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National Accounts and Environment Division

Division des comptes nationaux et de l'environnement



## **“Reading” Government Statistics: A User’s Guide**

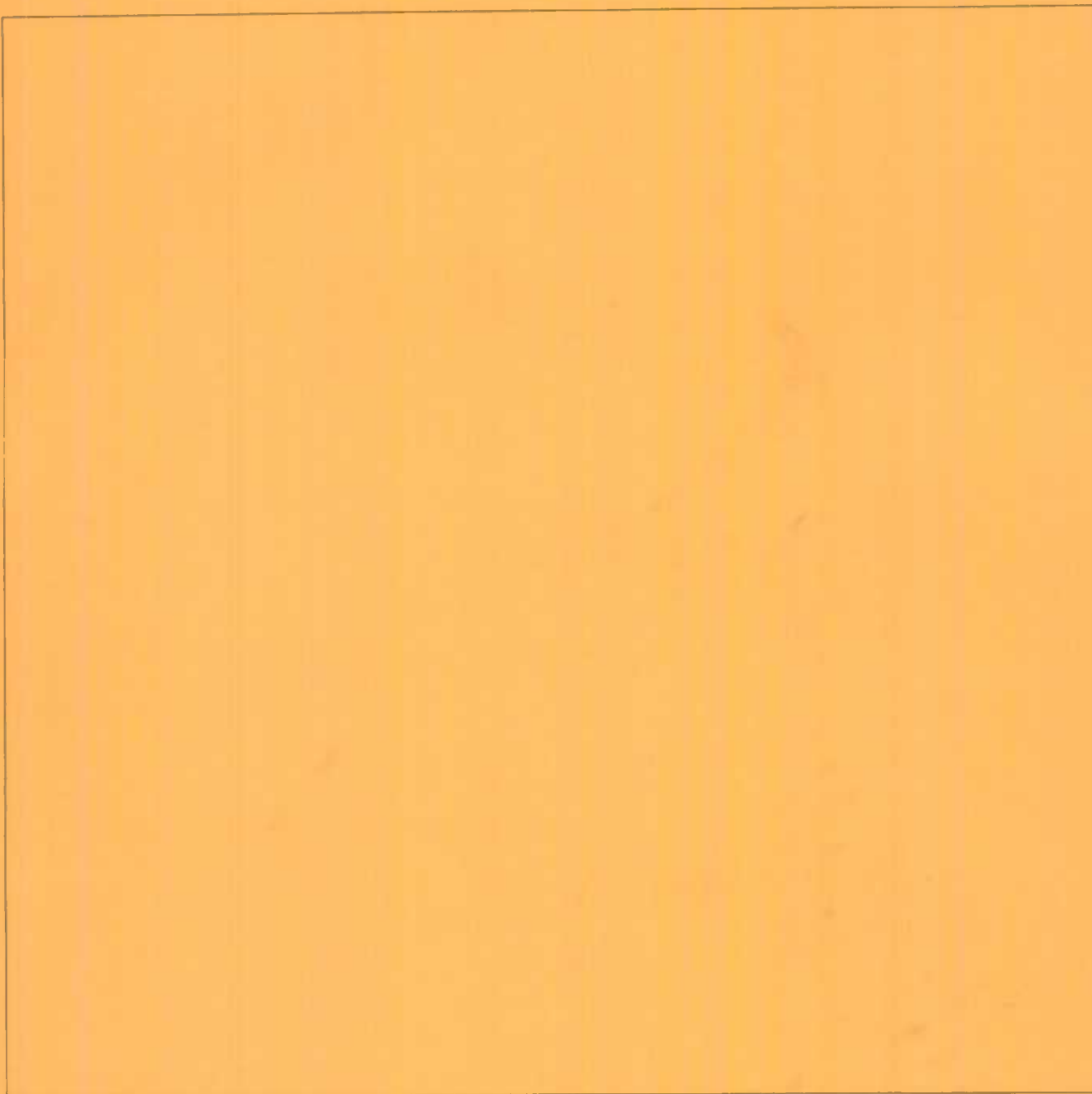
## **Comment “lire” les statistiques produites par le gouvernement: un guide pratique**

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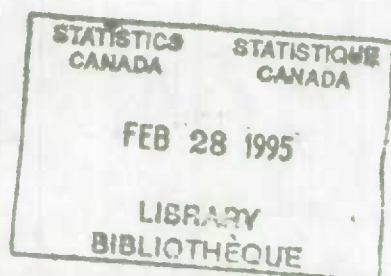
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**“Reading” Government  
Statistics: A User’s Guide**

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This article was written by Philip Smith of the National Accounts and Environment Division. For further information on the materials covered in this paper, please contact him at 613 951-9158.

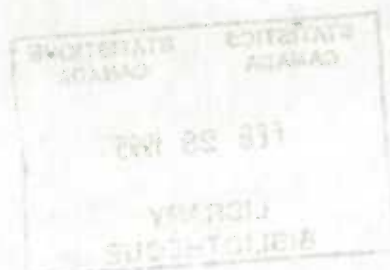
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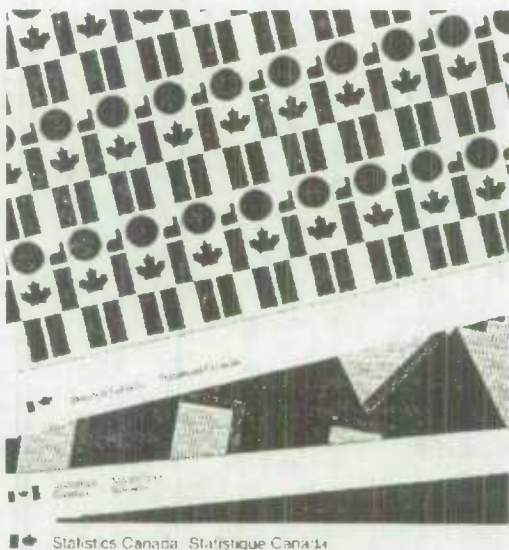
Juillet 1993  
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by Philip Smith

# “READING” GOVERNMENT STATISTICS: A USER’S GUIDE

*Le secteur privé au Canada devrait utiliser davantage les statistiques fournies par le gouvernement et payées par les contribuables. Pourtant, il faut savoir quand et comment se servir de ces données qui sont parfois compliquées et toujours très variées.*



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Good economic information is vital for business. Whether it be to better anticipate and react to shifts in demand, to control costs, to enhance productivity or to cope with financial market fluctuations, business needs reliable data. Some of these requirements are met directly when companies monitor their own sales, cash flow, expenses and the like. But to see the big picture and view their own performance in the context of the marketplace as a whole, firms must have access to reliable external sources of information.

Statistics Canada's job is to collect this kind of data and make it available to Canadians, who are paying about \$280 million in federal taxes this year, roughly \$28 per household, to get it. Yet the wealth of information regularly assembled by Statistics Canada is seldom used to its full potential. I seek in this article to help change that situation, by meeting three broad objectives. The first is simply to increase business awareness about the great variety of information products Statistics Canada has to offer. The second is to demonstrate how these and other economic statistics can be invaluable to Canadian businesses, both small and large. Finally, I will outline some points which need to be understood and kept in mind when using economic statistics in a business context.

Broadly speaking, the information collected by Statistics Canada comes from four sources: business surveys, household surveys, administrative data and the national accounts. Business surveys refer to questionnaires submitted to commercial entities of one kind or another. Household surveys pertain to data collected from families and non-family households. Administrative data sources consist of tax records, customs data, government accounting statements and so on. Finally, national accounts provide integrated statistical estimates, compiled within a consistent conceptual framework using information from all of the other survey and administrative data sources. The Table on page 44 provides an overview of the principal information products currently available from Statistics Canada.

There are two types of surveys: censuses and sample surveys. Censuses are comprehensive surveys which are intended to directly cover all entities within an area of concern. Two good examples are the quinquennial censuses of population and agriculture. Censuses yield enormous amounts of





detailed, reliable data, but are quite expensive. For most purposes it is more cost-effective to use sample surveys instead. Using a carefully-designed sample covering a small percentage of the target population, and scaling the outcome to represent the entire population, results can be obtained which are very close to those which would be garnered from a census, but at greatly reduced expense. There are trade-offs here between accuracy and detail on the one hand, and cost and respondent burden on the other. The third source, administrative data, consists of information collected for taxation, regulation or other operational purposes by governments or other entities. Statistics derived from administrative sources sometimes combine the best features of censuses and sample surveys, being both comprehensive and relatively inexpensive. The monthly estimates of merchandise exports and imports, calculated from data on Customs forms, are one excellent example. Another is the national accounts time series for total wages and salaries, which is derived from a tabulation of "T4" forms submitted annually by all employers to Revenue Canada.

Large corporations, and the business consultants and associations which serve them, need macroeconomic data from the national accounts, together with the panoply of monthly economic indicators, to understand broad trends in the economies of Canada and its trading partners. Such data can be used in connection with computerized mathematical models to monitor the evolution of the business cycle, forecast future trends and assess the impact of shocks to the economic system. Billions of dollars in profits depend upon corporate decision-makers' knowledge of current and prospective inflationary developments, financial market fluctuations and growth trends, which are revealed in macroeconomic statistics. Indeed, multinational corporations require enormous amounts of comparable data from countries all over the world to support their decision-making.

#### Geo-coded demographic data

Smaller companies, in comparison, are typically more concerned with localized markets than with national trends. For them, regional, industrial and commodity data pertaining to specific products and markets are more relevant. Retailers, for example, might use geo-coded demographic data from the census to help judge where to open another store. They might also use provincial retail

trade statistics and CPI data as a basis of comparison in assessing their own sales performance and pricing strategy. Companies can draw upon regional and industrial average hourly earnings estimates from the survey of employment, payrolls and hours to evaluate what their wage rates should be in order to remain competitive in the labour market. It is not uncommon for unionized firms to negotiate compensation agreements which link wage rates directly to the CPI. Other long-term business contracts with suppliers or customers might also contain price escalator clauses of this kind, using any one of Statistics Canada's wide range of price or earnings indexes. Importers and exporters can watch the detailed monthly trade figures to gauge their own performance and get a jump on emerging opportunities at home and abroad, while portfolio managers can monitor a wide range of manufacturing shipments, inventories and orders data, price indexes, construction indicators and other statistics to help them buy and sell at the right time.

**Raw data need to be recast in some fashion before their real significance can be discerned.**

Statistical information cannot speak for itself; it must be interpreted by human beings. Benjamin Disraeli made the point with some hyperbole in the 19th century with his well-known assertion: "There are three kinds of lies: lies, damned lies and statistics." When misinterpreted or misrepresented, whether innocently or wilfully, numerical data can easily lend credibility to erroneous conclusions. To make good use of statistical information, one should be aware of the different types of data available. The strengths and weaknesses of alternative sources should be known and the various ways of analyzing and interpreting data should be understood.

There are a great many sources of statistical information. Statistics Canada is undoubtedly the largest and most important for Canadians, but there are many others including the Bank of Canada, Revenue





Canada, Labour Canada, other federal departments, provincial and local governments, stock exchanges, trade associations, research institutions and international organizations. To find out about what these and other sources have to offer, we need access to *meta data*, which is to say "data about data." Statistics Canada's annual Catalogue (11-204), its various guidebooks such as the Guide to the Income and Expenditure Accounts (13-603), the Guide to the Labour Force Survey (71-528) and the Consumer Price Index Reference Paper (62-553), and the CANSIM series directory (12-569) all serve this purpose.

## Indexes, while extremely useful, are inherently arbitrary.

Statistics Canada's products are accessible free of charge in the media and in over 200 major libraries across Canada. One can also find out about statistical information by consulting the experts in Statistics Canada's ten regional offices.

The main types of data each have their relative strengths and weaknesses. Broadly speaking, these relate to:

- stability and homogeneity of the statistical universe;
- sample size and levels of aggregation;
- frequency and timeliness; and
- statistical revisions.

Household surveys tend to fare best under the first heading. The universe in this case – consisting of roughly 10 million Canadian households – is fairly uniform and does not change radically from one year to the next. It is not difficult to draw conclusions about this universe by utilizing small, random, stratified samples and scaling up the results appropriately. Thus, the monthly estimates of employment and unemployment which come from the Labour Force Survey are generally considered to be of very high quality despite the fact they are derived from a sample which includes just 1 of every 160 households.

Business surveys, in comparison, are a much more difficult challenge. Their universe – consisting of roughly 900,000 small, medium and large business establishments –

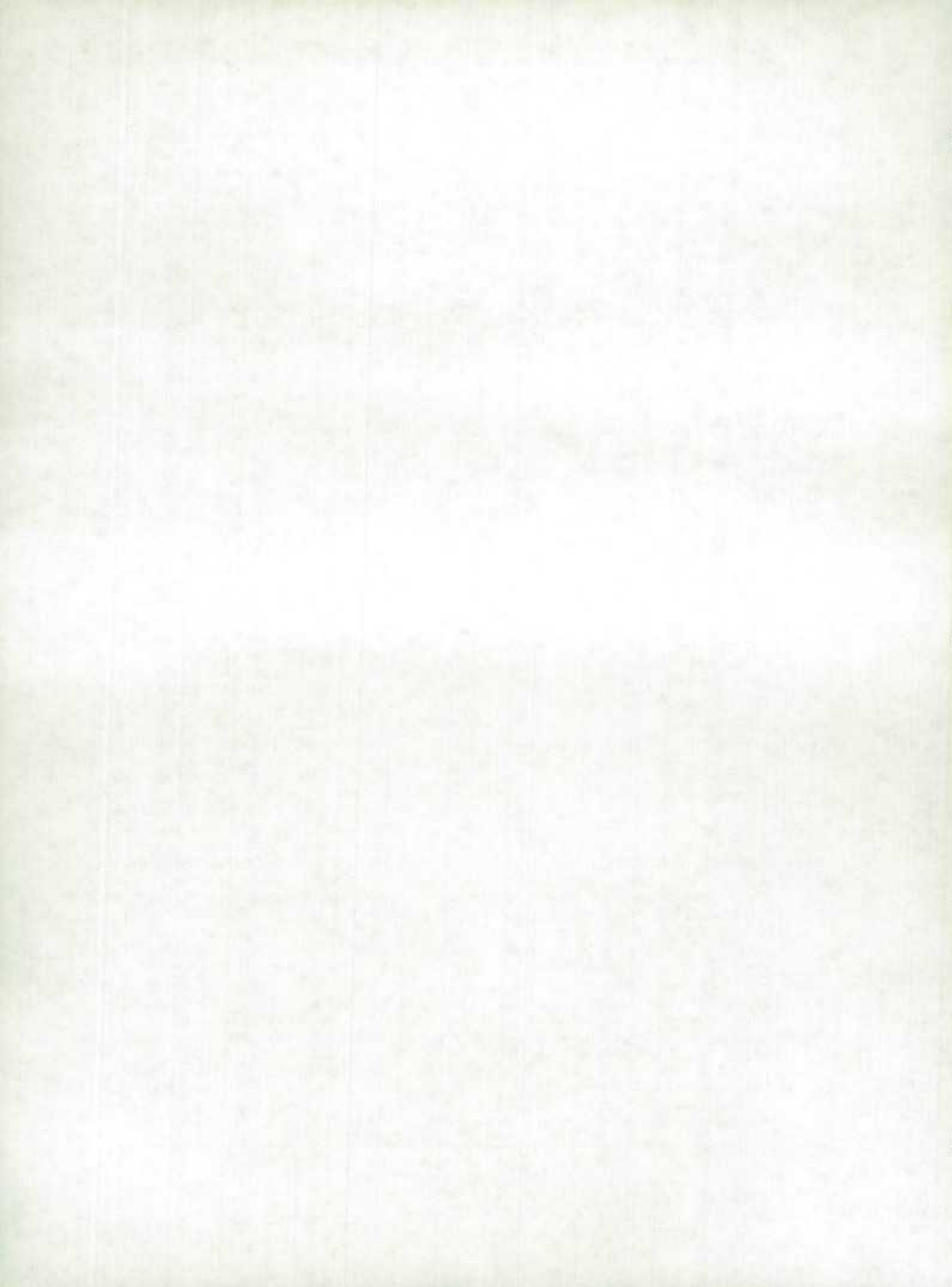
is more variable, sometimes expanding or contracting rather sharply in response to cyclical forces as new firms are created or old ones close down operations. It is also more heterogeneous: some establishments are huge, others tiny, and firms of particular kinds often tend to be concentrated in particular locations rather than distributed more evenly throughout the country. Accordingly, business surveys are a lot more difficult to design and carry out effectively. Those covering well-established and highly concentrated industries, such as steel or automobile manufacturing, are generally quite reliable but those dealing with new, dynamic, "high-tech" industries, such as computer software, or with industries where the average life span of firms is relatively short, such as the restaurant business, are more problematic for the survey-taker.

### Producing reliable statistics

Sample size is another important dimension of data quality, perhaps even more so these days as budgetary cutbacks have led to smaller samples in many areas. The number of units in the sample is especially critical when information is needed at lower levels of aggregation. For example, it is one thing to derive good estimates for total retail sales at the national level but quite another to produce reliable estimates for several different kinds of stores separately in each province and territory. If one is concerned with aggregates the sample size is not much of an issue, but if one needs detailed breakdowns it is crucial.

The frequency and timeliness of statistical information are additional elements which must be considered. As the Table that follows this article shows, some statistics are published monthly, others quarterly, still others annually and some even less frequently. Once again, there are trade-offs involving costs, respondent burden and user requirements. Furthermore, the matter of timeliness – how quickly the information becomes available after the reference period ends – is critical as well, no matter what the data frequency may be. The Table also provides a rough indication of the average lag, in calendar days, between the end of the reference period and the point at which the data are released by Statistics Canada.

And finally, there is the question of data revisions. Statisticians often release preliminary estimates with the proviso that they are subject to revision at some point in the future.





The idea is to strike a balance between accuracy and timeliness, sacrificing some of the former, temporarily, in favour of the latter. Not all statistical information is subject to revisions. For example, the consumer price index is not revised. But most statistics are, due to late-arriving survey responses or the use of delayed benchmark information from alternative more reliable sources.

These matters of data quality and reliability aside, how should statistical information be "read"?

Any analysis should begin with a clear recognition of what is, and what is not being measured. For example, the gross domestic product measures market-based economic activity within Canada's borders. It excludes both non-market activity, such as household or volunteer work, and the income earned by Canadian capital employed in other countries. For these reasons, among others, the GDP is not necessarily a good yardstick for assessing the general welfare of the population. Similarly, retail sales measure the revenues of retail stores but do not include vending machine business, mail-order sales or direct door-to-door merchandising. So if you need sales data pertaining to specific commodities, you should first consider how the market for these commodities is being served. The unemployment rate does not apply to all of Canada, since the sample excludes the Northwest Territories, residents of Indian reserves and inmates of penal and health care institutions. As these examples demonstrate, it is important to understand the associated concepts and definitions before using statistical information.

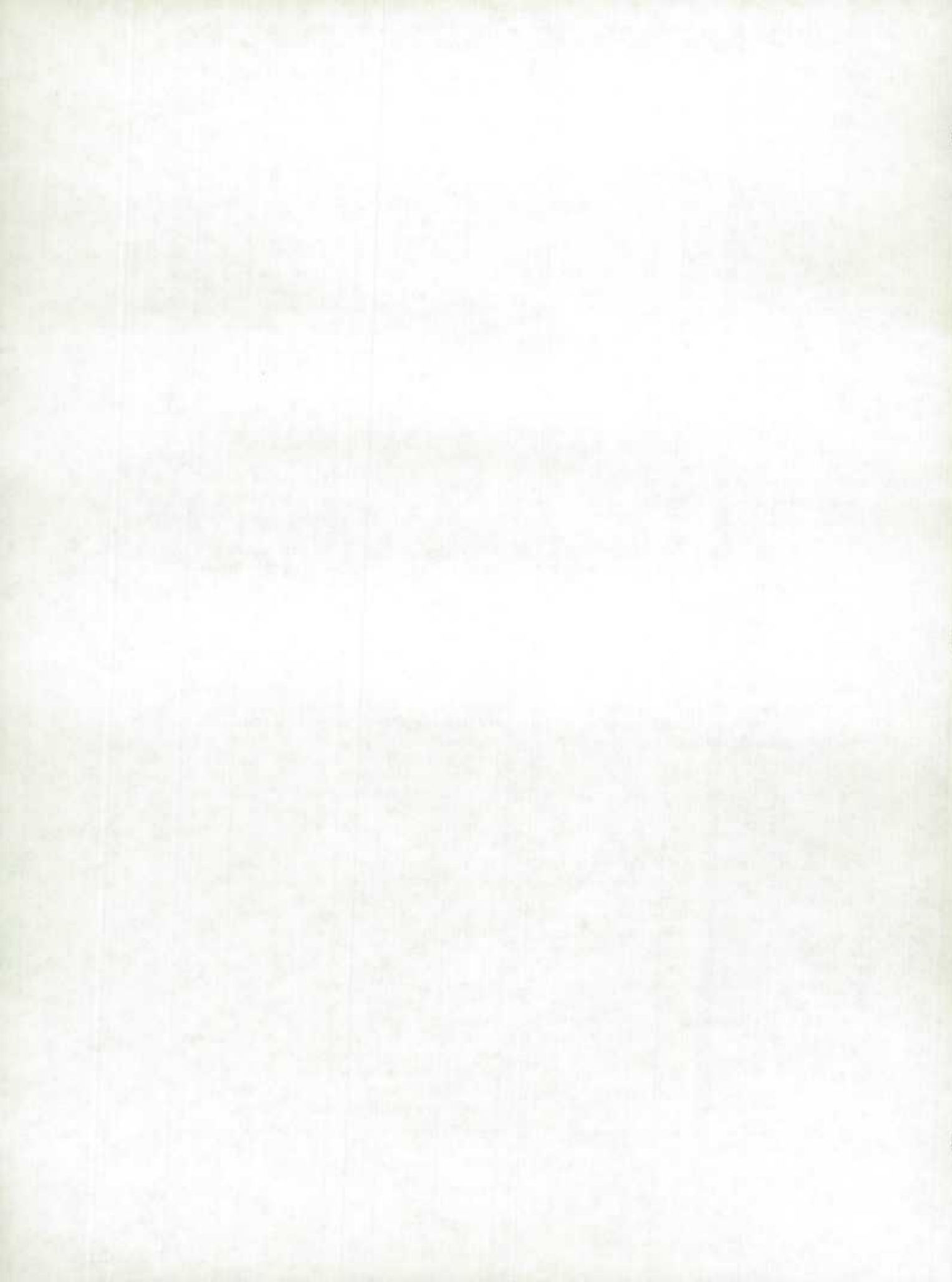
**T**he units of measure must also be carefully considered. Most economic data are computed in value terms (dollars), but some are measured in other discrete units, for example: thousands of employees, average weekly hours worked, cubic metres of refined petroleum, metric tonnes of wheat exported, hectares of land tilled, millions of cigarettes sold or thousands of cars held in inventory at retail level. Physical measures of these kinds can be affected by problems of heterogeneity and one should be careful in interpreting them. One employee is not identical to another and the same can be said for cars, grades of wheat and hectares of land. Still, for many purposes such quantities are sufficiently uniform to be useful for analysis.

The "units" problem becomes more serious when the items being aggregated are severely heterogeneous. It is one thing to say that a Buick is not the same as a Honda, and quite another to say that a video cassette recorder differs from a banana. Of course, dollar values (sales revenue, for example) pertaining to many diverse commodities can be easily aggregated, but such value aggregates fail to distinguish between changes in volume and changes in price. When commodities are extremely heterogeneous and value data will not suffice, index numbers are required.

**It is one thing to say that a Buick is not the same as a Honda, quite another that a VCR differs from a banana.**

Broadly speaking, index numbers compare groups of items, such as the market prices or the quantities purchased of a diverse selection of commodities, at different points in time or in multiple locations. Price indexes seem to be more widely recognized and better understood, but quantity indexes are very important as well. A price index typically seeks to measure the average movement of a group of prices through time, where the average is weighted to properly reflect the relative importance of each commodity in the total. The amounts of the commodities purchased or sold in some fixed base period are usually chosen as the weights. A quantity index measures the average movement of a group of quantities purchased, sold or consumed through time, where again the average is weighted to reflect the relative importance of each commodity in the total. In this instance the market prices of the commodities in some fixed base period are usually chosen as the weights. The consumer price index is undoubtedly the best known example of a price index, while "real GDP," the most comprehensive indicator of general business conditions, is a quantity index.

Indexes, while extremely useful, are inherently arbitrary. There are many alternative ways to construct index numbers, each yielding different results. The base period for index numbers is arbitrary and will affect the results. As a practical matter, fortunately, the



Statistics Canada Sources			
	Release lag (days)	Catalogue number	Publication frequency
<b>Business surveys</b>			
Employment, payroll and hours	60	72-002	monthly
Retail trade	60	63-006	monthly
Wholesale trade	66	63-008	monthly
Manufacturing inventories, shipments and orders	60	31-001	monthly
Restaurants, caterers and taverns	66	63-011	monthly
Consumer prices	20	62-001	monthly
Industry prices	30	62-011	monthly
Construction prices	46	62-007	quarterly
Survey of trustees pension funds	130	74-001	quarterly
Financial statistics for enterprises	66	61-008	quarterly
Public and private investment	120	61-206	annual
International trade in services	60	67-203	annual
Intercompany ownership	76	61-517	biennial
Other surveys of particular industries	various	various	various
<b>Household surveys</b>			
Labour force survey	10	71-001	monthly
Homeowner repair and renovation expenditure	300	62-201	annual
Household facilities and equipment	300	64-202	annual
Consumer finance and income distribution	300	13-207	annual
Census of population	various	various	quinquennial
Census of agriculture	various	various	quinquennial
General social survey	various	various	occasional
Family expenditure	400	62-666	occasional
Households and the environment	180	11-526	occasional
<b>Administrative data</b>			
Merchandise exports and imports	66	66-001	monthly
Building permits	60	64-001	monthly
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Travel between Canada and other countries	60	66-001	quarterly
Labour income	70	72-006	quarterly
Health statistics	130	62-003	quarterly
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International investment position	120	67-202	annual
National balance sheet	120	13-214	annual

effect of choosing different index number formulas or base years is usually not all that large. But it can be, particularly in dynamic areas such as that of high-technology products, or when major systemic changes occur due to such things as energy price shocks or the advent of the federal Goods and Services Tax. Index numbers are an effective solution to an intrinsically difficult problem, but one must be wary in using them.

Another key aspect of statistical analysis is that of analytical transformations and graphical presentation. Raw data are hard to interpret directly. Almost always, they need to be recast in some fashion before their real significance can be discerned. Often, quite simple transformations such as percentage changes or proportions bring out important insights which would otherwise remain hidden. Of course used inappropriately, such transformations can be quite misleading.

The process of seasonal adjustment is a particularly important, though widely misunderstood analytical technique, used almost universally with sub-annual time series data. Most time series contain strong seasonal regularities which are of little intrinsic interest in themselves, and which tend to camouflage the more valuable "trend" and "irregular" information. Via seasonal adjustment, we remove these regularities while preserving, one hopes, remaining trends and irregularities. The process involves the use of moving-average techniques to analyze and filter out the seasonal patterns. As with index numbers, there are several alternative methods of seasonal adjustment which yield slightly different outcomes. Seasonal adjustment also adds to the problem of revisions, since its results for any given period are likely to change when more raw data accumulate and the adjustments are recalculated. Nevertheless, seasonal adjustment is an extremely useful transformation and Statistics Canada applies it to most of its sub-annual time series data.

Business people have much to gain by taking advantage of the statistical system. They pay for it with their tax dollars and they should make use of it.

**Philip Smith** is director of the National Accounts and Environment Division at Statistics Canada. Further information on government statistics is available from the Statistical Reference Centre, Statistics Canada, (613) 951-8116 in Ottawa or from any one of the Statistics Canada Regional Offices.







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