in the Manufacturing Division. In addition, about 170 new indexes for manufactured products are now being published and further commodity indexes for individual industries are available on request, so that users may compile aggregate indexes made up of ingredients of their choice.

No average index for the Manufacturing Division will be published, since prices reported differ from firm to firm, depending on the description of the product and the terms of sale, so that an average cannot be calculated from the data.

Each Industry Selling Price Index is weighted according to the total value of factory shipments as reported to the Industry and Merchandising Division. Users should be aware of the implications of this system of weighting. Each manufacturing establishment usually carries on a limited range of activities, with the result that most products pass through a number of industries before they emerge as a finished product to be shipped out of the Division. Thus the sum of the value of factory shipments by industry substantially exceeds the value of shipments *out of* the Manufacturing Division. Users who propose to make their own aggregations should recognize the possibility of double-counting. The finer the level of aggregation the less duplication there is likely to be. If there is little or no exchange of commodities between the industries to be aggregated, as for example, slaughtering and meat packing and carbonated beverages, there is little or no double-counting. An aggregation of the carbonated beverages and the sugar refining industries would, on the other hand, involve substantial duplication. A system of "final output" weights, which cancels out inter-industry shipments, is difficult to construct and of necessity excludes many primary and intermediate commodities whose price behaviour is both important and sensitive.

The indexes are compiled from sellers' prices, i.e., they exclude the freight, insurance, and taxes which enter into the price paid by the purchaser.

Representative price indicators for each industry were chosen. The commodities and groups of commodities initially selected for inclusion in the index accounted for 75 per cent of the volume of shipments in their respective industries. Within this framework, it was necessary to identify specific products. This choice, based on the importance of the product, was made in consultation with the firms that were to provide price quotations. Changes have

[1] Catalogue No. 62-515, Occasional, Queen's Printer, Ottawa, $1.50.

been made and will continue to be made as some products disappear from the market and others take their place.

Models and varieties of product alter through time, thereby making it necessary to estimate price equivalents for different products. This problem is dealt with by comparing direct costs of labour and materials in the two products.

"Unique" goods, that is, goods which are rarely, if ever, repeated, require special treatment. In some instances, the price of a "unique" good is assumed to move with that of another related priceable product; in other instances, respondents are asked to quote a price on a model having approximately the same proportion of labour, materials and other inputs.

THE REVISED CONSUMER PRICE INDEX – A TECHNICAL NOTE

The recent revision of the Consumer Price Index, published in *The Consumer Price Index for Canada, 1949 = 100 (Revision Based on 1957 Expenditures)*,[1] is the fifth revision since the inception of series of retail prices in Canada in 1910. Revision of the index is undertaken periodically to bring the items included in the index, and their weights, into line with changed family spending habits. Indexes reflect the movements of prices with less precision as they move from the period to which their weighting system relates.

While revision of the item content and weights was a primary purpose, the current revision also includes a technical modification in the use of changing seasonal baskets of food in the index budget. In addition, a series of supplementary indexes for new classifications of commodity groups within the All-Items index is introduced.

The Consumer Price Index measures the percentage change through time in the cost of purchasing a constant "basket" of goods and services representing the purchases made by a particular population group in a specified time period. The basket is a constant or equivalent quantity and quality of goods and services but only items for which there is a continually measurable market price over time, corresponding to a specific quantity of the item, are included in the basket.

The index relates to a broad but specific group of urban families and reflects the price changes experienced by that "target group". The index is unlikely to represent closely the experience of any one family within the group nor should it be expected to reflect price change for other population groups for which income, family size and place of residence are characteristically different. The target group to which the revised index relates is composed of families (a) living in cities with over 30,000 population, (b) ranging in size from two adults to two adults with four children, and (c) with annual incomes during 1957 ranging from $2,500 to $7,000. This target group is comparable to that of the previous 1947-48 weighted index for which the income range was $1,650 to $4,050. No significant change in family size was evident between 1947-48 and 1957 and this specification was not modified in the revision. However, an appreciable increase in income levels of the urban population has occurred since 1947-48 and the income specification was accordingly modified to maintain a comparable target group for the revised 1957 weighted index.

In the revised index, the item content and the item weights are as reported in the 1957 Urban Family Expenditure Survey. The year 1949 was retained as a time base, however, for convenience of conformity with other statistical series, both national and international. The 1957 Expenditure Survey[2] consisted of a series of twelve monthly surveys of family expenditures on food in each of the five metropolitan areas across Canada and one survey covering nine cities, in which data were collected on all items of expenditure during the year.

The difference between the item content of the old and the revised index reflects wider sampling of items for pricing as well as changes in buying habits between 1947-48 and 1957. Examples of the items which have been added to improve the sampling are restaurant meals, sporting goods, jewellery and toys. Among new items added to take account of changed spending patterns are frozen foods, air travel and the purchase and repair of television sets. In all, 26 food items and 17 non-food items have been added. A few items have disappeared or declined in importance and have been dropped from the programme. A prominent example is direct hospital care, which has become less important in the family budget with the widespread adoption of provincial health insurance schemes. Pre-paid hospital care has also been dropped from the index because premiums can no longer be identified with a specific quantity of benefits.

The weight of an item in the index measures the influence that a change in the price of that item has on the movement of the index. For example, families reported (in 1957) that for every dollar spent on clothing, more than twice as much was spent on food, and the weights of 11 for clothing and 27 for food reflect this fact.

In Canada, as in other countries, not all goods and services are priced for the index. The price movements of items in the price sample are used to represent the price movement of items not priced. This is accomplished by means of a procedure termed "imputation", whereby the weight of an item not priced is added to that of a similar or related item which is priced. In the selection of items to be priced, commodities and services purchased by families are grouped first according to purpose, e.g., food, clothing, housing, etc. These principal groups are then further sub-divided. Clothing, for example, is classified into five sub-groups: men's wear, women's wear, children's wear, footwear and piece goods. Men's wear is divided into smaller groups, such as suits, coats, shirts. The items for pricing are selected on the basis of the importance of the item in family expenditure and the similarity of price movements of related items.

The 1957 based index is linked to the 1947-48 index at January, 1961. At that month, both the 1947-48 and 1957 weighted indexes are identical

[1] Queen's Printer, Ottawa, Canada. (75¢).

[2] *Urban Family Food Expenditure, 1957.* Dominion Bureau of Statistics, Catalogue Number 62-516.
City Family Expenditure, 1957. Dominion Bureau of Statistics, Catalogue Number 62-517.

for all components. For purposes of comparison, the 1957 weighted index has been calculated back to January, 1957. For the all-item index and the housing, clothing, health and personal care components, the two weighting systems give virtually the same results both as to level and movement in the period January, 1957 to December 1960. In the 1957 weighted index, the transportation group and the reading and recreation group show a stronger seasonal movement. The trends were similar but the increases in the 1957 weighted indexes were more moderate. The seasonal patterns of the two food indexes differ because of a change in the treatment of seasonal foods.

The prices collected for the index are retail prices inclusive of all sales and excise taxes. Prices must relate to regular merchandise, with items especially manufactured for sale purposes excluded. Where multiple prices are commonly used, i.e., for items sold in combinations of two or more units, the price per unit is calculated and used.

The purpose of the Consumer Price Index is to measure the impact of price change on the cost of maintaining a constant level of living. Prices change seasonally in response to changes in supply and demand and the index is designed to reflect such price movements. However, the quantities purchased by families also vary seasonally and a fundamental problem in constructing a monthly index is the choice of weights which will properly reflect the changing relative importance of seasonal items from month to month, and at the same time produce an index which measures price change only. Food is the most conspicuous example of seasonal variation in quantities purchased. In the 1947-48 indexes, food items in seasonal supply did not have a fixed weight but rather weights which changed within the year in accordance with consumer buying practices, thereby taking account of the fact that seasonally low prices are normally associated with seasonally high consumption and vice versa.

One group of food items, comprising fresh and canned fruits and vegetables, fat, eggs and meat, was a relatively constant percentage of total food expenditure, but there was significant variation within the group. For another group, comprising dairy products, cereals and other groceries, the percentage was relatively constant at both the group and item level. Constant weights were used to combine the groups and varying weights used within the first group.

The problem with this method was that the total quantity of food normally purchased varied from month to month within a range of plus or minus 2 per cent. The result was that the food index so calculated reflected this variation as well as price change.

In revising the index, a quantity index of food purchases was constructed from the data from the 1957 Survey, using average 1957 prices. This monthly index measures the variations in total quantity mentioned above. For each seasonal item in a given month, adjusted quantities were calculated by dividing by the quantity index for that month. This procedure keeps constant the total quantity of food over all months and adjusts the seasonal items in proportion to the actual amount purchased. Thus, it takes into account seasonal changes in the relative importance of items in the food budget and at the same time measures the impact of price change on the cost of purchasing a constant quantity of total food. This technique makes it possible to include highly seasonal items, available only in some month of the year, such as fresh strawberries, which among others, are included for the first time.

The seasonal pattern of the revised index differs appreciably from that of the former index. The amplitude is much the same but the seasonal low is reached about one month earlier and the peak two months earlier in the revised index. Comparisons of current monthly movements in food prices with movements in the recent past should therefore be based on the revised series.

Monthly data on seasonal items other than food were not collected in the 1957 survey and constant weights are used; the price is carried forward through the off-season period and the full price change recorded when normal buying is resumed.

Except for owned homes, the purchase concept is used in the treatment of consumer durables in the revised consumer price index. This is in accordance with previous practice except that in the 1947-48 weighted index reported expenditures on four items, cars, electric stoves, refrigerators and washing machines, were scaled down to what was deemed to be a normal level. Purchasing of these items was considered to have been abnormally large at that time by reason of the back-log of demand built up during the war. In the case of owned homes, the weight used is based on consumption as measured by the annual depreciation of the stock of houses owned and lived in by the target group. This concept had been used in the 1947-48 index and a shift to a purchase concept would have resulted in a rather large change in the weight assigned to the price of houses. In Canada, as in other countries, the relative merits of a purchase concept and a replacement concept for consumer durables is currently a subject of debate, and a change in concept was deemed unadvisable at this time.

Second-hand merchandise is excluded from the index. Insofar as families in the target group purchase from one another the cost of living of a group as a whole are not affected. The appropriate weight for second-hand merchandise is net purchases from the business sector and this is considered to be so small as to be negligible.

Sales and excise taxes are an inherent part of the market price of the goods and services subject to these taxes and property taxes are part of the

price of home ownership. All these taxes are included in the index. Income taxes, since they are not associated with specific goods and services, are excluded.

Premiums paid for property insurance and pre-paid medical care are included, since the first represents a guarantee to replace a specified quantity of property damaged or lost and the second a guarantee to provide a stipulated maximum amount of medical care.

The traditional groupings have been somewhat modified in the revised index. All items concerned with the purchase and operation of owned and rented accommodation have been brought together to form a housing component. The old group, Other Commodities and Services, has been divided to give more homogeneity, each with a title indicative of its content. The main groups and their weights in the old and in the revised indexes are shown in the following table.

Former index		Revised index	
Group	Weight	Group	Weight
Total index	100	All-items	100
Food	32	Food	27
Shelter	15)	Housing	32
Household operation	17)		
Clothing	11)	Clothing	11
Other commodities and services	25	(Transportation	12
		(Health and personal care	7
		(Recreation and reading	5
		(Tobacco and alcohol	6

There has been a growing demand for classification other than the traditional ones and supplementary classifications have been developed to meet this need. The entire item content of the index has been re-shuffled and at each of the levels of re-grouping distinctly different criteria of classification are employed. A primary distinction is between commodities and services, and commodities are divided into durables and non-durables. Non-durables are divided into food and non-food items, and the non-food items are classified according to principal commodity content, i.e., wool, cotton and synthetic. Indexes for the traditional groups will be published monthly in *Price Movements* and indexes for both the traditional and the supplementary classifications will be published monthly in *Prices and Price Indexes.*

SEASONALLY ADJUSTED INVENTORIES, ORDERS, AND SHIPMENTS IN MANUFACTURING INDUSTRIES – A TECHNICAL NOTE

In the long run the production and sale of end-products determine trends in economic activity, but in short-run fluctuations business inventories usually play an important, indeed sometimes a dominant part. Accordingly business cycle analysts in recent years have focussed a great deal of attention on the behaviour of business inventories as a whole and on that of their constituent parts. The questions they ask are, in the light of the historical record, how large are inventories, in relation to output and in relation to sales? How high are unfilled orders, absolutely and in relation to sales, and what is the recent behaviour of new orders and how does it compare with sales? To answer these questions the movement of shipments from month to month in each industry and the change in inventory levels must be seen against the customary month to month pattern. Accordingly, the Bureau's programme has called for the seasonal adjustment of the series of manufacturers' inventories, orders and shipments, which have been available on an unadjusted basis for some years. These series were published for the first time in the March issue of the Canadian Statistical Review. It is the purpose of this note to describe the nature of the new series, to indicate the method of seasonal adjustment adopted and the reasons therefor.

The publication of the series introduced a new page of economic indicators into the "S" section of the Canadian Statistical Review, expanding and complementing the set of indicators already available. The new page contains seasonally adjusted series on inventories, shipments, ratio of inventories to shipments, new and unfilled orders for all manufacturing industries, and shipments and new orders for the capital goods (ex heavy transportation equipment) and the construction goods industries. The seasonally unadjusted counterparts of these series can be found in Table 26A of the Review. The historical record from 1952-60, seasonally adjusted, can be found for the most part in *Inventories, Shipments and Orders in Manufacturing Industries, January, 1961.*[1] The historical record for the shipments and new orders for the capital goods (ex heavy transportation equipment) and the construction goods industries is not at present published but is available on request.

Monthly estimates of the dollar values of inventories, shipments, unfilled orders and new orders are obtained from a sample survey of manufacturing establishments. The monthly estimates for the year are revised annually on the basis of the Census of Industry. Detail regarding the sample survey and the quality of the data may be found in *Inventories, Shipments and Orders in Manufacturing Industries, December 1960,*[2] or in any other recent December report.

Raw data for inventories, shipments, unfilled orders and new orders are obtained from firms and are built up into aggregates on the basis of (1) the 17 groups in the Standard Industrial Classification System and (2) into 8 groups on the basis of the classification by economic use. Since many industries do not operate on an order basis, that is orders are normally covered as placed, series for new and unfilled orders are not applicable for all the groups in the first classification.

The data for shipments are an estimate of the value of shipments during the month and are adjusted for the fact that all months do not contain the same number of working days. The seasonal adjustment process is applied directly to the series for total shipments in all manufacturing industries and to total shipments in two components of the economic use classification, namely the capital goods (ex heavy transportation equipment) and construction industries.

Inventory data are estimated book values at the end of the month and therefore require no correction for calendar variation. The seasonally adjusted series for total inventories owned in all manufacturing industries is obtained by adding the seasonally adjusted component inventories of (1) raw materials, (2) goods in process, (3) finished products, and by subtracting, (4) the seasonally adjusted series for inventories held but not owned. This procedure gives a series similar in variability to one adjusted directly at the total level, but has the advantage of providing more detail.

The ratio of seasonally adjusted inventories to shipments, or the rate of turnover, is obtained by dividing the seasonally adjusted series for owned inventories by the seasonally adjusted total shipments in all industries.

Unfilled orders, like inventories, are estimates of values at the end of the month and therefore do not require adjustment for calendar variation. Unfilled orders are treated like shipments in that the seasonal adjustment process is applied directly to the series. The raw data for new orders are not obtained in the monthly survey as a direct question but are derived from the relationship of shipments to unfilled orders as follows:

> "Unfilled orders at the end of the previous month, plus new orders during the month less shipments during the month, equals unfilled orders at the end of the current month".

The seasonally adjusted new orders series for the same industries as in the case of shipments are obtained by applying this formula to the seasonally adjusted data rather than to the raw series. The series so obtained tends to be less variable than those obtained by the direct seasonal adjustment of the raw data.

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[1] Catalogue No. 31-001 Queen's Printer, Ottawa.
[2] Catalogue No. 31-001, December, 1960, Queen's Printer, Ottawa.

Several considerations determined the choice of the method of seasonal adjustment just described. The first consideration was reliability, smoothness being one measure of reliability. After some experimentation, it was decided to use the 6 rather than 5 or 5½ day calendar adjustment for shipments, since this procedure seemed to give the best results. Considerations of smoothness also prompted the use of the "formula" as a basis for adjusting new orders rather than seasonally adjusting by the direct method. The same consideration determined the use of the seasonally adjusted data in the enumerator and denominator to obtain the ratio of shipments to inventories, in preference to the seasonal adjustment of the ratio derived from the raw data.

It was also considered important to choose those methods which would yield as much detail as possible, consistent with reliability. For this reason, it was decided to apply the seasonal adjustment to each of the broad components of inventories and to obtain the total by aggregation. The need for more detail is urgent and it is intended in future to adopt so far as possible the summation approach in the seasonal adjustment of shipments and orders.

THE STANDARD INDUSTRIAL CLASSIFICATION AND THE STANDARD COMMODITY CLASSIFICATION[1]

PART I

Statistical classifications are fundamental to the kind of statistical work done by DBS and standard classifications are an indispensable means for integrating the statistical system. In its early years DBS was concerned mainly with developing new series and extending existing series to provide the required coverage of the "general activities and conditions of the people".[2] In recent years as emphasis has shifted from problems of statistical coverage to questions of quality and comparability, more attention is being focused upon the important role played by basic classification systems such as the industrial classification and the commodity classification. To be effective, these classifications must reflect the actual conditions existing in the economy and they must be so designed that they yield data of maximum usefulness. Developing such classifications requires a good deal of research and investigation as well as the cooperation of subject-matter specialists.

Part 1 of this article discusses principles and problems of classification and describes the Revised Standard Industrial Classification and the plans for implementing it in the Bureau's industrial series; Part II, which will be published in the June issue of the Review, is concerned with the Standard Commodity Classification.

The Role of Classifications

Classification systems are used wherever data are assembled because the very act of assembling implies arrangement into meaningful groups and classes. It is the function of a classification to divide a given set or class of objects or events into sub-classes. A basic logical requirement traditionally imposed upon a classification is that the sub-classes it generates be **mutually exclusive**, and they be **jointly exhaustive** of the universe of discourse.

Some of the classifications used in economic and social statistics are fairly simple such as the groupings of labour force activity. Others are quite elaborate and we are concerned here with two of the more complicated systems, namely classifications of industries and classifications of commodities.

The main objective of these classifications is to achieve comparability of different statistical series which are going to be used together. This means, for example, that in the compilation of production and employment statistics, the concept of "establishment" should be identical in both series, and that in the grouping of establishments into industries the same aggregations should be assembled for both employment and production. At higher levels of aggregation, the same procedures should be followed. Statistics are used jointly as a rule; only rarely in isolation. They must, therefore, be tailored along the same lines to facilitate general use.

The classifications have, however, a further object, i.e., to produce aggregates which, in themselves, are useful. For example, it is more important to have items of furniture assembled as a separate group than to establish groups for finished products made of wood, aluminum, fabric, etc., irrespective of use. This represents a simple example of a process which is quite complicated, as set out in fuller detail in the balance of this article.

Industry and Commodity

Industry data and commodity data are often used as if they were interchangeable. This may be a natural tendency for economists as a result of their early training in traditional market analysis. The point need not be elaborated here but it is worth pointing out that in traditional price theory a transition is made from the firm to the commodity to the industry with no apparent difficulty. A market demand schedule and supply schedule for a commodity are built up from marginal utility analysis and assumed cost curves for firms and in general it is assumed that each firm is concerned with producing or handling one product. The cost curves and revenue curves for the firm are the basis for similar schedules for the industry. In this way a process of analysis that begins with a market for a particular commodity depends for its further elaboration on the data assumed to apply to a firm and to an industry.

In fact, however, a particular commodity may be produced, handled, or sold by more than one industry. For example, the Census of Manufactures for 1949 shows that total shipments of toilet preparations from all industries amounted to $27 million, of which $16 million or some 60% originated in the Toilet Preparations Industry. Thus, although in most cases an industry is the **principal** source of a particular product, production outside of the industry is often substantial and some commodities are not especially identified as the products of any particular industry (e.g., electric motors, sulphur). It is worth noting that in the primary industries (those making up Agriculture, Forestry, Fishing, Mining) each industry is more closely identified with particular products than is the case for manufacturing. Moreover, manufacturing industries mainly engaged in the early stages of processing primary materials tend to be identified with a particular product and to account for most of it, (e.g., Sawmills, Pulp and Paper Mills, Sugar Refineries, Flour Mills) although there are exceptions

[1] This paper was prepared for presentation at the Canadian Political Science Association Conference on Statistics, Sir George Williams University, Montreal, Quebec, June 11-12, 1961.

[2] Statistics Act (RSC 1952, c257, amended by S.C. 1952/53, c18).

(e.g., Petroleum Refineries). As manufacturing industries go on to the production of more elaborate products containing mixed materials their products have a tendency to merge with those of other industries and the same commodity is found in a number of industries (e.g., electrical appliances, machinery, floor coverings).

The tendency toward mixtures of products is not confined to manufacturing industries. Retail trade provides many examples. Jewellery stores insert large advertisements in the newspapers featuring hobby tools, furniture and sporting goods for sale – not jewellery. Grocery stores have become supermarkets and their range of merchandise has expanded to include clothing, kitchen utensils, automobile accessories, toys and other non-food items.

In gathering statistics, therefore, it is necessary to maintain a clear distinction between the kind of data that can be collected and compiled for industries and for commodities. In the case of industries (as will be seen in more detail later) the appropriate unit from which to obtain data is either the establishment, the firm, or the enterprise. Establishments and firms produce commodities or deal in commodities or services but relatively few establishments are concerned with only one commodity or service and many of them produce or handle a wide variety of products. Such elements of input and output as employment, materials and supplies used, power consumed, and shipments or sales, apply to the whole establishment or firm. Even when commodity detail is collected (as in the case of materials used, or purchases, or shipments in a period) it is rarely possible to relate particular commodity shipments to the use of individual materials or supplies. Similarly, it is rarely possible to relate particular employment data to shipments of individual commodities. Thus, the main input and output factors are typically industry data.

On the other hand, the typical commodity series such as exports and imports can be related only approximately to particular industries. In the case of Canadian exports, where bulk items from primary industries loom large, the connection between items in commodity trade and particular industries is closer than it would be if our exports were composed mainly of highly manufactured articles. Products such as wheat, lumber, fish, newsprint and base metals are the products of particular industries. However, products such as machinery, chemicals, fertilizers, tend to be produced either as principal products or as by-products by a number of industries. From the viewpoint of the producer of data and also from that of the user, it is important therefore to distinguish clearly between commodity statistics and industry statistics.

The Standard Industrial Classification and its Revision

The Standard Industrial Classification was introduced in various statistical series during the period 1946 to 1950. Prior to that time, various industrial classifications were used in different series of statistics. For example, the Census of Manufactures used a classification system in which manufacturing industries were grouped mainly on the basis of the chief component material of their principal products and, in addition, it grouped the same industries into broad categories in supplementary classifications based upon the origin of their principal products and on purpose or use. The monthly Employment and Payroll statistics used a classification system that had been developed for that survey just after World War I. The Labour department had introduced another system of industrial classification in connection with National Selective Service during the war and it was used for manpower statistics developed in that connection. The Population Census had developed a classification system covering all industries for use in classifying the gainfully occupied population. The Census system was based upon the component material classification used in the Census of Industry supplemented by the classifications used for other branches of industry in DBS surveys. This welter of different classifications created difficulties when users of data attempted to relate the results of different surveys. Thus, in 1943 the Dominion Statistician convened an interdepartmental meeting to consider the problem, with the result that an Interdepartmental Working Committee on Industrial Classification was set up. By 1946 the working committee had drawn up a complete Standard Industrial Classification which was then given its first test in compiling the Census of the Prairie Provinces. After more testing and some minor amendments to facilitate convertibility with the International Standard Industrial Classification which was then being developed by the United Nations, the Standard Industrial Classification Manual was printed and published in 1948.

The principal objective in designing an industrial classification is to obtain classes or industries that are as homogeneous as possible. Before this can be done, agreement must be reached on a suitable definition of "industry". It might be expected that economic theory would provide at least a first approximation to the required definition and, therefore, one turns to theory. As has already been indicated, however, the traditional theoretical approach is less satisfactory than one would wish. The concept of the "firm" is well established in theory where the firm is taken to be a productive unit producing or handling a "product". The product is assumed to be a commodity or service[3] that is identical with or very closely related to the products of other firms. A group of firms concerned with a particular "product" constitute an industry.

This point has already been mentioned briefly above and it is repeated here in a somewhat different context because it is important that the nature of the industrial classification used for statistics be clearly understood. An examination of statistical returns from business firms or establishments in

[3] The case of firms that produce combinations of products is usually mentioned in the theory of the firm but it does not influence the main thread of the analysis. cf Scitovsky, Tibor, *Welfare and Competition* – Irwin, 1951, pp 134 - 140.

most industries indicates that the typical business organization is engaged in a number of different activities and is concerned with more than one product. The striking feature of business organizations is not so much their high degree of specialization as the diversity of their activities. For example, many manufacturing establishments have sales branches and warehouses and many firms are quite complex with units engaged in a wide range of activities. The organization of the firm does not necessarily permit the collecting of separate information for the various units. A classification brings together units having some characteristic or characteristics in common to attain groups and classes having the greatest possible homogeneity according to the criteria considered significant for the purpose in mind. Establishments and firms can be considered as homogeneous according to any one of a number of different characteristics (for example, size, geographical location, ownership). For purposes of industrial classification, however, the commonly used criteria for determining homogeneity are similarity of **principal** product, or alternatively, similarity of the industrial process carried on in the case of manufacturing and other commodity-producing industries; or in the non-commodity-producing industries, the type of commodity handled or service rendered or the kind of organization.

To the extent that the criterion used is similarity of the **principal product**, the classes of the industrial classification used for statistics are related to the "industry" as defined in price theory. The classes based upon other criteria are of a different character, however, and to the extent that they are used, the aggregations of establishments making up industries in the classification are basically different from the theoretical "industry". Examples of manufacturing industry groupings based upon similar technology rather than similarity of principal product are Knitting Mills and Iron Foundries. The products of individual knitting mills may differ widely and they are related only in that they are all knitted. Similarly, iron foundries use a particular technique to produce a wide variety of types of product which are related only in that they are all cast. This kind of grouping is not confined to manufacturing industries but is found also in wholesale trade and in retail trade where such groupings as Wholesalers of General Merchandise, Department Stores, and Variety Stores, are used.

Still another basis for setting up industries in the classification is to provide categories that are useful for various purposes, including alternative aggregations of the industry data. Alternative groupings of manufacturing industries into "producers' goods" and "consumers' goods" categories are sometimes desired and, therefore, where possible, individual industries that facilitate such regrouping have been established. Arrangements of industries into use or purpose categories and groupings such as "primary" and "secondary" manufacturing industries have been used at times and where possible industries which facilitate these groupings are provided in the classification. Another important consideration for those setting up an industrial classification is the number of establishments that will be included in any industry. In general it is desirable to be able to provide geographical breakdowns of the statistics, at least to the level of provinces, and therefore it is generally undesirable to create an industry that has less than three establishments in any province. These last two sets of criteria may be considered as constituting the pragmatic part of the approach used in setting up an industrial classification. Thus, the classification is a compromise between theory and practice and in that sense it is no different from most projects in applied economics.

In the primary industries of Agriculture, Forestry and Logging, Fishing, Hunting, Trapping and Mining, the major divisions are further subdivided on the basis of the kind of product as indicated by the type of farm, mine or other unit operated. No particular problem arises in this connection and to attain the most suitable subdivision, the data obtained on actual surveys are examined to determine the amount of detail that it is reasonable to provide in the classification.[4]

Manufacturing industry receives much more attention from those engaged in setting up a classification. Over the years manufacturing establishments have been classified at times according to the origin of their principal products (e.g., farm origin, forest origin, marine origin) and again by the nature of the chief component material of their principal products (e.g., animal products, vegetable products, mineral products) and again by the use or purpose to which the principal products are put (e.g., food, clothing, producers' materials, household equipment). If any one of these characteristics is applied to all manufacturing industry, it is found that certain types of establishments can be classified quite satisfactorily but a great many remain unclassified in a large heterogeneous remainder. For example, the origin of some products is not easily determined, particularly many of the synthetic materials that are widely used today, and many products consist of a number of materials having different origins.

In applying the "nature of the chief component material", a similar difficulty is encountered. The products of some industries can be identified quite easily as animal, vegetable, or mineral, while others are not easily classified on this basis. In general, manufacturing establishments engaged in relatively simple transformation of materials obtained from the primary industries can be classified more readily with regard both to the origin and to the nature of the chief component material of their principal products than can establishments engaged in more elaborate industrial processes leading to end products that are commonly composed of several materials. Such products as newsprint, leather, woollen yarn, and canned salmon are readily identifiable as of animal or vegetable material and as of forest, farm or marine origin. The more

[4] There is a problem of farm definition and the "industry" approach is not well established among agricultural economists, but this is not basically a problem of classification.

elaborate products of manufacturing industry such as furniture, footwear and transport equipment are less readily identifiable on the basis either of the type of material or its origin because they are manufactured of many materials. Industries producing this kind of product, then, are classified most effectively on the criterion of the "use" or "purpose" of their principal products because the products are more final and their most significant characteristic is the purpose for which they were manufactured. In designing the Standard Industrial Classification the committee took such factors as these into consideration and set up 17 major industry groups in manufacturing, some of which were based upon the chief component material of the principal product and others on the purpose of the principal product. It was expected that as Canadian industry developed toward producing more end products, it would be necessary to create even more major groups based upon the purpose of the principal product.

In the Construction Industries the unit for classification purposes is the contractor and, therefore, in most cases it is the firm. Contractors are grouped together on the basis of the kind of contract undertaken, i.e., whether they are general contractors or sub-contractors. General contractors are further classified by the kind of project with which they are primarily concerned, i.e., buildings, highways or heavy construction work like hydro electric plants, dredging, transmission lines.

The industries that do not produce physical commodities are divided into those rendering services such as Transportation, Storage and Communication; Finance, Insurance and Real Estate services; and Community, Recreation, Business and Personal Services. Provision is also made for establishments engaged in rendering typically governmental services.

The Wholesale Trade and Retail Trade major groups are sub-classified according to the principal commodities handled or, in the case of certain kinds of retail stores, the type of organization (e.g., department stores, variety stores, country general stores). In these industries, provision is made for classes handling the typical combinations of kinds of merchandise commonly found in the same establishment.

The Nature of the Revisions Made

A Statistical classification performs two main functions. It is a working tool by which the statistician organizes the collection, tabulation and presentation of data and, since it thereby determines the categories to be shown in the final publication, its groupings must be such that the user is provided with data suitable for his purposes. In the case of industrial classification, this means data of the type most useful for general economic analysis and, in particular, for studies of industries and groups of industries. (For the moment the discussion need not be complicated by bringing in the other important function of **standard** classifications, i.e., the integration of different statistical series dealing with data from the same field).

Categories suitable for the collection of data must be designed in accordance with the actual structure of industry. Thus, the categories of establishments provided in the classification are strongly influenced by experience gained from requesting operating details on questionnaires designed to apply to the type of establishment assigned to a particular industry. If this were not done, many respondents would tend to misinterpret the questions and provide inconsistent answers and they would find it difficult to fit the information taken from their records into the set of questions asked. Similarly, the categories found most useful for analysis are those that correspond to the combinations of activities or of products commonly encountered in practice. On both these counts, therefore, the statistical classification should not be permitted to become out of date in the sense that its groupings no longer correspond with the actual structure of industry in the area to which it is applied.

The pace of change and innovation is accelerating in modern industry. Changes in the structure of Canadian industry caused by developments in techniques, methods and new materials, were especially accelerated in the wartime and post-war periods by the relatively rapid growth of the economy. In drawing up the Standard Industrial Classification just after the war, it was possible to foresee and provide for some of these developments but many of them were not apparent at that time and so, as the years went by, more cases were encountered for which the classification made no provision. By 1956 it was apparent that a major revision was required and a committee was established for this purpose. The revision is now complete and the revised classification has been printed. It will be used to tabulate the 1960 Census of Industry and at the same time the 1959 Census will be retabulated on the revised basis so that data for the two years can be published together.

In revising the classification it was considered important to take account of the requirements of both producers and users of statistics. The committee reviewed the classification group by group, consulting those responsible for the principal surveys that use the classification and making such changes as appeared desirable from that viewpoint. Where necessary survey returns were retabulated according to various proposals and the results examined to obtain the most practical and useful categories. When the revision based upon the views of DBS personnel and others using the classification in surveys was completed, a Draft of Revised Standard Industrial Classification was circulated widely for comment. Written suggestions and comments were received from more than sixty individuals, industry associations, labour organizations, firms and government agencies. The final revision was then prepared in the light of these suggestions, most of which were practicable and helpful.

The principal changes in the classification structure resulting from the revision can be summarized quite briefly:

Division 1

Agriculture – The number of major groups and classes was greatly reduced and separate major groups were provided for Experimental and University Farms, Small Agriculturel Holdings, and Commercial Farms. Only the commercial farms are further sub-classified by type. This arrangement will improve comparability because it can be used by the Census of Agriculture as well as by other surveys and it separates out farms that are likely to be classified to industries other than Agriculture in some surveys.

Division 2

Forestry – No change.

Division 3

Fishing and Trapping – No important change.

Division 4

Mines (including Milling) Quarries and Oil Wells – The only basic change was that Natural Gas Processing Plants are now included here instead of in Manufacturing.

Division 5

Manufacturing – The number of major groups is increased from seventeen to twenty. New major groups are provided for Knitting Mills, Furniture and Fixture Industries, Primary Metal Industries, Metal Fabricating Industries, and Machinery Industries. Former major groups eliminated are Iron and Steel Products, and Non-Ferrous Metal Products. The groups for Wood Industries and Clothing Industries have been significantly reduced in size by the separation of Furniture and Fixture Industries, and Knitting Mills, respectively.

These changes indicate the development toward more groupings by "purpose" rather than "chief component material". They also show the relative importance attached to the technique of production in the case of Knitting Mills. The most basic revision has taken place in the metal industries where new methods and materials have affected the traditional relationships between establishments primarily engaged in manufacturing metals and metal products.

Division 6

Construction – No basic change.

Division 7

Transportation, Storage and Communication, and

Division 8

Public Utility Operations have been combined into one new division called Transportation, Communication and Other Utilities. The only important change in the constituent classes is the transfer of Post Office from Government Service to Communication.

Division 9

Trade – The most important change in this division is in the distinction between wholesale and retail. Formerly, certain types of establishment such as sellers of building materials, farm implements, hardware, and office equipment primarily engaged in selling to businesses were nevertheless included in Retail Trade. New definitions of Wholesale Trade and Retail Trade now base the distinction between them on whether sales are primarily to business firms or to consumers.

Division 10

Finance, Insurance and Real Estate – No basic change.

Division 11

Service – This division is now called Community, Business and Personal Service Industries and it does not include Government Service. Some types of establishments primarily engaged in repair work have been added and there is some rearrangement involving the elimination of the former major group for Community or Public Service and a restriction in coverage of "Business Service" to "Services to Business Management."

In addition to the above changes in the form and content of Divisions in the 1948 Manual, many individual classes have been changed or eliminated and new classes have been established. These detailed amendments will not be discussed here but two changes having more widespread effect should be mentioned. First, a new Division has been created in the revised Manual for Public Administration and Defence having substantially the same coverage as the former major group Government Service. The heading "Government Service" had caused some concern because of the possibility that figures published under it might be interpreted as applying to all governmental activities. For purposes of industrial classification, government service is defined to include establishments engaged in strictly governmental activities (such as enacting legislation, tax collection, law enforcement or protection of the state) while government-owned establishments engaged in operating farms, mines, factories, railroads, local transit systems, public utilities or in any other activity assigned to another part of the classification are coded to the appropriate industry. An industrial classification is not a classification by ownership. Service branches and divisions of governments such as research agencies, scientific services, statistical and economic services, maintenance of public buildings, are included in Public Administration just as such service branches are included with the principal activity in other industries. It was decided, therefore, that a separate division entitled Public Administration and Defence would be interpreted more accurately as consisting of establishments engaged in typically governmental activities.

The second major change involves the classification of establishments primarily engaged in repair work. In the original Standard Industrial Classification establishments primarily engaged in repair work (with few exceptions) were included in the Manufacturing Industries division. Much repair work is done by manufacturers and in a few lines repair establishments are typically separate (e.g., shoe repair, motor vehicle repair, watch and jewellery repair) and separate industry classes were provided for these. In most cases, however, establishments primarily engaged in repair work were included in the manufacturing industry appro-

priate to the principal product they repaired. This was not satisfactory because with few exceptions the Census of Manufactures does not include repair establishments (exceptions are ship repair, railroad rolling stock repair, and furniture repair). When the classification was reviewed it was decided that an attempt should be made to find a generally acceptable method for classifying repair establishments so that practice would be uniform on different surveys. The plan finally adopted was to classify establishments primarily engaged in repair work in the same division of the classification as the establishments in which the same kind of repair work is mainly done. Thus, motor vehicle repair shops are included in Retail Trade along with Motor Vehicle Dealers; Gasoline Service Stations; and Accessory, Parts, Tire and Battery Shops. Activities overlap between these types of establishments so that more useful data are obtained when they are continguous in the classification. Similarly, classes for Watch and Jewellery Repair Shops and Radio, TV and Electrical Appliance Repair Shops are included in retail trade along with retailers of these products and a number of other types of repair shops (e.g., bicycle repair shops, musical instrument repair shops) are included in the same class as retailers of these articles. Such repair shops as those working on industrial machinery, agricultural machinery, and office equipment are included in Wholesale Trade. Shoe Repair Shops form a class in Personal Service, and clothing repair is included with Laundries, Cleaners and Pressers while other types of repair shops, not associated particularly with any other kind of business, are included in the major group Miscellaneous Services.

Implementing the Revised Classification

This subject is dealt with very briefly here because a later article will deal with the most important example of implementation. The revised classification was used as a basis for the Census of Industry schedules for 1960 and the data will be tabulated on that basis. In the meantime, the 1957, 1958 and 1959 Censuses are being tabulated on the revised basis and they will be published along with the 1960 results. Thus, an overlap of several years will be provided as part of the 1960 series of bulletins. Other series of statistics have already started using the new classification or have plans under way for its adoption. The monthly Labour Force Survey is using a combination of old and new groupings which permits the tabulation of 1961 results both ways. The 1961 Census of Population and the Census of Distribution will use the revised classification. The monthly Employment and Payrolls survey will introduce the revised classification in connection with a change of index base (probably to 1961) which should be completed by the end of 1963. Others are fitting into this same general pattern.

A standard classification system is essential to a program for integration of different statistical series but it is not sufficient to assure such integration. Means must be made available to assure that those using the classification do so in a uniform manner. Uniform application is facilitated by a good index and by a satisfactory means for disseminating information on decisions in doubtful cases. For industrial classification, however, the most important requirement is a common agreement on the unit to be classified and its definition. The unit for which information is obtained and which is classified by industry is either the establishment, the firm, or the enterprise. In the process of revising the Standard Industrial Classification particular attention was paid to the question of the unit that is appropriate for different purposes and to the definition of the different units. As a result the committee recommended a definition of "establishment" and on the basis of that definition the "firm" and the "enterprise" can be identified without difficulty.

In this context, a firm may be defined as a unit engaged in economic activity and having a legal status as such. Thus, it may be an individual proprietorship, a partnership, a corporation, or a cooperative. In most cases a firm has only one place of business and one principal activity but some firms are more complex in that they consist of a number of units which may be engaged in quite dissimilar activities. On the other hand, a number of firms may be associated to form a type of family of firms. For example, an individual may be the sole owner of a number of businesses such as a general store, a gasoline service station, a truck line and a motel all located in one town; or a number of corporations may be associated by being controlled by one holding company; or one operating corporation may control others. Subdivisions of complex firms are the units we have called "establishments". Aggregations of firms we will call "enterprises".

If data are gathered using the firm as the statistical unit then the industrial classification must be broader than when the establishment is used. For most surveys gathering industrial statistics it is desirable to use the most homogeneous unit capable of reporting all elements of basic industrial statistics and in most cases, this is the establishment. The elements of basic industrial statistics considered essential are the main elements of input and output which indicate that the unit concerned is an operating entity that is essentially self-sufficient in carrying on its principal economic activity. For some purposes, such as surveys of profits, the firm is the appropriate statistical unit because separate records are not maintained for all items of expense on the basis of establishments and therefore the firm is the most homogeneous unit capable of reporting profits.

Almost all establishments contain smaller subdivisions engaged in particular activities such as delivery service or purchasing. Although some items of data can be reported for these smaller units (for example, direct labour or shipments) they do not ordinarily have records which permit them to report all of the items required of an establishment. Thus, the range of information obtained would have to be restricted if this smaller unit were used as the statistical unit.

The items of data required of an establishment are: on the input side – materials used, process supplies used, fuel and power consumed, goods

purchased for resale, earnings and employment; and on the output side – commodities sold, shipped or produced (which in some cases may require inventory data), whichever is appropriate; or revenue; or other appropriate measure of services rendered. Different inputs and outputs apply in different industrial sectors and the above are merely illustrations of the main elements. The important consideration is that the elements of input and output will permit the calculation of "value added" or "gross mark-up" or "gross profit" as well as providing related data on total employment. The data on products or services should be available for both quantities and values wherever applicable and those for employment should be in terms of numbers employed or its equivalent.

The above definition of "establishment" permits the Standard Industrial Classification to achieve one of its main purposes which is to act as an integrating force in attaining comparability in industrial statistics obtained from different surveys. When all surveys obtaining information from industry use the same statistical unit (the establishment), then information will be obtained for the same units and statistics can be compiled for a given aggregation of units. Each survey can then explain its coverage and procedures on the basis of a set of establishments.

Since each establishment is either a firm or part of a firm and since it is planned that an establishment will be covered completely by a particular survey that includes it, then it follows that data for firms will consist of aggregations of the establishment returns (except that some items of information are available only for firms and not for the separate establishments). Similarly, data for enterprises will represent, in the main, aggregations of the information that can be assembled for firms although again some types of information may be available only for the enterprise as a whole.

When purely industry type data are made available for all industries, they provide non-duplicating information which can be added up for the whole economy. In this case, each establishment is part of a firm and it is defined in terms of the records kept by the whole firm and thus a system of strict establishment statistics avoids gaps in coverage. For the same reason, duplication is avoided and, therefore, when individual surveys can express their coverage on the basis of particular sets of establishments, they become additive without fear of gaps or duplication.

The Standard List of Establishments

To effect the kind of non-duplicating coverage outlined above everyone conducting a statistical survey obtaining information from establishments must use the same list of establishments. With this objective in mind, DBS began to assemble a standard list of establishments almost two years ago. The list is being built up by comparing existing lists such as those used for the Census of Industry, the Monthly Employment and Payrolls Survey, annual surveys of Transportation, Communication and Public Utility Industries, surveys of Wholesale Trade. To avoid the possibility of perpetuating such duplication as might be encountered on these lists, it was decided to handle multi-establishment firms separately from the single-establishment ones. The firm is taken as the unit for this purpose and when an establishment of a firm is encountered on any list, the whole firm is taken for purposes of comparison. The objective is general agreement on the establishments of each firm that will be recognized and used in statistical surveys.

The task of setting up the standard list of establishments is more complicated and difficult than appears at first glance. Although multi-establishment firms are not the majority by any means (they comprise less than 10,000 of the almost 400,000 firms in non-agricultural industry), they tend to be large and, therefore, their importance in most industries is much greater than their numbers would imply. The organization of some large firms is quite complicated and they may operate units such as warehouses, sales offices and central administrative offices that deal with more than one establishment of the firm (and the different ancillary units of this type in a firm do not necessarily deal with the same aggregations of establishments). Many relatively simple multi-establishment firms consisting of two or three establishments or containing a number of identical establishments (e.g., chain stores) are not difficult to sub-divide in a manner satisfactory to all concerned. In the more difficult cases, however, (some 700 have been encountered) the firm must be consulted by correspondence, telephone or personal visit. Such negotiations take time and they must be carried out by people who are well acquainted with the surveys involved and with the desired objective. People of this calibre tend to be busy on other projects and, therefore, the amount of time they can devote to this work is limited. Steady progress is being made, however, and as Mr. Berlinguette points out in his paper, everything possible is being done to advance the work so that the new definition of establishment and the standard list of establishments can be used for Census of Industry 1961.

Maintaining Continuity in the Statistics

Use of the revised Standard Industrial Classification in 1960 and the new definition of establishment in 1961 will result in a major break in the series of annual census data for manufacturing and mining. This problem has been the subject of considerable planning so that a three-year overlap will be provided with the 1959 data on the revised industrial classification and revised figures will be made available soon thereafter for five years back i.e., from 1955. (This refers to principal statistics and does not include the commodity detail for materials and shipments in the different industries).

The break resulting from the introduction of the new establishment definition has more serious consequences, however, than the revision of the industrial classification. Thus, a major research project is planned to use all available information in converting the data obtained on the old basis to

as close an approximation as possible to the data that would have been obtained on the new definition of "establishment". This project will take some time but it may be expected to provide a good basis for historical statistics and in addition it should provide additional information on the actual makeup of our industrial statistics both past and present.

The International Industrial Classification

Comparisons with the industrial statistics of other countries are often important. The United Nations Statistical Commission, recognizing the value of such comparisons, undertook a project in 1947 which resulted in the International Standard Industrial Classification published in 1948. This volume was revised slightly in 1958 and is available as *Statistical Papers, Series M No. 4, Rev. 1*, United Nations, New York. Although the United Nations classification is not used for Canadian statistics, its requirements are taken into account in designing the Standard Industrial Classification. Thus, except in cases where the structure of Canadian industry renders it too difficult, the classes in the Canadian SIC are so arranged that they can be regrouped into the international structure.

THE STANDARD INDUSTRIAL CLASSIFICATION AND THE STANDARD COMMODITY CLASSIFICATION[1]

PART II

The Standard Commodity Classification

Commodity statistics of external trade and domestic production have been collected and published for a long time and many separate commodity series are published in statistics of agriculture, forestry, fishing, mining and manufacturing. In addition, data are available for commodities handled by various means of transport and from time to time commodity data on purchases and sales are obtained from wholesale and retail outlets. Commodity data are found also in the field of price statistics. Little has been done in the past to standardize the classification systems used in these various fields and when data were given for a particular commodity there has been no assurance that the definition used was uniform.

About 10 years ago it was decided that a program should be started for a Standard Commodity Classification which would provide an acceptable framework for all series of commodity statistics. The most commonly used system of commodity classification was that of the chief component material of the product. Thus, the statistical classifications for imports and exports have had the following general divisions:

Group 1 – Agricultural and Vegetable Products (except Chemicals, Fibres and Wood)

Group 2 – Animals and Animal Products (except Chemicals and Fibres)

Group 3 – Fibres, Textiles and Textile Products

Group 4 – Wood, Wood Products and Paper

Group 5 – Iron and Its Products

Group 6 – Non-Ferrous Metals and Their Products (except Gold)

Group 7 – Non-Metallic Minerals and Their Products (except Chemicals)

Group 8 – Chemicals and Allied Products

Group 9 – Miscellaneous Commodities

Group 10[2] – Non-Monetary and Monetary Gold, and Subsidiary Coin.

A similar breakdown has been used for Wholesale Price Indexes as follows:

Vegetable Products

Animals and Their Products

Fibres, Textiles and Their Products

Wood, Wood Products and Paper

Iron and Its Products

Non-Ferrous Metals

Non-Metallic Minerals

Chemicals and Allied Products

These examples indicate that some measure of standardization has existed in the broad groupings but each series developed its own classification system within the major groups and, therefore, the standardization was more apparent than real. In addition, the commodity data obtained on annual and current surveys of production such as the Census of Manufactures and of Mining and in Agriculture statistics were neither gathered nor presented according to any classification system but simply as lists of commodities. When commodities are merely listed there is little opportunity to compare groups of commodities from the different series and comparisons of data for individual commodities may be of little value because the definitions used are not uniform.

Interest has grown in the use of commodity data for market analysis, for commodity flow studies, and in connection with aggregative type series such as the current index of production and the inter-industry flow of goods and services. For such purposes as these the figures gathered currently from a wide variety of sources must be arranged according to a standard pattern so that they are comparable. A Standard Commodity Classification system that will meet the requirements of both those who gather and produce the statistics and those who use them is the most satisfactory means for achieving this purpose. Accordingly, a committee was established in DBS in 1950 and work has gone forward since that time resulting in the Standard Commodity Classification Manual which was published in 1959.

The first problem faced was the selection of a basic framework that would facilitate the work of bringing together related classes of commodities to satisfy the many needs that were known to exist. After a good deal of discussion within DBS and with the principal users of trade statistics and

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[1] This paper was prepared for presentation at the Canadian Political Science Association Conference on Statistics, Sir George Williams University, Montreal, Quebec, June 11-12, 1961.

[2] As of January 1960, Group 10 includes Special Transactions – Non-Trade.

other commodity data, it was decided that the most fruitful outline for the classification was one based upon the **state of fabrication** of the product. This should not be confused with the traditional criterion of **stage of production** which results in the broad categories "crude", "simply transformed" and "more elaborately transformed". The **stage of production** kind of classification has not proven satisfactory because of the difficulty of obtaining a generally acceptable basis for the division between "simply" and "more elaborately" transformed. For the Standard Commodity Classification it was decided to base the **state of fabrication** categories on the function that the product can be expected to perform either in production or consumption. Thus, the principal categories are "crude materials", "processed materials", and "end products".

"Crude materials" are those obtained from one of the primary industries. Examples are ores, logs, hides, skins, fibres. Many such products may have been cleaned or otherwise prepared for shipment either to facilitate their handling or to avoid paying freight on waste material, e.g., ores are milled and the concentrates shipped to avoid shipping rock; wool is washed; cotton is ginned and baled; logs are trimmed and are sometimes roughly squared so that they occupy less space in transit. Such processing does not change the character of the product from its state as a crude material.

"End products" are articles that are ready for use either as producers' equipment or consumers' goods. They may have been subjected to relatively minor processing (e.g., a simple corn broom) or to very elaborate fabrication, but end products have the common characteristic that they are ready for use without further modification or without becoming a part of something else.

"Fabricated materials" comprise all other commodities. Thus, they are the products of manufacturing processes but they either require more processing or they will be incorporated into something and lose their identity. Included in the category of processed materials are fuels, lubricants and other process supplies. It should be pointed out that some fabricated materials are the result of quite complicated industrial processes (e.g., fabricated metals, hardware, and synthetic materials) so the distinction between fabricated materials and end products is not based upon the amount of work done. An end product used as equipment retains its identity and may be used over again, whereas a material is either changed in form upon further processing or loses its identity. An example that the committee found helpful when determining the limits of these groupings was that of the nail and the needle. A nail is used to join some parts and when it has been used it becomes part of the resulting structure and no longer exists as a separate article so it is a fabricated material. A needle is used to assist in the production of a product but it emerges from the process intact and can be used again for the same purpose so it is an end product. It is useful also to consider that materials are usually described or bought and sold in terms of bulk quantities such as tons, yards or board feet. End products are articles and are usually described or bought and sold in terms of one piece, a dozen, a gross, or some number of articles.

After some experimenting it was decided that two exceptions should be made to the kind of basic classification scheme outlined above. These are Live Animals; and Food, Feed, Beverages and Tobacco. Live Animals are treated as a separate division because of their special character. Traditionally, commodity classifications have distinguished between live animals principally for food and those not principally for food. This is an arbitrary distinction, however, and it was felt that individual users of data could make such a distinction if required. Live fish used as food are classified as Foodstuffs and not as Live Animals.

The other exception, Food, Feed, Beverages and Tobacco was made because many foods do not lend themselves easily to classification by state of fabrication. For example, vegetables may be consumed fresh, frozen, dried, canned, as vegetable flour, as juice, or in vegetable soups or other food preparations. Thus, the distinction between a product that is ready for use and one that still requires further processing is not effective when applied to foodstuffs. Feed, generally, is made of the same materials as food or from by-products of food preparation. Beverages are closely related to food and traditionally, tobacco is drawn into this group. In any case, tobacco and tobacco products form a very small division which, if split into three parts (i.e., crude materials, processed materials and end products) is almost lost in the classification. In addition, there is a widespread demand for separate data on food which further justifies a separate division.

The main divisions of the Standard Commodity Classification are therefore:

1. Live animals
2. Food, feed, beverages and tobacco
3. Crude materials, inedible
4. Fabricated materials, inedible
5. End products, inedible

This arrangement should not require revision regardless of changes in materials or industrial processes. One of the problems encountered with the earlier classifications based upon chief component material was the difficulty of classifying products based upon new materials and particularly, synthetic materials. The arrangement in the Standard Commodity Classification also makes for a better classification in that it permits the use of different criteria in the various divisions and thus it is easier to obtain a maximum number of homogeneous

commodity classes. For **crude materials**, the most useful criterion is the kind of material and so subgroups are provided for crude animal products, crude vegetable products, crude wood materials, textile and related fibres, metals in ores and concentrates, and so on. For **fabricated materials**, the criterion of chief component material is the most useful because at this stage the kind of material is still apparent and is the most important characteristic of the commodity. For **end products**, however, the most important characteristic is purpose and in this division the criterion for further breakdowns is the use or purpose of the product resulting in such groups as machinery, transportation and communication equipment, personal and household goods. End products tend to be made of mixed materials and the same product may be made of different materials so that the chief component material is not apparent in many cases. Thus, the SCC provides a greater number of useful subdivisions of end products than was possible in the earlier classifications. Since the many uses to which the data will be put cannot be foretold, the objective of a general-purpose classification is to provide as many classes as possible and to provide them in a form suitable for rearrangement into alternative groupings.

The development of the Standard Commodity Classification has been a large project in which many people have participated. No individual or small group can be familiar with the whole field of commodities and so the working committee has consulted many experts, obtaining the advice of every industry association and group that could be contacted as well as commodity experts in the civil service. The individuals and groups consulted have been most helpful and they have made a significant contribution to the success of the project.

One of the most difficult problems faced was keeping the number of commodity classes within reasonable limits. Those particularly interested in a commodity or commodity group usually recommend quite detailed lists of subdivisions to provide what they consider to be a desirable degree of homogeneity in the individual classes. If such a degree of detail were attempted, however, the number of commodity classes would be so large that the resulting classification would be unwieldy. The many subdivisions proposed by experts in a particular commodity field are quite valid from a strictly classification standpoint but such an array of classes based upon highly technical distinctions may be more misleading than helpful to most statisticians and users of statistics who do not possess the technical knowledge required to interpret the data. In addition, a classification system used to assemble statistics should not be based upon kinds of distinctions that cannot be ascertained when the basic data are collected. If a set of classes is too detailed or too technical and if the basic information obtainable does not always make the kinds of distinctions required by the classification, then the resulting figures do not represent the categories that they purport to provide. In drawing up the Standard Commodity Classification, therefore, the committee had to try to find the optimum balance between the understandable desire of experts for detailed classes and the equally understandable reluctance of those collecting data in the various fields to introduce breakdowns that call for a degree of precision in the basic returns that appears impractical on the basis of experience.

Problems of Implementation

The implementation of a new system of commodity classification in surveys obtaining information from mailed questionnaires consists mainly in redesigning the schedule. Surveys of the commodity producing industries gathering commodity detail on such factors as production, shipments and materials used generally use mailed questionnaires. The Standard Commodity Classification provides a means by which they can specify the commodity detail required so that the resulting data can be assembled into the groups and classes of the standard framework. Some surveys obtain more detail in particular fields than do others but all of them can adhere to the same general scheme of classification. Over the years as the SCC has been developed, a good deal of consultation has gone on between those responsible for gathering statistics of commodities and most of the schedules have been amended where necessary so that the commodity detail of such series as domestic production, shipments and materials used can be assembled on the standard framework. This kind of implementation of the standard classification does not in itself cause discontinuities in the various series. From time to time the commodity detail on the schedules is changed in any case as particular commodities become more important and others relatively less important. Thus, the changes introduced by the standard classification are adopted gradually as part of the general process of periodic revision.

Implementation of the Standard Commodity Classification in External Trade Statistics presents a different kind of problem and this project is taking considerable time and resources. It should be noted that the classification system used for imports and exports has been in use for over 40 years without major amendment. Basically, this classification system stemmed from the tariff and with changes in production methods and the growing importance of synthetic materials it has become increasingly obsolescent. Thus, a change in the classification system was needed in any case and a standard classification has obvious advantages over one designed purely for external trade.

Statistics of exports and imports are compiled from documents sent to DBS by the Department of National Revenue. Exporters of goods, e.g., are required to prepare a Customs document B.13, providing a description of the various commodities included in each shipment along with the quantity and value of each. These documents are coded in

DBS and a punch card is prepared for each commodity or group of commodities included in a shipment and assigned to the same commodity class.

Exports require, of course, a somewhat different level of detail than do imports; for example, Canada does not export citrus fruits but they are important in imports. The Standard Commodity Classification provides a standard framework from which each statistical survey can draw a classification suitable for its purpose. No classification derived from the standard departs from its framework, the standard groupings being merely condensed or expanded. The first step in implementing the Standard Commodity Classification for statistics of imports and exports was, therefore, to draw up an Export Commodity Classification and an Import Commodity Classification based upon the SCC. Each of these classifications required a study of the existing classification and of the documents representing actual shipments and the standard classes were grouped or further subdivided as required. It was decided that, at least in the beginning, the new classifications should not be more detailed than the existing ones in the sense that they should not contain significantly more classes at the most detailed level. The Standard Commodity Classification contains some 5600 classes while the Export Commodity Classification lists only 1200 and the Import Commodity Classification will have some 2500. The switch from one classification to another involves many changes in procedure and puts a considerable strain on the compilation staff so if the new classification were more detailed it would add significantly to the complexity of the transfer operation. Once the change has been made and the new system is running smoothly, it should be possible to increase the number of classes in each case because the revised classification structure is more logical than the old one and is more suited to the classification of the kinds of commodities encountered today.

Export and import figures are published monthly by commodity and country showing the figures for the current month and the cumulative total for the calendar year to date. Thus, the December report in each year contains the December figures and the figures for that calendar year. Changes in the classifications during the calendar year are undertaken only in exceptional cases because they would interfere with the accumulation of annual data. A new classification can be introduced only on January 2 and theoretically the coders would put away their old code books on December 31 and pick up new code books on January 2. In a continuing operation of this kind, however, it is not feasible simply to switch classifications on a given date without having done a good deal of preparatory work. This consists of training key members of the staff in the use of the new classification and providing extra assistance to the coding staff so that they can keep up with the regular flow of work while the training is under way. Thus a program has to be worked out at least a year and preferably two years in advance of the actual transfer from one classification to the other.

In the case of exports, the first draft of an Export Commodity Classification was finished in August 1959 and additional staff was provided so that some members of the Export Unit could do practice coding with the new classification. The final version of the Export Commodity Classification was printed toward the end of 1960. New rulings had been prepared and an expanded alphabetical index put into the new classification. When the Export Commodity Classification was introduced at the beginning of 1961 there was a nucleus of trained staff and the coding proceeded more quickly and smoothly than had been anticipated. In spite of this, however, the export figures will be delayed somewhat during the balance of 1961 with the delay for January figures being about eight weeks, for February figures about six weeks, and so on.

The periods of practice coding which resulted in double coding of documents for two different months, provide information that can be used to compare the data resulting from the old and the new classifications. This permits a much more precise determination of the relationship between the export figures for 1960 and earlier years and those for 1961 than would be possible without the overlap. When the results of the double coding can be analyzed a convertibility index will be issued so that users of the figures can convert from one basis to the other and thus follow trends in exports for groups of commodities as well as for individual classes.

The conversion problem for imports is even more complicated than for exports and it was for this reason that the new classification was introduced first for exports. The experience gained in the export field should help to reduce the possibility of incurring serious delays in the issue of import figures during the conversion period. Additional staff has been supplied and a first draft in the import commodity classification was prepared in 1960.

The documents used in preparing statistics of imports are those obtained from National Revenue covering shipments cleared through Customs and they consist of a copy of the Customs entry and declaration, and a copy of the shipper's invoice. Tariff descriptions are important in clearing goods through Customs and, therefore, the descriptions on the Customs documents tend to be in terms of the tariff provisions. In many cases, however, the subdivisions provided in the SCC do not conform to those of the tariff and in fact they are frequently based on a quite different set of criteria. The tariff structure is based largely upon "chief component material" throughout the whole range of commodities whereas, as explained above, the SCC classifies end products on the basis of purpose or use. Whereas exports from Canada consist very largely of crude and fabricated materials, our

imports are made up mainly of end products and therefore the section of the new Import Commodity Classification dealing with end products which are classified by purpose is particularly important. This will result in a basic difference between the classification scheme used in the tariff and that used in import statistics.

It is expected that a new draft of the Import Commodity Classification will be ready by the middle of this year when it will be used for a period of practice coding on import documents. The experience gained from practice coding will assist in revising the draft so that a final classification can be prepared later in the year. If at all possible, the final classification will also be used for a period of practice coding before it is implemented. Practice coding is a very important part of the implementation procedure because it both trains key members of the staff in the use of the new classification and provides a test of the classification itself. In addition, the practice coding reveals cases in which new rulings are required and shows up deficiencies in the index of commodity terms available to the coders.

The sheer size of the import coding operation may not be widely known and, therefore, it is worth noting that last year some 4 million customs entry documents were received and coded. To program ahd effect a switch from one classification system to a quite different one in the midst of this flow of documents is a complicated and difficult procedure. All available means are being taken to make the transition as smooth as possible and to have as little interference with the regular flow of monthly data as can be achieved. In spite of the care taken in preparation, however, it is expected that when the new Import Commodity Classification is introduced the import figures will be delayed somewhat during the first year. This delay is expected to reach a peak in March and to be less for each succeeding month thereafter so that by the end of the first full year the import data will be back on schedule.

The same steps that are being taken to provide a link between data based on the old and new classifications for exports will be followed for imports. Thus, the results of the practice coding periods will be analyzed to provide as detailed a cross-index as possible. In the case of both exports and imports, many commodity classes are unchanged although the grouping system is very different in the new scheme.

The introduction of the Standard Commodity Classification in External Trade Statistics represents a major achievement in the field of statistical integration. In most countries statistics of external trade are taken directly from the administration of the tariff and, therefore, they are not based upon categories considered most useful for economic analysis because the tariff is concerned mainly with revenue or protection, or both. The attainment of statistics for external trade that fit in with the general scheme of economic statistics opens up many new possibilities for using commodity data.

FORTHCOMING CHANGES IN THE CENSUS OF INDUSTRY[1]

Nature of Establishment Statistics

As described in the article on Standard Industrial and Commodity Classifications, published in two parts in the May and June issues of this Review, a standard statistical classification system performs two main functions. First, it provides a framework according to which the statistician organizes the collection, processing and publication of data grouped in the form most suitable for general economic and industry analysis. Second, it serves as an integrating force in attaining comparability in statistics obtained from different surveys. In the case of the Standard Industrial Classification, an essential condition in fulfilling the second function is the use in all industry surveys of the same statistical reporting unit. For most D.B.S. industry surveys this unit is the "establishment", which will be defined from now on as the **smallest unit which is a separate operating entity capable of reporting all elements of basic industrial statistics.** Characteristics of the establishment and its relation to other units such as the firm and the enterprise are fully described in the previous article and there is no need here to elaborate further.

It might be noted, however, that the basic industrial statistics (or "principal statistics" as they are commonly known) required of an establishment are generally the main elements of input and output, viz. materials and process supplies used, fuel and power consumed, goods purchased for resale, number of employees, salaries and wages, commodities sold or produced (or revenue) and inventories. These data permit the calculation of census "value added" or "gross profit", but do not provide sufficient information to obtain "Gross Domestic Product Originating" which is the measure of an industry's **net** contribution to total domestic output. The missing data consist principally of the cost of purchased services such as advertising, insurance, professional consulting fees, etc., some of which, by nature, cannot normally be directly allocated by establishment in a multi-unit firm. Although census "value added" is mostly net of duplication insofar as commodity transactions between industries are concerned, it contains elements of duplication when both commodity and service industries are aggregated. When the establishment is also the firm (it is in the vast majority of cases) purchased services could easily be reported and deducted from value added to obtain "net" contribution to Gross Domestic Product. However, in the case of multi-establishment firms which are relatively few in number but account for a substantial proportion of output, purchased services would have to be reported in total for the firm as a whole and the allocation done on an arbitrary basis. Thus, when the establishment is used as the reporting unit, it is not possible to derive sufficient data for the calculation of Gross Domestic Product Originating by industry without resorting to arbitrary estimation. If the firm or, in certain cases, the enterprise was to be used as the reporting unit, the industrial classification would have to be broader and the resulting industry statistics would be much more heterogeneous than is the case when the establishment is used as the unit of classification.

Programme for Revision of Census of Industry Statistics

The most comprehensive and one of the most widely used of the D.B.S. industry-type surveys is the annual Census of Industry. The latest revision of the Standard Industrial Classification together with the adoption of a standard definition of the "establishment" will have important effects on the form and content of the industry statistics since both a change in the structure and a change in the coverage of the statistics is involved. Because of the size and complexity of the task, it was decided to implement these changes in two stages.

The first stage, involving changes in the classification structure of the industry statistics, was completed last year when all establishments were reviewed and reassigned to the new classification codes according to nature of principal product or industrial process. A description of the major changes in the classification of mining and manufacturing industries is contained in the previous article. Suffice it here to say that the manufacturing industries most affected by the change are those in the groups generally known as "durable" industries. In many cases it was necessary to revise substantially the lists of commodity materials and products printed on the different industry forms because of the basic nature of the change of definition of some industries. In cases where new industries were created, the commodity lists had to be completely redesigned.

The recoding of establishments and the redesign of the forms were completed in time for the 1960 census schedules to be printed and addressed on the new basis. The reported data are now being processed and the 1960 figures which will appear in forthcoming industry reports will be

[1] This paper was prepared for presentation at the Canadian Political Science Association Conference on Statistics, Sir George Williams University, Montreal, Quebec, June 11 - 12, 1961.

tabulated on the basis of the revised classification. In order to provide some continuity, however, principal statistics for Canada and the provinces for the years 1957, 1958 and 1959 will be retabulated on the revised basis and published with the 1960 data. Since the principal statistics for these past years had been recorded on punch cards a large part of the work is being done mechanically. Any reprocessing of data for years prior to 1957 will have to be done by hand. It is not practicable to rework data such as details of fuels, materials and products by industry for past years, nor is it feasible to re-tabulate principal statistics below the provincial level. All extra staff that can be obtained during the next few years will be engaged in revising the classification and coverage of principal statistics only.

It is emphasized here that the reclassification and retabulation work described above for the years 1957-60 simply consists of the allocation of existing reporting units to different industry codes and although the data for individual industries will be different, in most cases, from previous tabulations, the composite figures for the manufacturing and mining industries will show little or no change. This will not be so when the second stage in the changeover to the new classification, involving changes in the coverage of the reporting unit, is implemented.

The adoption of the new establishment concept will not only result in additional changes in the totals for individual industries but will result in changes in the aggregate totals for mining and manufacturing as well. In order to understand the nature and extent of these changes it is necessary to have some knowledge of past practices in the interpretation of the industrial classification and the reporting unit. A description of the Census of Manufactures will be used as a typical example.

Problems Arising from the Use of Existing Concepts

When the Standard Industrial Classification is viewed as an integrating framework of all industries in the economy, it is apparent that the collection of industry-type data for all industries would provide data which could be summed to totals for the whole economy without fear of gaps or double counting. Essential conditions are that each establishment, as defined earlier, be coded to only one industry and cover in its survey return all its activities.

Heretofore, the Census of Manufactures was more a survey of manufacturing **activity** than a survey of manufacturing **establishments**. Although some elements of non-manufacturing operations have been collected during the past few years (notably payrolls and purchases and sales of goods not of own manufacture) the main emphasis was placed on collecting and publishing statistics on manufacturing activity regardless of whether or not manufacturing was the **principal** activity of the establishments surveyed. Non-manufacturing operations of manufacturing establishments were considered to be outside the scope of manufacturing statistics and constituted a gap in total activity unless accounted for separately or picked up by other surveys. As a result, inconsistencies in coverage were difficult to avoid when data from different surveys were used in a combined form.

In an effort to cover the universe of manufacturing activity and to provide complete coverage of manufactured commodities it was the practice to treat as separate establishments, the manufacturing operations of establishments whose major activity fell in another field. For instance, an establishment classified to wholesale trade on the basis of its major activity, which also engaged in manufacturing as a secondary activity, was asked to complete a Census of Manufactures form covering its manufacturing operations only. Again it was difficult to ensure that the same establishment, reporting in the wholesale trade survey, excluded those operations reported in the manufacturing survey. Elements of duplication were thus embodied in the results of different surveys when they were used as components of larger aggregates.

Also, in order to make industry statistics as homogeneous as possible, establishments were required in many cases to break down their operations into a number of separate reporting units, according to type of product manufactured, which units were then classified to different industries. Although this practice did not adversely affect the statistics for manufacturing as a whole, it did result in arbitrary figures for individual industries to the extent that the establishments concerned or the D.B.S. editing staff had to use estimating or pro-rating procedures in order to compile statistics in the form requested. Similarly, but to a lesser extent, the industry statistics by detailed geographic area were subject to arbitrary estimation because of the effort to break down separately located but integrated establishments into the areas where operations were physically located.

The attempt to limit the coverage of industry statistics to manufacturing activity only resulted, in certain cases, in internal inconsistencies between the statistics of individual industries as well as in duplication between industry divisions. The problem here arose because of the inability of some respondents to report production or shipments at a level of valuation consistent with the other operational statistics. Particularly concerned were firms operating sales branches, marketing divisions or selling warehouses. In many cases their records could not provide value of shipments (and in some cases even volume of shipments) at the manufacturing level as requested but could only show valuations at the point of sale. Where, of course, firms maintained internal billing prices between the plant and the sales outlets, the latter could be set up as separate establishments in wholesale or retail trade and the statistics in both manufacturing and trade were consistent. But where this was not the practice it was discovered that many were

valuing plant shipments at wholesale or retail prices, including selling and handling expenses, while limiting other data such as employment, payrolls, supplies, fuel and power to plant operations as per instructions. This meant that value of output for such establishments, and they are usually large, was overstated relative to such input factors as employment and payrolls. Also, since the selling outlets of these same firms were usually covered in the retail or wholesale surveys duplication occurred in value added equivalent to the margin between the manufacturing and selling operations.

All of these practices had one common shortcoming. In each case, the delineation of the reporting unit failed to recognize the capability of the accounting records of the establishments concerned to report the data in the form desired. Furthermore if firms, with a great deal of effort, could follow instructions for purposes of the annual Census of Manufactures they found it impossible to report on the same basis to the monthly Employment Survey. Thus the resulting data could not always be used with confidence in projects requiring the use of manufacturing industry statistics for inter-industry analysis and in conjunction with data from other surveys. Important examples of such projects are productivity and real output measurements where consistency and uniformity of statistics within and between surveys, industries and industry divisions are essential.

Plans for Improvements

With the 1961 survey which gets under way early in 1962 the Census of Manufactures will become a census of manufacturing establishments rather than a census of manufacturing activity in that all the non-financial activities of manufacturing establishments will be covered and those establishments whose major activity is not manufacturing will be classified in total to the appropriate non-manufacturing industry. In general, the boundaries of the establishment, as described earlier, will conform with the accounting records of respondents.

In addition to achieving a greater degree of internal consistency in the statistics of particular surveys, and of improving comparability of data between surveys, the new approach will reduce and simplify the burden of reporting on respondents and in the process will also reduce the volume of editing within D.B.S.

The previous article described the work now under way at D.B.S. in the development of a standard list of establishments to be used in all industry-type surveys. In the course of developing the list of manufacturing establishments, the large multi-unit companies presented special problems. For the smaller more simply organized firms any changes in reporting procedures can usually be implemented by providing clear and comprehensive reporting instructions on the survey forms or by an analysis in the Bureau of the firms' reporting practices in various surveys. The questionnaires are now in the process of being completely re-designed for the 1961 Census of Industry and reporting instructions are being re-written in terms of the new establishment concept.

Also, all cases are being reviewed where the reporting units currently used in various surveys (particularly the Census of Manufactures and the monthly Employment Survey) differ in number or coverage. Such differences are usually indicative of reporting difficulties and in many instances an analysis of the reported data suggests the proper corrective procedure in line with the new approach. For large complicated firms, however, the determination of the number and coverage of each separate establishment for which the full range of input and output statistics can be reported is a complicated task. It requires a thorough knowledge of the nature and implications for industry analysis of the new approach, in addition to a knowledge of the firms' accounting practices. Company officers are not sufficiently acquainted with the surveys concerned and the desired objectives to interpret the new requirements on the basis of a set of instructions. The job has to be done by qualified D.B.S. officers who must acquire a knowledge of the accounting practices of the problem firms. Such qualified statisticians are few indeed and the task is a big one. Negotiations have to be carried out with each individual company, either through personal visit, correspondence or telephone and there are hundreds of problem cases to be studied. Many have already been dealt with but there still remains a substantial number.

Most of the research work involved in the development of the standard list of establishments for multi-unit manufacturing firms is the responsibility of Census of Manufactures officers who have at their disposal the bulk of the files and records needed in the study of reporting problems. However, since the standard list is to be uniformly used in all industry surveys, the ability of accounting records to delineate separate establishments for other than the annual Census of Manufactures (especially the monthly Employment Survey) must be taken into account. It sometimes happens that a firm can easily provide annual data to the Census of Manufactures according to a certain breakdown but finds it can only report on a consolidated basis to the monthly Employment Survey. Such cases are considered on their merits, involving occasionally a consolidated report in both surveys.

As with most basic changes aimed at improving existing procedures or subject matter certain compromises have to be accepted. Revised statistics for individual industries although more consistent and comparable with those of other industries will not be as homogeneous. Organization and degree of integration of individual firms differ widely and accounting records do not always encompass homogeneous units or relate to the same coverage

of operations. The number and boundaries of separate establishments can thus vary even in the case of companies engaged in the same size and variety of operations. It should be noted however that in the process of determining the number and statistical content of establishments of multi-unit firms special breakdowns of activities or locations will be required where strict adherence to the accounting criterion would significantly affect the meaning and usefulness of the data for particular industries. Two important examples of such cases involve the metal mining and refining companies and the petroleum refineries. In the former case there is no accounting valuation for the ore transferred from the mining operation to the refining (or manufacturing) process. In a strict interpretation of the new establishment concept these companies would consolidate all their operations in the one report which would result in a large statistical gap in either the mining or manufacturing industry depending in which classification division the combined return were coded. Similarly, in the case of the large petroleum companies which operate extensive wholesale marketing facilities, not all firms maintain appropriate figures on the value of petroleum products transferred from the manufacturing to the marketing divisions. Again the consolidation of manufacturing and trade activities in the one establishment report would seriously affect the analytical meaning of the industries involved. In such cases special arrangements have to be made with the respondents to provide estimates or approximations to the desired valuation to permit the formation of separate establishments and thus maintain the analytical usefulness of the industry statistics. Such exceptions to the new establishment concept will be relatively few and care will be taken that uniform procedures are followed in all surveys.

Implications of New Approach for Manufacturing Statistics

Although it is not possible at this time to determine exactly in quantitative terms the effects on Census of Manufactures data of the new establishment definition certain implications are obvious. These are described below together with a few selected examples.

1. The new approach will tend to **increase** the level of the aggregates since the concept demands coverage of total activity, not just manufacturing activity as in the past. The statistics will reflect all the non-financial operations of establishments whose principal activity is manufacturing. Previously, the employment data in published manufacturing statistics covered only manufacturing operations and materials and shipments data covered only goods of own manufacture and custom work. As an example, the value added in 1957 in the "Sash, Door and Planing Mills" industry on the old basis was $82,737,000. On the revised basis, taking into account only the addition of purchases and sales of goods not of own manufacture[2] value added would amount to $103,489,000 for the same year.

In addition to goods not of own manufacture, the expanded coverage will provide for reporting data on the following operations: new construction by own labour force; machinery and equipment produced for own use by reporting establishments; installation or erection of establishment's products (when erection unit does not constitute a separate establishment); operations of establishment's auxiliary units such as cafeterias, power plants, garages, warehouses, laboratories, truck fleets, etc.; and sales personnel attached to the plant. Also the operations of sales offices and sales branches, where these do not constitute separate establishments, will be included as extensions of the establishment's boundaries. The addition of employees and their earnings at these sales locations apart from the plant will increase the level of employment and payrolls substantially in some industries.

2. The new definition will tend to **lower** the level of the aggregates since those establishments not principally engaged in manufacturing, whose manufacturing activity is now included in the manufacturing survey, will be omitted from the manufacturing industry compilations. The reverse situation, where the Census of Manufactures would pick up new establishments from other industry surveys, is not likely to occur except infrequently. In order to maintain total coverage of **commodity** statistics, data on products manufactured by non-manufacturing establishments will be collected on simplified forms or on the questionnaires of the non-manufacturing industries to which the establishments have been coded.

To illustrate the effect of the loss to the manufacturing universe, the "Sash, Door and Planing Mills" industry is again used as an example. Taken the revised total (inclusive of goods not of own manufacture) shown earlier for value added ($103,489,000) and subtracting the value added of manufacturing in those establishments which will be coded to non-manufacturing industries (in this case, mostly wholesale trade) would give a total of $89,332,000. It is to be noted here that the last figure is not too far off the original published figure of $82,737,000. It is expected that these compensating effects will be fairly common.

3. The new approach will also tend to **lower** the level of the aggregates of materials and shipments by bringing about a substantial reduction in the practice of "splitting" establishments of firms with integrated manufacturing processes. This was an attempt to produce product homogeneity in

[2] These data have been collected on Census of Manufactures questionnaires as supplementary information since 1954.

industry statistics. If a manufacturer, for instance, operated a foundry for the production of castings which were then used in the manufacture of machinery items by the same manufacturer, the practice was often to consider the castings operation as a separate establishment coded to the castings industry. The manufacturer was asked to place a valuation on the castings which were then recorded as a material of the machinery establishment. The elimination of this practice in all but certain exceptional cases will result in lower levels of materials and shipments but, since the revised procedure will only cancel out inter-industry transfers, the net effect on total value added and employment data will be nil.

4. The new establishment concept emphasizes the problem of valuation. At the present time instructions on the schedules request materials to be valued at the laid down cost at the plant (i.e. including all costs up to the point of delivery at the plant door) and shipments to be valued f.o.b. plant less sales and excise taxes (i.e. manufacturer's selling value at the plant door less sales and excise taxes). To the extent that respondents are following instructions and making estimates, when required, involving the addition of transportation and handling costs to purchased values (when materials are carried to the plant in a firm's own vehicles) and the deduction of transportation and handling costs from delivered values (when products are delivered in a firm's own vehicles) the figures on the new basis will be lower for value of materials and higher for value of products. This is because where the firm's own transportation facilities are involved, the new establishment boundaries will extend back to the point where the plant took delivery of materials and forward to the point where the products were delivered. Actually, however, it is doubtful that in many instances respondents were making these types of adjustments and the figures were probably being reported as recorded in the firms' books.

In the case of firms operating sales outlets which do not constitute separate establishments the new approach will probably not materially affect the valuation of shipments since most such firms, as pointed out earlier, were likely reporting value of shipments at the point of sale and not at the plant.

Generally speaking, wherever valuation of shipments is recorded at other than the plant level, consistency demands that other statistics, such as materials, fuel and power, inventories, employment and payrolls cover the same accounting area. The extent to which materials, fuel and power will be affected is not believed to be significant since their use at other than the manufacturing location should constitute only a small proportion of the totals for the establishment. In the case of employment and payrolls relating to non-manufacturing activities, however, increases can be substantial. Some data have been collected on the questionnaires since 1946 for those activities attached to the plant and available from plant records. They have never been included, however, in published statistics. In the Carbonated Beverages industry, for instance, value of sales can only be reported at delivered prices but employment and payrolls of driver-salesmen had been excluded from published data. The total for salaries and wages for 1957 on the old basis was $24,382,000. On the revised basis, inclusive of wages of delivery personnel, the total would be $37,668,000 for the same year.

Treatment of Head Offices and Similar Auxiliaries

At the present time the Census of Manufactures does not have complete coverage of head and administrative offices and has never surveyed separate sales offices, warehouses or laboratories operated by manufacturing firms. For the 1961 survey, however, it is planned to effect complete coverage of these auxiliary units. In the past the employment and salaries and wages of those head and administrative offices that were surveyed were either coded in total to the industry in which the greatest portion of the company's manufacturing operations was classified or else, in the case of certain large multi-unit firms, were pro-rated among the different industries involved.

In the great majority of cases central administrative and executive personnel of single-establishment firms are located at the site of the manufacturing plant and are automatically included in the plant reports. Where head or administrative offices are located away from plant operations, and those belonging to large multi-establishment companies employ a substantial number of workers, statistical treatment in line with the new establishment concept will vary according to the number and classification of the firms' establishments.

Separately located head offices, sales offices, administrative offices and other separate auxiliary units (laboratories, warehouses, etc.) do not usually constitute separate establishments for purposes of industry statistics since they do not normally produce operational revenues but give rise only to costs of operation (mainly salaries and wages) which make up part of the selling price of manufactured products and which are thus included in the value of shipments or sales. Where such units belong to single-establishment firms they will be considered as extensions of the establishment's boundaries and their operations consolidated with the establishment's total activity. This has been the practice in the past. It may be perferable, however, to keep the employment and cost data of such units separate (when disclosure rules of the Statistics Act are not involved) in tabulations of principal statistics by area; their assignment to an industry in a particular location, especially if that location is of relatively small size, would misrepresent the actual employment and payrolls originating in that area.

In the case of multi-establishment companies, the following rulings will apply:

1. Where all the establishments of the company are classified to the same (3-digit)[3] industry, the auxiliary units will be coded to that same industry. Where the auxiliary units are not located in the same areas as the plants, their employment and cost data should preferably be kept separate in tabulations of principal statistics by area as explained above.

2. Where the establishments of the company are not all classified to the same (3-digit) industry but are coded to different industries, or industries in different industry groups or even different divisions of the classification, the inclusion of data for auxiliary units in any one of the (3-digit) industries concerned would distort the relationship between items of principal statistics. In such cases, the auxiliary units will be coded at the group (2-digit)[4] level only in tabulations of industry statistics. Where multi-establishment firms cut across group or major division lines of the classification, the separate auxiliary units will be coded to the (2-digit) industry group in which the major part of the company's operations are concentrated. Although this may result in some distortion of (2-digit) industry group statistics it will eliminate distortion within groups and will leave date at the (3-digit) industry level free of these entreprise-type data. The same principles will apply (i.e. coding at a higher level of aggregation) in the case of geographic statistics where data on auxiliary units would distort industry statistics by area.

Problems of Continuity

In order to meet an existing need for data on manufacturing activity and also to maintain conceptual comparability with past surveys establishments will still be requested to report certain data on manufacturing activity separate from other activities. As described earlier these activity statistics will contain some arbitrary elements but they will be accompanied, in future, by the more consistant and integrated set of "total activity" data. It is planned to publish the results of the 1961 Census of Manufactures on the old manufacturing activity basis to provide an immediate link with previous years. With publication of the results of the 1962 survey, however, data from the 1961 Census of Manufactures will be reassembled and published on the new basis, thus providing a one-year overlap at that time on the "total activity" basis.

However, when the results of the 1961 survey are published some changes will already have been implemented, such as the elimination from the Census of Manufactures of those establishments whose principal activity is not manufacturing and the consolidation of reports for some firms with integrated manufacturing establishments. These changes can be projected back for previous years by removing non-manufacturing establishments from the compilations and reworking the returns from integrated companies.

The task of reworking Census of Manufactures data for a number of previous years to reflect **all** the conceptual and reporting changes resulting from the adoption of the new establishment definition is a much more complicated and time-consuming job that will involve some not inconsiderable amount of pro-rating and estimating. However, a substantial amount of information is available for back years from the Census of Manufactures itself and from other D.B.S. surveys.

Present plans call for the recompilation of the Census of Manufactures on the new basis back to 1954 to provide an adequate overlap for analytical purposes. The choice of this period was dictated by the fact that data on purchases and sales of goods not of own manufacture, an important component of non-manufacturing activity, have been collected on Census of Manufactures questionnaires since 1954. Similarly, data on revenue from sale of own-generated electricity and on cost of office supplies have been collected for back years. Also collected on the census questionnaires since 1946 have been payrolls relating to non-manufacturing operations carried out at the plant location. This does not represent total payroll of the establishment as it will now be defined since the data exclude employees engaged in auxiliary operations away from the plant, such as in sales outlets, warehouses or administrative offices.

Other items of non-manufacturing activity missing from the census questionnaires for back years include value of construction by own labour force, value of machinery and equipment produced for own use, revenue from installation and erection when not included in the value of shipments and revenues from such auxiliary operations as warehousing, cafeterias, etc.

In the case of missing employment and payrolls data it is expected that the bulk of the information, including that for missing head, administrative and sales offices can be derived from the records of the monthly Employment Survey which covers total activity of manufacturing firms employing 15 or more workers. Similarly, most of the data on value of construction by own labour force can be obtained from the Capital Expenditure survey in which the information is largely reported on an establishment basis. Data on value of machinery and equipment for own use and on revenues from auxiliary units have never been collected separately and constitute unknown factors at the moment. It is not believed, however, that the results of the 1961 survey will reveal these items to be significantly large and even arbitrary estimation of the missing data should not distort the statistics to any extent.

[3] Smallest grouping or "class" in the Standard Industrial Classification, e.g. Sugar Refineries in the Foods and Beverages group of the Manufacturing Division.

[4] Grouping of 3-digit industries, e.g. Foods and Beverages group in the Manufacturing Division.

In the case of value of materials used, the main instruction on the Census of Manufactures questionnaires has always requested materials and supplies used in manufacturing operations. It is not too clear to what extent materials used in non-manufacturing activities such as construction, trucking, etc., were included along with manufacturing materials. Possible discontinuities will be determined when results of the 1961 survey are available to ascertain whether special adjustments for back years will be required.

Possibly the most troublesome element of discontinuity will be changes in the level of valuation resulting from changes in the reporting boundaries of establishments. Although they are not believed to be numerous, these changes are generally substantial since they usually involve the largest companies. Estimating procedures will most likely have to be used in these cases to project the value statistics back to 1954.

To help the present limited professional and clerical staff handle this large and complicated project special temporary help has been acquired. During the next few years every effort will be made to develop an adequate overlap of principal industry statistics according to the new classification and the new establishment concept and to complete and fully implement the standard list of establishments.

REGIONAL STATISTICS AND REGIONAL STATISTICAL CLASSIFICATIONS[1]

General Introduction

Generally speaking, the amount of statistical data published by DBS on a provincial basis is considerably less than that regularly available on an "All-Canada" basis; and data for areas smaller than provinces are even more severely restricted in scope. Well known exceptions include of course the bulk of the information collected in connection with the census, which is tabulated and published in considerable regional detail; including counties (or census divisions, in provinces not organized on a county basis), municipalities, metropolitan areas, "tracts", i.e., socio-economic subdivisions of metropolitan areas, and in some cases, even smaller areas known as enumeration districts, consisting of areas covered by individual census enumerators. To date, "block" statistics, relating to individual blocks in urban areas have not been tabulated, although some requests for these have been received; such data are available for large population centres in some other countries.

In addition to census data, there are a number of other important series published regularly at a level of detail comparable to the census tabulations (for example, annual statistics of the manufacturing industries), and many others which provide at least provincial subdivisions.

On the other hand, many widely used series, such as the National Accounts and the Index of Industrial Production are available only on a Canada basis, and some series are not completely classified provincially; for example, data for the "Atlantic Provinces" and "Prairie Provinces" frequently appear in lieu of separate figures for each of the provinces in question.

There are a number of reasons which explain the evident decrease in the amount of data available as the areal unit under consideration shifts from the larger to the smaller.

In the first place, the Statistics Act, which determines the rules under which DBS may collect and publish data forbids disclosure of information relating to individual persons or business establishments. This restriction, designed to protect the respondent, is carefully observed at DBS and also prevents publication of data relating to groups of 2 establishments, (since one of the respondents in question could conceivably subtract his own return from the total, and infer his competitor's position). Statistics of certain public utilities, (e.g. railways) subject to regulation by federal authorities are an exception to the general rule, since specific legislation relating to these bodies supersedes the provisions of the Statistics Act. In certain other cases, data relating solely or chiefly to the operations of individual firms are published with express permission of the respondent. Obviously, then, the disclosure rule acts as a barrier to publication of regional detail in many cases, especially in the field of manufacturing, since there may be fewer than 3 establishments of a given type in any particular region, even though the number in Canada as a whole is quite large.

Second on the list, we may put conceptual considerations. Some statistics relating to the activities of business operating on a national scale cannot be allocated regionally except on a very arbitrary basis; for example profits of multi-establishment firms, or certain characteristics or activities of transportation companies.

A third restriction operating in this area arises from the use of sampling techniques to collect data. It is a feature of statistical sampling that the precision or reliability of a sample is related to the absolute size of the sample. Thus, a sample designed to yield results of acceptably small error for Canada as a whole, will not in general produce satisfactory results for its geographical subdivisions. Consideration is given of course in designing such samples to possible requirements for regional classifications, however the "law" still operates and the results are always less reliable (even if reliable enough) for provinces, and still less reliable for smaller political or areal subdivisions. To obtain results by a complete count, or a sample large enough to produce acceptable precision at the lowest level of areal subdivision would be extremely costly, if indeed practicable in any sense, and for all practical purposes may be considered impossible in most cases.

A fourth restriction on regional detail is a very practical one of resources generally. The cost of processing and publishing additional data, at the subprovincial level in particular, is significant, and must be judged in relation to urgent requirements for new series, and quality control and extension of existing series, at the national level.

Finally, it must be noted that many types of regional and local data are available from sources other than DBS. Several provincial governments have their own departments of statistics, and municipal and county governments also collect information on a variety of subjects in the course of their normal administrative functions. It has been the policy of DBS to encourage developments at the provincial level, and, rather than to displace or duplicate this activity, to initiate and support forms of co-operation designed to minimize the reporting load on business firms, who are the source of a good deal of the most widely-sought data, and to ensure a high degree of comparability of data originating in the several provinces, and at the national level. To this end, conferences of federal and provincial statisticians are held regularly in Ottawa, and between formal meetings, continuous liaison is maintained by way of correspondence, telephone and personal contacts.

[1] Reprints of this article are available on request.

A New Classification Device

Although there is thus no prospect of DBS being able to release all the data on a county or census division basis that is now released in the form of national or provincial totals, there does exist a classification device which will, it is hoped, provide a basis for the further development of statistics on a "less-than-province" basis. We refer to the system of Provincial Economic Regions, or P.E.R's., which was originally developed by the Department of Defence Production several years ago. This system involves the subdivision of each province into a limited number of areas which exhibit a comparative homogeneity, from the viewpoint of past or potential economic development. In this context the term "homogeneity" is used in a relative sense; the boundaries of each region are designed to unite areas which have a basic unity or similarity of economic life, and at the same time to separate these areas from surrounding areas whose economic life is neither unitary with, nor similar to, that of the enclosed areas.

The question naturally arises as to what are to be accepted as the determinants of "economic unity" and "economic similarity". In the work done in the Department of Defence Production this question was answered in terms of a formula which took account of production patterns and marketing relationships in areas under consideration, and also of what were referred to as the "structural" and "functional" aspects of the local economies, differentiating between the physiographic characteristics of an area (the structural factor) and the effect of the operational relationships which have been achieved over time with other parts of the country (the functional factor). To quote directly from "Economic-Administrative Zoning of Canada"[2] "A local economy can be described structurally in terms of the natural resource background and the composition of its human and capital resources; but its activities, its functioning may be described only inadequately in terms of these endogenous factors, for much of its activity may be determined by its functional relationship with other areas due to the operation of the spatial factor and the resulting locational advantages or disadvantages".

In the actual zoning process a four-factor analysis (structural, functional, production and marketing factors) was applied by assigning specified weights to each of the factors. Then, if two adjacent sub-areas were found to have significantly more in common than "in difference", after due allowance for the weights assigned to the four factors, the sub-areas were put into the same P.E.R. If they had less in common than in difference, they were placed in separate P.E.R's.

In applying this theoretical model to the Canadian economy it has been found necessary to make certain concessions to practical and institutional factors. For example, it seems desirable to define a maximum of ten P.E.R's. per province for reasons partly dictated by anticipated coding and data-assembly problems. It is also desirable that the P.E.R's. be composed of groups of complete counties or census divisions – in order to make use of existing census data and industrial statistics.

To conclude this brief note on the conceptual background of the P.E.R's., it should be mentioned that, although most of the developmental work in this area was done by D.D.P., the Dominion Bureau of Statistics has accepted the responsibility for the further development and refinement of the P.E.R. system, in collaboration with interested provincial and federal agencies.

The "Raison d'Être" of Economic Regions

Several departments of the Federal Government have indicated support for further development and use of the Provincial Economic Regions. The department already mentioned as one of the initiators of the work in this field (Defence Production) has an obvious interest in being able to assess the impact of defence contracts on particular areas. The Department of Citizenship and Immigration, to name just one other federal agency, has indicated considerable interest. Several provincial governments have found regional break-downs useful, noteworthy among them being the Ontario government, which as early as 1947 had established a system of 19 economic regions in the province, subsequently reduced to 10. Many business firms and trade associations have also shown support for regional analyses.

In seeking an explanation for this developing interest in regional analysis, it may first be noted that a feature common to all of the sciences is the search for alternative levels of observation. If a set of objects or events are to exhibit the significant forms or patterns which are the basis of deduction, prediction and action, the ultimate objectives of scientific activity, it is generally the case that they will do so most clearly, if at all, when viewed at an appropriate level of observation.

If the "magnification" is too low, or if we stand too far away from the "picture", there may be no evidence of pattern or perhaps merely a trivial or irrelevant pattern; if the magnification is too high and the field of view constricted, pattern will be replaced by indeterminateness and randomness. At some intermediate stage of magnification, or suitable vantage point, however, a significant pattern in space or time may emerge – for example, the molecule or the crystal with their mathematically precise structures, or a chain of events or groups of events exhibiting unmistakeable causal connections, of nature or society as visualized by the scientist.

In the social sciences, progress was initially slow because raw material was scarce or non-existent, and the testing and applications of theory well-nigh impossible. At a later stage, progress

[2] Department of Defence Production, June, 1954 page 7. (Out of print.)

was hampered because information existed largely in atomistic form and even skilled investigators were unable to cope with the vast mass of data. The science of statistics overcame this obstacle by enabling the combination and condensation of otherwise unmanageable numbers of facts and observations into a comparatively few summary numbers, such as averages, describing the central tendency of the data; measures of dispersion, describing the range of variation about the average, totals or aggregates (which are self-explanatory) and classifications or frequency distributions whereby large numbers of elements are sorted into a small manageable number of groups on the basis of observed or postulated similarities and thereafter are treated as equivalents within their assigned classes. Thus, by reducing the observations to a comparatively few summary numbers or "statistics", the investigator was enabled to proceed with his analysis, to compare, contrast and correlate the data, and determine the existence or non-existence of significant pattern.

In recent times the realization has been growing that we may have gone too far in some cases in condensing and aggregating basic data. The complexity of the economy does not always lend itself to a high degree of aggregation and, despite the usefulness of complete aggregation as an aid to abstracting significant pattern, it is probable that in some cases significant patterns have been concealed through an excess of aggregation. In other cases, aggregation has perversely created false patterns which are functions of the aggregation process itself, patterns which are quite independent of the original data. Consequently there has been a growing tendency towards what is sometimes referred to as "disaggregation" or "deconsolidation" of statistics. The term sub-aggregation might also be used to describe this process and is often more descriptive of the actual operation. It simply means that in the course of arriving at the totals we obtain also sub-totals. However, the process is described, its essential feature is a further change in the level of observation, or, more accurately, the development of alternative levels of observation. Naturally, there is only one direction to go if we start from the aggregate, that is, back in the direction of the details from which it is composed. It is unlikely however that the cycle will be completely reversed, although recent developments in techniques for handling and digesting information suggest that in some cases electronic machinery can succeed in extracting significant patterns from masses of raw data which would be overwhelming from the point of view of the unaided human mind. Probably, an "optimum" or most suitable level of observation appropriate to each problem will evolve, somewhere between the atomistic and aggregative. As suggested previously, it is entirely possible that significant pattern does not, in fact, exist below a certain level of observation, no matter how powerful may be the tools of analysis brought to bear on the data.

The tendencies described above are nowhere more evident than in the field of economics and economic statistics. Classical economics dealt largely with "micro economics" – theories about the behaviour of individual businesses and consumers. It began to be supplanted in the '30's by "macro economics" which dealt with the economy as a whole and which encouraged the development of aggregative statistics such as the national income, gross national product and the "labour force" and indices of industrial production and consumer prices. In recent times economists have suggested that further progress along these lines may be hampered because the aggregates despite their usefulness conceal within them too many contradictory and arithmetically cancelling elements. In other words the aggregate although superior to the atomistic is not necessarily the "optimum" or most useful level of observation for many problems.

Fortunately the demand for sub-aggregation has appeared at a time when, as previously noted, new techniques and devices for data analysis are in a stage of rapid development and consequently the disadvantage of sub-aggregation, essentially the same problem which inspired the development of statistics in the first place, i.e., the inability of the human mind, even with the assistance of the desk calculator, the adding machine and the slide rule, to deal with vast numbers of bits of information, is rapidly disappearing. The larger number of statistics and the vastly greater number of inter-relationships which must be examined when we sub-aggregate can be handled by electronic computing machinery if other alternatives fail.

There are many lines along which sub-aggregation can proceed, for example, we may wish to examine in detail the various industries which form the basis of the national economy and the inter-relationships amongst them or we may wish to look at the various socio-economic groups which share in the national income. We may also note that there are many regional differences, similarities, and inter-relationships in the national economy. Sub-aggregation along regional lines is complementary, not necessarily competitive with other forms of sub-aggregation.

If the per capita income of each economic region in Canada is high it follows that the per capita income for Canada as a whole will be high, but the converse of this statement is not true. An overall state of prosperity in the nation is not inconsistent with the existence of seriously depressed areas or regions. "One-half of one per cent of the labour force unemployed" may seem trivial on the national level of observation, but if the one-half of one per cent are concentrated in a handful of regions the situation appears in a different light.

An additional feature of regional sub-aggregation of statistics is that it offers a large potential contribution to the solving of a particular problem

which has received too little attention in the past, that of tying economic statistics closely to underlying realities. For example, the "steel industry" is a difficult concept to grasp, unless it can be visualized in terms of specific business establishments engaged in the manufacture of iron and steel located in specific areas of Canada, bordering on specific lakes or rivers and rail lines and communication arteries generally and closer or further away as the case may be to major users of steel and domestic or foreign sources of coal and iron ore.

The foregoing arguments on behalf of regional economic analysis might be said to be based on its contribution to **static** analysis, in the sense that it envisages a use for area-to-area comparisons in a given time. But it has also been argued that regional analysis contributes to the study of the **dynamic** problem of economic growth. What, for example, determines that Region 'A' will prosper, will "take-off", as the new expression has it, while Region 'B' will languish? By providing a framework within which economic data can be published, a division of each province into Economic Regions makes it possible to test various hypotheses about economic growth. Comparative growth rates in different regions can be determined, and the economic condition of the faster growing Regions at the time of "take-off" can be examined to see "what started it all".

The above-mentioned advantages to be derived from having an integrated program of Economic Regions might be listed under the general heading of contributions made to the decision-making process in government and business enterprise. But decisions once made must be enforced, and here too a scheme of Economic Regions can be useful, since it offers to administrators a ready-made system of administrative areas, such as any organization might otherwise have to set up for itself. As one example of this possibility, we might cite the case of the Central Mortgage and Housing Corporation, which has found it possible to use the existing Provincial Economic Regions, with only minor changes, as the basis for determining the areas of responsibility of its own regional offices.

Some of the justifications which have been offered above for regional economic analysis has been couched in general terms, such as might apply to any system of sub-dividing national or provincial economies, including, of course, the county system. In favour of the particular Canadian regional model under discussion it might be added that the system may provide the framework for (a) the release of data which could not be published on a smaller-area basis (i.e. counties) because of secrecy provisions, and (b) the estimation of statistical aggregates which could not be calculated on a county basis, because of sampling principles. The P.E.R. system may also provide a means of integrating and reconciling a number of other schemes of geographical classification in use in DBS and elsewhere, at a level below that of a whole province. (A working committee on Geographical Classification has recently been established in DBS to examine the possibilities of this.)

Recent and Prospective Changes in the Economic Regions

It was mentioned that the Provincial Economic Regions have been established as combinations of complete Counties or Census Divisions. Necessarily, therefore, when the boundaries of Census Divisions are redrawn, as they were in Alberta in 1956 and as they have been in Manitoba for the census this year, the boundaries of the Economic Regions must also be redrawn. In the Manitoba case provincial authorities accepted the responsibility for the delineation of the Economic Regions (referred to in provincial terminology as "Economic Reporting Groups") and these were quite acceptable to federal interests. In Alberta the new Census Divisions established in 1956 seemed to provide of themselves, without further aggregation, a sufficiently useful framework for the presentation of the available economic data, and as a result no need was felt in that province for revised Economic Regions until last year, when trade associations began asking for data on an Economic Region basis. After considerable discussion between interested federal and provincial agencies, an appropriate scheme of Economic Regions, based on the 1956 census Divisions, has been worked out for Alberta.

In some other provinces there have been stirrings of new interest in the problem of the disaggregation of the province into component parts. In Saskatchewan, discussion has been going on for some years on the question of a possible reorganization of the municipal structure of the province.

The responsible authorities in the Province of Quebec have also indicated that a new interest is being taken in the Economic Regions of that Province, and Provincial Economic Regions are now being used by statistical agencies of the provincial government as a framework for the assembly and presentation of statistics.

Although a federal agency was responsible for the first published scheme of "Provincial Economic Regions", the foregoing indicates that provincial governments are now taking an interest, and an initiative, in this field. This is as it should be, since no one in Ottawa can hope to acquire the detailed knowledge of local conditions that is available to the provinces. However, since DBS is increasingly being asked for data on an Economic Region basis, it also has an interest in this area. Regional statistics is clearly a field where the most efficient use of resources will require a high degree of co-operation and a mutually satisfactory sharing of responsibility amongst federal and provincial authorities.

THE D.D.P. SYSTEM OF ECONOMIC REGIONS

The attached list provides a description of the Department of Defence Production (D.D.P.) system of economic regions. The set of regions defined here differs in two respects from that presented in the D.D.P. publication "Economic – Administrative Zoning of Canada" (1954), which is now out of print. Both changes are in Ontario. First, Frontenac County has been shifted from region 51 to region 50. Second, Brant County has been shifted from region 54 to region 53.

It should be stressed that while the regional systems in Ontario and Quebec have gained general acceptance, this is not yet the case in other provinces. Further changes may be made in these other provinces, and the present list should not be considered final.

In the attached list, C.D. stands for "census division", and the appropriate D.D.P. code number appears in brackets after each region. Persons interested in consulting provincial maps showing the boundaries of census divisions are referred to those appended to the 1951 Census of Canada.

Census Divisions are those established for the 1951 Census of Canada. Some changes in Census Divisions have been made for the purpose of the 1956 Census; especially in Alberta. It has not been possible for the present to redefine the economic regions in terms of the 1956 Census Divisions.

Province, Region and Component Counties or Census Divisions

Newfoundland:

St. John's – Southeastern Newfoundland (00)
- CD 1
- CD 2
- CD 3
- CD 7

Central Newfoundland (01)
- CD 6
- CD 8

Western Newfoundland (02)
- CD 4
- CD 5
- CD 9

Labrador Region (03)
- CD 10

Prince Edward Island:

The Province (10)

Nova Scotia:

Sydney – Cape Breton (20)
- Cape Breton
- Richmond
- Victoria
- Inverness

Northern Nova Scotia (21)
- Antigonish
- Guysborough
- Pictou
- Cumberland
- Colchester

Halifax – South Shore (22)
- Halifax
- Lunenburg
- Queen's
- Yarmouth
- Shelburne
- Digby

Nova Scotia – Concluded:

Annapolis Valley (23)
- King's
- Annapolis
- Hant's

New Brunswick:

Moncton – Southeastern New Brunswick (30)
- Westmorland
- Albert
- Kent

Saint John – Southern New Brunswick (31)
- Saint John
- King's
- Queen's
- Charlotte

Saint John Valley Region (32)
- York
- Sunbury
- Carleton
- Madawaska
- Victoria

Northeastern New Brunswick (33)
- Northumberland
- Gloucester
- Restigouche

Quebec:

North Shore – New Quebec (40)
- Saguenay
- New Quebec (District)

Gaspesia – South Shore (41)
- Bonaventure
- Gaspé
- Kamouraska
- L'Islet
- Matane
- Montmagny
- Rimouski
- Témiscouata

Quebec – Continued:

Saguenay – Lake St. John (42)
- Chicoutimi
- Lake St. John

Quebec (43)
- Beauce
- Bellechasse
- Charlevoix
- Dorchester
- Lévis
- Lotbinière
- Montmorency
- Portneuf
- Quebec

Three Rivers (44)
- Berthier
- Champlain
- Maskinongé
- Nicolet
- St. Maurice

Eastern Townships (45)
- Arthabaska
- Brome
- Compton
- Drummond
- Frontenac
- Mégantic
- Richmond
- Shefford
- Sherbrooke
- Stanstead
- Wolfe

Montreal (46)
- Argenteuil
- Bagot
- Beauharnois
- Chateauguay
- Deux-Montagnes
- Huntingdon
- Iberville
- Joliette
- Labelle
- Laprairie
- L'Assomption
- Missisquoi
- Montcalm
- Napierville
- Richelieu
- Rouville
- St. Hyacinthe
- St-Jean
- Soulanges
- Terrebonne
- Vaudreuil
- Verchères
- Yamaska

Metropolitan Montreal (47)
- Jesus Island
- Montreal Island
- Chambly

Quebec – Concluded:

Hull – Western Laurentides (48)
- Hull
- Papineau
- Pontiac

Abitibi – Témiscamingue (49)
- Abitibi
- Témiscamingue
- Abitibi (District)
- Mistassini (District)

Ontario:

Eastern Ontario (50)
- Carleton
- Dundas
- Frontenac
- Glengarry
- Grenville
- Lanark
- Leeds
- Prescott
- Renfrew
- Russell
- Stormont

Lake Ontario (51)
- Durham
- Haliburton
- Hastings
- Lennox and Addington
- Northumberland
- Peterborough
- Prince Edward
- Victoria

Metropolitan (52)
- Halton
- Ontario
- Peel
- York

Niagara (53)
- Brant
- Haldimand
- Lincoln
- Welland
- Wentworth

Lake Erie (54)
- Elgin
- Middlesex
- Norfolk
- Oxford

Lake St. Clair (55)
- Essex
- Kent
- Lambton

Upper Grand River (56)
- Huron
- Perth
- Waterloo
- Wellington

Ontario – Concluded:

Georgian Bay (57)
- Bruce
- Dufferin
- Grey
- Muskoka
- Parry Sound
- Simcoe

Northeastern Ontario (58)
- Algoma
- Cochrane
- Manitoulin
- Nipissing
- Sudbury
- Timiskaming

Lakehead – Northwestern Ontario (59)
- Kenora
- Rainy River
- Thunder Bay

Manitoba:[3]

Winnipeg – Metropolitan (60)
- CD 20

South-East Manitoba (61)
- CD 1
- CD 5
- CD 19

Manitoba Interlake (62)
- CD 9
- CD 12

South Central Manitoba Prairie (63)
- CD 2
- CD 6

South-West Manitoba Prairie (64)
- CD 3
- CD 4
- CD 7
- CD 8
- CD 10
- CD 11
- CD 13

West Central Manitoba Woodlands (65)
- CD 14
- CD 15
- CD 17
- CD 18

Northern Manitoba (66)
- CD 16

Saskatchewan:

Regina – Southeastern Plains (70)
- CD 1
- CD 2
- CD 6

[3] The Manitoba Census Divisions and P.E.R's. incorporate changes made as of the 1961 Census.

Saskatchewan – Concluded:

Saskatchewan Palliser (71)
- CD 3
- CD 4
- CD 7
- CD 8

Saskatoon – Central Plains (72)
- CD 11
- CD 12
- CD 13

Saskatchewan Southeastern Parklands (73)
- CD 5
- CD 9
- CD 10

Central Saskatchewan Parklands (74)
- CD 14
- CD 15
- CD 16
- CD 17

Northern Saskatchewan (75)
- CD 18

Alberta:[4]

Medicine Hat – Alberta Palisser (80)
- CD 1
- CD 4

Lethbridge Prairie Region (81)
- CD 2
- CD 3

Calgary Environs Region (82)
- CD 5
- CD 6
- CD 9

East Central Alberta Prairie (83)
- CD 7
- CD 10

Edmonton Environs (84)
- CD 8
- CD 11

Alberta Parklands (85)
- CD 12
- CD 13
- CD 14

Alberta Peace River (86)
- CD 15

British Columbia:

East Kootenay (90)
- CD 1

West Kootenay (91)
- CD 2

Okanagan (92)
- CD 3

[4] The Alberta P.E.R's. have been redrawn to confirm to the boundaries of Census Divisions established in 1956.

British Columbia – Concluded:

South Central B.C. (93)
CD 6

Vancouver – Lower Fraser (94)
CD 4

Victoria – Vancouver Island (95)
CD 5

Northwestern B.C. (96)
CD 7
CD 9

North Central B.C. (97)
CD 8

Northeastern B.C. (98)
CD 10

Yukon:

The Territory (11)

Northwest Territories:

Mackenzie (12)
District of Mackenzie

Arctic (13)
District of Keewatin
District of Franklin

RECENT DEVELOPMENTS IN THE WORK OF THE DOMINION BUREAU OF STATISTICS[1]

The present note is one of a series having the same title, whose purpose is to keep readers of the Journal in touch with the evolution of statistical programmes in Canada. Two notes were previously published, in November, 1959, and in February, 1961, and readers are referred in them, since in these notes a project once initiated is not mentioned again until a significant stage in its history can be marked off.

The adoption of standard classification systems in a number of important statistical series is one of the major developments of the recent past. Further progress has occurred in the field of labour statistics. In 1961 Census represents the culmination of planning extending over a period of years. The revision of three complete reporting systems is a major advance in the field of judicial statistics.

The 1961 Census

By July, 1961, virtually all the returns in the Census, taken on June 1st, were in and by early October preliminary bulletins on population in some 4,500 urban areas had been released. The purpose of these tabulations is to permit municipalities to compare the preliminary census returns with their own information on population. At the time of writing it was expected that population totals for Canada and the provinces would be released in February, 1962. The release of data on various characteristics of population, housing, and agriculture will follow and continue until sometime in 1963.

As part of the 1961 Census of Canada, income data were collected from a twenty per cent sample of non-farm households. The results of these returns will be released in 1963. It is planned to analyse the incomes of individuals, families, and households, and to provide cross-classifications of incomes by sex, age, occupation, family size, sources of income, and so forth. The more detailed cross-classifications will only be available at the provincial level, but general income information will be released for counties, census divisions, and the larger urban centres.

Since the 1961 Census is one of the most comprehensive in recent years, it seemed opportune to undertake a series of census monographs on various aspects of the Canadian economic and social structure. A Census Monograph Advisory Committee, consisting of persons from universities and government, was appointed in the summer of 1961 and a tentative programme has been mapped out. An announcement of the nature of the proposed project was made in the November, 1961, issue of this Journal.

The 1961 Census of Population is being classified according to the *Occupational Classification Manual Census of Canada, 1961.*[2] While this classification was prepared primarily for the recent Census, it is widely used in other statistical surveys. The new classification revises the classification used in the 1951 Census. While the grouping system is quite different, many of the occupational classes remain unchanged; some classes have been added to take account of new developments (e.g., class 187, computer programmers); others have been dropped (e.g., harness and saddle makers). The changes in the grouping system and the tables were designed to provide categories that are more homogeneous from an occupational point of view and a terminology with an occupational rather than an industrial flavour.

A quality control programme for the monthly Labour Force Sample Survey has been initiated. Research on the Labour Force Sample design has been undertaken with a view to improving it in the light of the data available from the 1961 Census. In addition, a quality analysis programme for the 1961 Census of Canada has been set up.

Economic Statistics

The Interdepartmental Committee on Unemployment Statistics in a report released in October, 1960, recommended the adoption of a definition of unemployment based on data from the Labour Force Survey. This definition includes, in addition to "persons without jobs and seeking work," "persons on temporary lay-off," a series formerly published as a separate category within the group "persons with jobs." The new definitions of employment and unemployment were given effect in the September, 1960, issue of the monthly bulletin *The Labour Force.*[3] Summary historical tables based on the new definitions, and containing revised figures for the period since November, 1945, were published in a supplement to this bulletin, and detailed historical data were made available from time to time during 1961 in a number of special tables. The format and content of *The Labour Force* have been altered and the publication now includes a brief analysis of current data. In addition, special articles and tables are included from time to time.

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[1] This note was published in the *Canadian Journal of Economics and Political Sciences*, February, 1962, and is reprinted here by kind permission of the Editor.

[2] Catalogue no. 6061-501, April, 1961, $4.50. All the publications mentioned in the footnotes are available from the Queen's Printer, Ottawa.

[3] Catalogue no. 71-001, $2.00 per year.

The forementioned committee also recommended that an interdepartmental labour force research advisory committee be established and this recommendation has also been adopted. Among other things, this committee has given attention to the possibilities of exploiting more fully the resources of the Labour Force Survey. On several occasions data on the familial characteristics of the unemployed have been published in *The Labour Force*. Data on the industrial and occupational distribution of the employed and on the rates of unemployment by occupation and industry have been published by quarters for the period since the first quarter of 1960 (see the March and June, 1961, issues of *The Labour Force*).

In order to improve the statistics of the numbers of paid employees, the monthly survey of business establishments is being extended to cover a sample of establishments usually employing less than fifteen workers. Attention is also being given to employment in public or community service (such as in schools and hospitals) and government service; it is in these areas that much of the increase in employment in recent years has taken place. As mentioned in the previous note, one of the important objectives of this project is to provide a comprehensive set of statistics on the numbers of paid employees, with major industry totals for each province.

The second study of labour mobility in Canada was completed late in 1961. The scope of this study, which covers the years 1956-60 inclusive, is wider than that of the first study, as explained in some detail in the previous note. The results are being published in a series of articles in the *Canadian Statistical Review*, rather than in the form of a reference paper.

Several important developments are taking place in the area of industry statistics. The Census of Industry for 1960 moved over to the revised Standard Industrial Classification.[4] In order to link the new and the old series, principal statistics for the three previous years are being retabulated on the new basis. The 1961 Census of Merchandising is also using the new classification.

The 1961 Census of Industry will incorporate the new definition of "establishment." Briefly, this new definition requires that all activities of an establishment be covered in a single report and the report in total is to be classified to the major activity industry. Formerly, the main emphasis was on the collection and compilation of data on manufacturing activity only. To maintain comparability with past practice, the Bureau will continue to collect separate data on manufacturing activity.

The Bureau's adoption of the Standard Industrial Classification and of the new concept of establishment in itself raised problems of historical continuity. This concern with historical statistics was reinforced by the interest expressed by the Canadian Political Science Association in connection with the Association's sponsorship of the historical statistics project. Efforts will be made to compile statistics on the new basis for a number of years.

For some time it has been recognized that there was a need for more data on wholesale and retail trade for intercensal years. As part of this programme, a complete coverage survey of wholesalers proper for the year 1958 was completed and published in 1961 and in addition data relating to agents and brokers for the years 1957-59. Recently a committee was appointed in DBS to consider the further expansion of statistics of wholesaling and retailing for intercensal years.

The second federal-provincial conference of mining statisticians was held in May, 1961. The principal objectives are to secure uniformity in published data and to eliminate duplication in collection and compilation. In forestry the experimental sample surveys conducted in cooperation with provincial departments to determine the cut of forest products from private lands were extended to cover all New Brunswick and selected forest districts in Nova Scotia, Prince Edward Island, and Alberta. The Bureau plans to produce two new publications on the petroleum industry in the course of 1962, one on natural gas processing plants and the other on the supply and disposition of crude petroleum and natural gas liquids.

At the request of the Department of Defence Production, the Bureau is now compiling, in much more geographical and commodity detail than formerly, data on stocks of critical materials.

In response to the needs of the Productivity Council and the widespread interest in the subject, the work on statistics of productivity has been speeded up. Two approaches are being used: the first aims at producing global measures which will indicate trands in productivity in the private nonfarm economy as a whole and in its major divisions, manufacturing, mining, transportation and so on; the second to produce for individual industries and groups of industries detailed measures suitable for the analysis of the nature of changes and variations in productivity. It is expected that the global measures will be available in advance of the more detailed measures. Global measures of man-hours

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[4] See papers presented at the Canadian Political Science Association Conference on Statistics, Sir George Williams University, Montreal, Quebec, June 11-12, 1961, "The Standard Industrial and the Standard Commodity Classification" by Neil L. McKellar and "Forthcoming Changes in the Census of Industry" by Vincent R. Berlinguette, printed in the *Canadian Statistical Review*, May, June, and July, 1961.

by industry, based on special tabulations of Labour Force Survey material, will, of course, be useful for purposes other than the study of productivity.

Early in 1961 a new wholesale price series, *Industry Selling Price Indexes*,[5] was introduced. This new series, which covers the manufacturing division of the Standard Industrial Classification, classifies wholesale prices by industry rather than by commodity and thus facilitates the analysis of prices in relation to other series so classified. The revised Consumer Price Index was published in *The Consumer Price Index for Canada, 1949 = 100 (Revision Based on 1957 Expenditures)*.[6] The revision brings the item content and item weights into line with spending patterns in 1957 and also includes a technical modification in the use of changing seasonal baskets of food in the index budget; in addition, it introduces a series of supplementary indexes for new classifications of commodity groups within the all-item index. A similar revision to the weighting system for city indexes is under way. The Industry Selling Price Indexes and the Revised Consumer Price Index were the subjects of technical notes published in the February and March issues of the *Canadian Statistical Review*.

The results of the 1959 sample survey of urban family expenditure and income (described in the previous note) were nearing publication at the time of writing and are to be released from time to time in the *Daily Bulletin*, with publication expected to be complete early in 1962. This survey is part of the continuing programme of small biennial sample surveys initiated for the purpose of reviewing the expenditure patterns of families to which the Consumer Price Index refers. The 1962 surveys, which will provide monthly data on expenditures on food and semi-annual data on the complete budget, are in the planning stage. The 1962 survey of expenditures on food will be the first since 1957, the programme of biennial surveys having been interrupted in the interval for a variety of reasons, including the 1961 Census.

Turning to price indexes of investment goods, the Price Index of Highway Construction was completed in 1961 and the results released in the *Daily Bulletin of* August 15th. This is an annual index and will be published regularly in future in *Prices and Price Indexes*.[7] It measures the percentage change through time in prices paid in contracts awarded for new construction and reconstruction of highways; it has as a time base fiscal year 1956-57 and the weights of the items included are based on the aggregate value of units of construction and supply items in contracts awarded during the period 1956-57 to 1959-60. Unlike most construction price indexes, the prices included are bid prices rather than prices of units of labour and materials. A reference paper on this series is being prepared. The initial development of prices indexes of machinery and equipment is complete but no decision as to publication has been made.

Quarterly surveys of corporation assets and liabilities were started in 1961. These surveys cover, or will cover, non-financial corporations, trust and mortgage loan companies, instalment finance and small loan companies, investment dealers and stockbrokers, and selected investment companies. There are many problems of coverage and analysis, and it will be some time before it will be possible to publish results on a regular basis. All balance sheet items, in condensed form, are covered, with particular emphasis on security holdings and debt. It is anticipated that, among other things, these surveys will add greatly to the knowledge of financial markets in Canada. In 1962 attention is to be directed to the problems of obtaining quarterly balance sheet data from governments. Problems in other areas of financial statistics are being studied.

In the course of the effort being made to fill in the gaps in existing statistics of government operations, quarterly government income and expenditure data for the years 1950 to 1960 were published for the first time in *National Accounts, Income and Expenditure, Fourth Quarter and Preliminary Annual, 1960*.[8] Quarterly data on government revenue and expenditure now form part of the regularly published national accounts series. These tables facilitate an analysis of the impact of the swings from deficit to surplus on the level of economic activity and on financial markets.

A quarterly sample survey of municipal government revenue and expenditure, which is intended to serve as a current indicator for national accounts purposes, was initiated in 1961 as planned, as was a study of the financial statistics of industrial and commercial enterprises operated by government; the work on federal government enterprises is well advanced and in the course of 1962 provincial government enterprises are to be brought into the programme.

The seasonally adjusted quarterly constant dollar estimates of gross national expenditure and its major components were published for the first time in *National Accounts, Income and Expenditure, First Quarter, 1961*.[9] This publication also includes a note on the nature and uses of the series and a complete post-war record for both the unadjusted and the seasonally adjusted data. The estimates now form part of the regularly published national accounts material.

Development of the work of measuring in base-year dollars gross domestic product by industry of origin has progressed to the point that plans for

[5] Catalogue no. 62-515, Occasional, $1.50
[6] Catalogue no. 62-518, Occasional, 75 cents.
[7] Catalogue no. 62-002, $3.00.
[8] Catalogue no. 13-001, $2.00.
[9] Catalogue no. 13-001, $2.00.

publication are being formulated. It is hoped that a reference paper containing the statistical material, a historical analysis of the findings, and a discussion of concepts, sources, and methods can be released in the latter part of 1962.

The seasonal adjustment programme continues. Seasonally adjusted statistics of manufacturing inventories, orders and shipments at the total level were inaugurated in the *Canadian Statistical Review*,[10] for March, 1961 and seasonally adjusted series with more detailed industrial classifications the following September. The same publication for June, 1961, carried a new seasonal adjustment for exports and imports and further country detail was made available in the September issue.

Work on the preparation of estimates of the gross and net stock of capital consumption allowances by industry has progressed to the point where preliminary estimates have been completed. These estimates are being examined for their conceptual significance and statistical limitations and, following this examination, a decision as to publication of the estimates will be made. A table of the inter-industry flow of goods and services for the year 1961 is in the planning stage.

The rapidly increasing significance of the energy industries in the national economy continues to place considerable emphasis on the provision of adequate energy statistics. The Bureau, as a major collector and publisher of energy statistics, has expanded its operations to meet these needs, especially in providing more complete data on the transportation and distribution of oil and gas. The monthly report on sales of natural and manufactured gas has been revised and expanded, and new monthly and annual reports on gas pipeline transport and an annual report on gas distribution have been introduced. Because of the intense interest in the competitive position of various sources of energy, additional refinements to these and other reports have been designed to provide more detailed data on both the supply of, and demand for, energy in Canada. In order to minimize duplication of effort and to provide suitable means to cope with problems of consistency, integration, and interpretation of data, the Bureau relies heavily on co-operative arrangements with provincial authorities, industry associations, and other federal departments and agencies. Liaison at the federal level has recently been put on a more formal basis by the establishment of an Interdepartmental Advisory Committee on Energy Statistics under the joint sponsorship of the Bureau and the National Energy Board.

Renewed interest in the field of regional economic statistics has led to the forming of a committee within DBS charged with the responsibility for examining the basis of the various geographical classification systems used in the Bureau as the framework for the presentation of statistical data. Such systems include, for example, the agricultural crop districts, the census metropolitan areas, and the counties or census divisions. The committee has examined the possibility of finding some level of aggregation, smaller than the province as a whole, at which all these different classification schemes can come together, so that data derived from surveys of particular aspects of the economy (surveys of manufacturing, or retail sales, or labour force, to name a few) can be published for a common set of smaller-than-province areas. After examining the background of all the areal classification systems now in use the committee has come to the conclusion that the system which seems to hold out the best prospect of providing a common meeting-point for the areas used in all other systems is the "provincial economic region" system, originally developed by the Department of Defence Production and reported on in detail in the August, 1961, issue of the *Canadian Statistical Review*. The committee is currently examining the feasibility of making such adjustments to the boundaries of the areas used in other geographical classification systems as will enable each of the areal units used in these other systems to be fitted intact within the boundaries of one "provincial economic region."

Turning to transportation statistics, the motor vehicle report has been expanded to include for the first time information on provincial motor vehicle fees, licences, and regulations. The results of the Motor Transport Traffic Survey are now produced on a quarterly basis and contain additional details on commodities. The proposed sample survey of passenger automobile travel has again been postponed and present plans call for inauguration of the survey in 1963. The 1960 publications on civil aviation are expected to be considerably expanded in scope. Statistics on ton miles of cargo carried in coastal shipping are to become available in 1962, rather than in 1961 as originally intended.

As agriculture becomes more specialized, a general purpose sample of field crops has to be supplemented by special samples for estimating specific crops. The possibility of developing a sample of potato production is being explored; information from the 1961 Census on the distribution of growers by size will facilitate this development.

Annual unit conversion factors (which reduce to a common denominator the feed grain requirements of all livestock and poultry on farms) were reviewed during the past year; periodic review is necessary if the factors are to take account of changes in feeding practices.

Plans have been made to obtain an addressograph list from the 1961 Census for use in direct mailing in the semi-annual surveys (crop acreage and livestock numbers, cash and net farm income, volume and value of farm production, farm prices

[10] Catalogue no. 11-003, $5.00.

of agricultural products, value of farm capital and wages paid to farm help). This is part of a process of moving away from the time-honoured method of distributing schedules through rural schools. Past experience shows that the shift to direct mailing has made for a substantial improvement in the quality of information supplied.

Judicial Statistics

A new uniform crime reporting system has been prepared in co-operation with users, reporting departments and, in particular, with a committee of the Canadian Association of Chiefs of Police. The new system, which is expected to be implemented in January, 1962, is for the use of police departments reporting statistical data on crimes, traffic enforcement, and police administration to the DBS for publication in each of these areas.

A Dominion-Provincial Conference on Training School Statistics was held at the Bureau on October 30 and 31, 1961. Resolutions coming out of this conference will result in more meaningful data being made available concerning the populations of juvenile institutions. Similar developmental work has been undertaken with the Penitentiaries Branch of the federal Department of Justice concerning a revision of the statistical system used to report information to DBS on the populations of penitentiaries.