

Official Statistics – Pressures and Challenges

ISI President's Invited lecture, 2003

Introduction

I am deeply honoured to have been asked to be one of the speakers at this special President's Invited Papers Session. I well remember when, as President of ISI, fourteen years ago I had the privilege of inviting other speakers. While both the inviting and being invited are privileges, I must say that inviting involves much less work...

I have spoken and written on several occasions about the characteristics and make-up of statistical offices which are successful¹. Building such offices is a structural challenge which is intrinsically timeless: ensuring quality of output, relevance, non-political objectivity, and respect for confidentiality. On this occasion I would like to consider those challenges which present themselves as a result of the specific circumstances which prevail at the beginning of the 21st century. As in earlier papers, I will attempt to discuss not just the challenges but also some coping strategies. Given that the issues discussed today are of more recent vintage and hence less completely explored, I will not always be able to propose fully developed proposals for dealing with them.

The challenges I selected for attention are ones which, I believe, have broad impacts – although, of course, any such selection reflects a personal perspective. I will first consider two fundamental sources of pressure on statistical offices: the general erosion of social trust and confidence; and the somewhat related issue of privacy. Next, I will indicate

¹ I. P. Fellegi: Characteristics of an Effective Statistical System (Morris Hansen Lecture), *International Statistical Review*, v. 64, pp. 165-199; I. P. Fellegi and J. Ryten: A Peer Review of the Swiss Statistical System, Neuchatel 2000; and I. P. Fellegi and J. Ryten: A Peer Review of the Hungarian Statistical System, Budapest, 2001.

some specific areas of subject matter which are under pressure for several possible reasons: either because they are seriously underdeveloped relative to need (social and environmental statistics), or because technological developments have dramatically altered the traditional environment in the relevant frameworks evolved (the impacts of modern information and globalisation on economic statistics). I will conclude with the consideration of some challenges for international statistics.

Two strategic issues

Trust

I will start with a strategic challenge for both well developed statistical systems and less developed ones: public trust. Trust has always been a defining characteristic of effective statistical systems. As I have said on other occasions², few users of official statistics are in a position to replicate large scale national data collections. If they cannot “test” the data, the only possible source of confidence in the data is faith in the provider: they either trust the statistical office, in which case they might be ready to use the statistics disseminated by the office, or else they have no other option but to dismiss the information which, as a consequence, becomes worthless to them. The word trust in this case encompasses not just faith in the professional competence of the statistical office, (i.e. that well designed surveys and good quality assurance results in acceptably low rates of error), but faith in the integrity of the office to safeguard the statistical system from political influence which could result in a variety of subtle and pernicious errors ranging from biased question wording to misleading presentation or even suppression of results.

Trust goes to the heart of the usefulness of a statistical system as a key component of democratic government – not just the trust of knowledgeable users, but of the public at large. As the UK government’s White Paper on Official Statistics put it (quoted by Bill McLennan³):

² *I. P. Fellegi*: Characteristics of an Effective Statistical System (Morris Hansen Lecture), International Statistical Review, v. 64, pp. 165-199.

³ *Bill McLennan*: You can count on us – with confidence, Journal of the Royal Statistical Society, Series A, v. 158, pp. 467-489.

“...open access to official statistics provides the citizen with more than a picture of society. It offers a window on the work and performance of government itself, showing the scale of government activity in every area of public policy and allowing the impact of government policies and actions to be assessed.”⁴

And, in discussing the White Paper, the Chancellor of the Exchequer of the day, Kenneth Clarke added:

“I am well aware how impossible it is to have a sensible public debate in the face of unfounded suspicions of statistical integrity”

There are several trust-enhancing factors over which the statistical office can exercise control. Clearly, there can be no trust if the statistics that are disseminated are methodologically unsound; if agency staff do not have a high level of professionalism; if we are not vigorously forthcoming in informing the public about the limitations of the information we provide; if the office does not rigorously adhere to non-political objectivity; and if it does not scrupulously protect the confidentiality of identifiable statistical returns. However, even in the presence of a high level of performance in these areas, there are societal factors over which national statistical offices have little or no control. The difficulty of establishing our credibility depends on the extent to which the society in which we operate is predisposed to be trusting rather than cynical and suspicious. The evolution and character of social trust is, therefore, an external factor which we ignore at our risk.

Unfortunately, trust appears to have been in a long cycle of decline ever since the immediate post-war years. Indeed, the World Values Survey⁶ clearly indicates an erosion of trust in government, among individuals, and between groups. During the early enthusiasm of the post-war years governments were thought to be capable of

⁴ Op. cit.

⁶ See, for example the book based on the World Values Survey: **Trust, well-being and democracy** by *Ronald Inglehart* in Mark Warren (ed.), **Democracy and Trust**, New York and Cambridge: Cambridge Univ. Press, 1999. pp. 88-120

accomplishing practically anything. Indeed, they were trusted to accomplish almost miraculous deeds, like abolishing poverty or eliminating the business cycle. But this sense of trust was gradually replaced by the Thatcher-Reagan orthodoxy that whatever government can do, business can do better. Watergate, the Clinton impeachment proceedings and other scandals solidified misgivings about the integrity of government leaders. And globalisation further eroded the notion that national governments can influence the evolution of economic developments, or even social ones. Not that business leaders are particularly trusted, particularly not in light of recent wrongdoings in the financial and accounting domains. Or church leaders, for that matter, whose image has certainly been soiled by allegations about sexual abuses. And God only knows what 9/11 has done to trust among citizens. The declining trust in government encompasses not just the integrity or motivation of politicians, but also the competence with which government programs are carried out⁷ – and highly publicised cost overruns of government programs exacerbate these perceptions.

But there is a flip side of the issue of declining social trust, as far as national statistical offices are concerned: the same phenomenon that poses a huge challenge also holds out for us major opportunities. These are rooted in the fact that the less trust there is in society (whether this is based on the assumption of doubtful integrity or suspected incompetence), the more there is a need for an objective and visibly unbiased mechanism to resolve real or potential conflicts in the design of government programs, and to provide information on the basis of which their performance can be assessed once they are implemented. Official statistics, if their provider is truly trusted, can often serve in such a capacity.

Indeed, faced with a challenge of credibility and trust, many governments have reacted by trying to increase the transparency of their programs and of their policy processes. Transparency, if it is to be anything other than a slogan, must involve setting out the reasoning behind policy decisions, as well as the results that are expected from them. If taken seriously, this type of evidence based decision-making not only requires more

⁷ I am grateful to my colleague Robert Smith for pointing out this distinction in a private communication.

statistics, but also statistics of greater *complexity* and much higher *reliability*. How we respond to this challenge may well determine our long-term relevance.

Of course, official statistics have been involved in government decision making for many decades – but mostly indirectly: They have, for over one hundred years, been used to monitor key indicators about the state of the economy and of selected socio-economic phenomena. And the evaluation of these indicators, together with a wide variety of other inputs, was indirectly involved in guiding decisions.

In several countries a more direct use of statistics gained prominence in the years following the Second World War. It involved the determination of formula-driven benefits where most of the inputs for the formulae came from official statistics. In Canada the applications ranged over a wide domain: indexing pensions or labour contracts to the rate of increase of the Consumer Price Index; calculating the amounts involved in federal-provincial revenue sharing; establishing unemployment insurance benefits; and so on. These uses are still continuing.

However, in Canada and some other countries an even closer involvement of statistics in government policy has evolved during the last 10-15 years. These newer uses of official statistics differ from earlier ones in at least two major ways:

- First, whereas traditionally formula uses typically involved pre-existing statistics, in more recent years we have specifically been asked to undertake very complex (and often expensive) statistical developments, designed specifically to provide inputs for the formula-based requirements of governments.
- And second, in some important instances we were asked to develop a statistical information system not just to support the implementation of a decision that has already been taken, e.g. to develop statistics for input into some formula that has already been developed, but also to provide the relevant insights needed for the formulation of policies.

Let me illustrate each of these situations by an example.

The first example is analogous the usual formula-based use of statistics, with the one great difference that the statistics needed were not pre-existing. We were asked to develop them for a particular application. Canada, like other countries, imposes consumption taxes. Unlike some other countries, such taxes are separately imposed by the federal and provincial levels of government, each with somewhat different rules. Several years ago the federal government decided to try to harmonise these taxes, i.e. to agree **with** provinces to collect the revenue once and then divide it according to a formula which would mimic the results of the separate collections. Since the federal consumption tax, when it was introduced, was one of the most controversial and indeed hated taxes ever imposed in Canada, and since even the harmonisation initiative itself was hotly contested, some backroom deal on how to share the revenue simply would not have been acceptable either to the public or to many of the provincial governments involved. The agreement eventually involved substantial extra funding for Statistics Canada to increase the scope and frequency of its economic surveys so as to be able to provide the needed statistics. This turned out to involve the *annual* production of *provincial* level input-output tables⁸. While this expansion had far-reaching benefits for our entire system of economic statistics, the motivation for the funding was primarily to support the harmonisation of consumption taxes. Incidentally, and very pertinently as far as trust is concerned, Statistics Canada took a very unequivocal position. Being conscious of the fact that the data would drive the allocation of huge sums of money, we knew that they would be subjected to unprecedented scrutiny by all concerned. As a consequence we made it clear that we will only agree to the role that was intended for us if we received adequate funding to undertake the massive restructuring of our economic statistics that this project required. Clearly, to sustain such a position required a strong Chief Statistician position.

A second example comes from the area of health. In Canada health is a provincial responsibility. It is, by far, the largest single source of government expenditure. Federal

⁸ To the best of my knowledge, few if any countries produce regular sub-national input-output tables. Indeed, even at the national level only a few countries produce them annually.

government leverage in this field comes through negotiated initiatives involving the offer of additional funding. A few years ago, in response to a major funding problem affecting the health system, the two levels of government agreed that the federal government will increase its funding for health by some \$23 billion. The major condition of the federal government was that the two levels of government will annually report to Canadians about health *outcomes*. In fact, the agreement specified the indicators that were to be used for the purpose. And these indicators were so designed as to support learning from experience: what approaches (and perhaps even what medical procedures) appeared to work well, and what were the underlying reasons when they did. Statistics Canada was funded to carry out a very large annual health survey, capable of breaking down results for each of some 130 health regions. The survey probes self-reported health, life style and other health determinants, chronic conditions, and interactions with the formal health system. It also seeks informed consent from Canadians to link the survey information to administrative data containing information on both hospital stays and office visits to physicians, the conditions involved and the treatment received. Through linkage of the survey and administrative data one can probe what lifestyles appear to be associated with what health conditions, what treatments appear to have worked in the presence of particular background and lifestyle factors, and so on.

The health information initiative was significant because it occurred in the midst of a high level of public concern about health issues, heated debates among political leaders, and substantial conflict between the two levels of governments. In the face of such an environment, the federal government felt that the most important concession that it wanted to secure from provincial leaders was a public accounting – not about how the federal funds were spent but about what impact they had. Such public accounting serves the need for transparency of government actions; it also seeks to secure broad public support for measures to steer the health system towards improvements – by openly assessing what works and what does not.

These applications illustrate my point: there is a huge opportunity for official statistics to become the trusted agent of both the public and the government. Depending on the

application, we can provide invaluable help to the evolution of government programs, to their subsequent improvement, and indeed to their social acceptability. Achieving such ambitious goals will not only enhance our stature but, more importantly, will enable us to play a central role in the evolution of evidence based decision-making and to the enhancement of trust in our respective countries. Conversely, if we fail, we will place one of the most promising innovations in public policy development into jeopardy since it is hard to conceive what other agent can be such a broadly *trusted* information broker.

Since our usefulness depends on gaining and holding the trust of the public, our success in this task becomes our single overriding challenge. The difficulty of succeeding is not negligible, given the general distrust of governments and of their agencies – of which we are, inevitably, one. So how can we strive to succeed in this domain? To reiterate, it is not enough to produce high quality statistics; it is not enough to be honest; it is not enough to be non-political. We need to convince our increasingly cynical publics about these characteristics. Of course, we will never succeed if the basic attributes are missing: non-political objectivity, quality, vigorous confidentiality protection, and full disclosure of the methodologies used and of the limitations of the resulting data. And of course we also need a media strategy which combines visible openness to them with a vigorous defence of the agency in cases of unfair criticism or erroneous reporting.

However, these traditional approaches, while necessary, are not sufficient. It is equally important to differentiate our public image from that of “the government”. One of the best ways to achieve this goal, in my experience, is through high quality analyses of important public policy issues. Government publications are typically designed to shed *positive* light on government programs. Our products can and should be visibly different. While it is clearly improper for us either to *advocate* or to *criticise* government policies, we can and should try to *illuminate important public issues*: showing, with rigour and impartiality, what can be deduced from available data, including the implications of relationships that are highlighted by the data. Since other government publications **can be seen as lacking** this kind of impartiality, such output will, over time, be seen by leading members of the media and the more informed members of the public as indications of

non-political objectivity. While some of our analysis might risk not finding favour with the government of the day, such work actually does a great service to it: by gaining the trust of the public, it enables the statistical office to fulfil its crucial public function as trusted information provider.

I will make two final comments about the issue of trust. First, the challenge of gaining and keeping public trust is that much more difficult since the development of the types of policy relevant statistics described above requires the statistical office to be very close to key policy departments of the government (or governments in a federal state). But there is no contradiction here: one needs to be close to governments – in the sense of “being plugged in” to understand their statistical needs. This need not (indeed *should* not) mean any compromise about the needed arm’s length relationship when it comes to controlling methodology, questionnaire content, dissemination and even analytic output. In fact, one can argue that it is in the interest of the public that policy issues of current concern to the government should benefit from relevant statistical information – so long, of course, that the information was designed to provide *guidance*, not *justification*; and also so long as the same information is available to everyone who wants to participate in a public discourse about the policies in question.

My concluding comment on this section concerns the trade-off between timeliness and accuracy. Timeliness is, of course, a key component of relevance. However, in an atmosphere of generalised suspicion, the traditional trade-off between relevance and timeliness needs to be rethought to reduce the probability of large revisions: they harm credibility even if it is generally understood that they were made for professional, not for political reasons.

Privacy

In addition to the issue of trust, I consider privacy concerns to be the second overriding strategic challenge for statistical offices. Privacy as a concern has been around at least for 30 years, i.e. ever since the arrival of large electronic files. However, it has received new

impetus during the last fifteen years as technology caught up with the fears that were already noticeable in the early 1970's. Offices of privacy protection have been established in most developed countries. They have different powers in different countries, but usually their most important source of influence is their ability to mobilise public opinion. Their prominence has grown as the increasingly widespread use in daily life of the Internet technology has driven home to people the risk of information about them getting onto the wrong files. And the more the public is concerned about privacy, the easier it is for the statistical office to lose the trust of public if it does not pay due respect to privacy concerns. In this section I will be outlining our privacy challenge: to be "aggressively conservative". I will outline first the conservative, then the aggressive half of this balance.

Privacy is generally defined as the right to be left alone, to be free from interference, from surveillance and from intrusion. Information privacy essentially involves the right to control information about oneself. The heart of information privacy, therefore, is informed consent: i.e. the right to give or deny consent for the use of information about oneself. In this sense all surveys, certainly all that are compulsory, are privacy intrusions. Even voluntary surveys can be seen as intrusive, depending on the sensitiveness of the survey content, the extent to which the voluntary nature of the survey is highlighted, and the persistence with which we follow up reluctant respondents.

While household surveys clearly pose some privacy problems, these are relatively easily handled, at least in the case of voluntary surveys since in such cases the respondent does indeed exercise ultimate control about the provision of information about himself or herself. However, record linkage poses a special challenge. On the one hand, it almost inevitably represents a violation of information privacy since it is rarely possible to obtain informed consent. However on the other hand, as I will discuss in the next section, it is an almost unavoidable prerequisite transforming social statistics from its current, relatively ineffective status of monitoring *inputs* to social programs, into a powerful tool designed to illuminate the *impacts* of such programs.

Record linkage occurs, for example, when we bring together records from a health survey with information from the health records of the individuals concerned. Health records are collected from and about people in hospitals, emergency rooms, doctors' offices, and so on. It is often out of the question to obtain informed consent under such crisis conditions for the use of patient information in subsequent statistical analyses. But even apart from the difficulties of logistics, since one typically cannot foresee the statistical analyses that it might be desirable to carry out subsequently, it would be impossible to inform patients about why future record linkages might be in the public interest. And health is just an extreme example: the same argument applies to most situations where one might wish to link information derived from administrative files.

By law, Statistics Canada has the right of access to all files of all levels of government for statistical purposes. In practice, only a relatively small number of files are useful. These include the customs and tax records, health records, some education records, and records from the police and the justice system. But, of course, these relatively few files contain some of the most sensitive personal information. Yet linkages involving such files can yield crucial insights, for example about increased cancer mortality following exposure to certain risk factors, or about the effectiveness of some intrusive medical interventions.

Given the potential benefits derived from record linkage, the public's right to information privacy has to be balanced against society's need to know. This general principle is accepted even by Privacy Commissioners. The question remains, however, of who should be allowed to carry out the linkages, and under what conditions and with what safeguards.

With respect to the question of *who*, statistical offices have some important advantages: namely their strict legislated confidentiality provisions, and the fact that many of them operate under an act which provides legal access for them to administrative files. To these advantages we have to add a less tangible but even more important asset: public trust – if it exists. These positional advantages are, however, not immutable. For example, should the public become apprehensive about our use of information about them, the law

giving us access to administrative records can easily be changed. So, in a fundamental sense, public trust in the statistical office is the key determinant of our continued ability to provide potentially major insights through records linkage.

This brings me to the second question, i.e. the one about *how* record linkage should be conducted. As I indicated above, it should be done with extreme care, but combined with an aggressive pursuit of selected key objectives.

Let me first talk about the aspect of care. A major public controversy involving an alleged privacy violation by a statistical office is a strategic threat: we can be incapacitated if the public loses faith in our ability to handle their information with sensitivity. As a precautionary measure, Statistics Canada requires all record linkage applications to be approved by its top Executive Committee. In deciding which applications to approve the Committee looks for: a high likelihood that the linkage would result in significant public benefit; a methodology that would yield valid results and no disadvantage affecting the subjects of the linkage, individually or collectively. In addition, for applications thought to be especially sensitive, Statistics Canada seeks out the views of Privacy Commissioner(s) as well as the degree of public support from key client groups or other stakeholders. Furthermore, in order to ensure transparency, all approved record linkage applications and their expected public benefits are listed on our web site.

However, while we are certainly careful, we are aggressive in the pursuit of the ultimate goal of shedding light on the impacts of social programs: what works and what does not. This is our public duty, given the overriding importance of health, education, justice and labour market programs – as well as their cost. I am convinced that nothing provides more effective legitimacy for record linkage applications than a history of significant insights gained from previous linkage activities – combined, of course, with demonstrable care in weighing the balance of privacy intrusion and the resulting public good. In our various record linkage applications we have shed light on issues ranging from

Selected subject matter pressures

Any selection of subject matter issues for special attention is necessarily subjective. I have tried to single out a few areas where I think we are furthest behind, where the challenges are the greatest, and where we can make material progress in the next 5-10 years. I will comment briefly about the generally underdeveloped state of social statistics, on some specific issues of economic statistics arising out what is referred to as “globalisation”, and finally on environmental statistics.

Social statistics

In the period following the Second World War the emphasis of many statistical offices was on developing the system of national account (SNA) and its feeder systems. Social statistics were very much the Cinderellas of statistical systems. There were some valiant attempts in the late sixties and early seventies to create a comprehensive conceptual framework for a system broadly comparable to the SNA, called social accounting matrices. For a variety of reasons, however, these did not succeed in providing useful guidance for empirical developments. Social statistics, with very few notable exceptions, evolved into a limited (I might say pedestrian) role: to monitor social *processes* and expenditures, as opposed to social *outcomes*. So, for example, the focus was on school enrolments and teacher salaries, not on the longer term impacts of various types of education; and on expenditures on health, as opposed to the health impacts of medical interventions, of personal lifestyles, or of the environment.

There are several factors which contribute to the relative state of underdevelopment of social statistics.

Expense

The usefulness of social surveys depends on their explanatory power: the ability to relate social outcomes to underlying causes. The information system that is needed is typically

expensive: there is often a need for longitudinal observation, as well as for the existence of a larger information system in which data from household surveys can be linked to information from administrative records. Securing funding for such systems is clearly a problem.

Missing conceptual frameworks

A major difficulty relates to the virtual absence of appropriate conceptual frameworks to guide empirical work: what are the key factors that interact with the health, education, labour market or other outcomes of interest⁹. Had they existed, such frameworks could have provided invaluable guidance about the key factors that might be associated with different outcomes – and hence about the areas that these surveys ought to probe. In the absence of such guidance the fall-back strategy was to include a wide range of possible factors. This decision made the surveys both more expensive and operationally more complex. However, it also facilitated the initiation of a broad research effort which will hopefully start a virtuous circle: one where the empirical research will point to appropriate conceptual frameworks which, in turn, might provide future guidance for sharpening the focus of the surveys. I will come back to the issue of fostering a research program because this, in itself, represents another challenge.

Paucity of codified international experience

In addition to missing conceptual frameworks, we are also handicapped by the paucity of international experience which could guide national undertakings. And this is a vicious circle: the paucity of country experience makes it difficult to formulate international guidelines; and the lack of guidelines contributes to the difficulty of getting such surveys underway in the first place. Furthermore, not having internationally comparable information significantly diminishes the usefulness of whatever country-level surveys might be undertaken.

⁹*I.P. Fellegi and M. Wolfson: Towards Systems of Social Statistics, Journal of Official Statistics, v. 15, pp. 373-395.*

Some international agencies (notably the OECD and the WHO) began to pay more emphasis to the formulation of recommendations for the measurement of a few specific social variables (e.g. the measurement of literacy and the subjective assessment of health status), but more persistent collaborative effort is needed. International comparability of social statistics is not any less important than that of economic statistics. Indeed, in this age of so-called “globalisation”, social regimes are likely to differ even more among countries than economic ones. The very existence of these differences in social regimes provides an enormous opportunity to explain the differences in social outcomes among different countries.

Organisational arrangements

Speeding up the development of social statistics is further exacerbated by the fact that in many countries responsibility for much of social statistics is located outside the main statistical agency. This is a problem in that, in our experience, it requires substantially complex surveys to try to shed light on the factors associated with different health, education, labour market, or other social outcomes. Such surveys, as I have mentioned above, often require a longitudinal dimension, and their design often has to envisage linkage with other large and complex files (e.g. health insurance files, school and university records, etc.). The conduct of such surveys taxes the design and operational skills of even a large centralised statistical agency, let alone the smaller agencies which might exist in social ministries. Furthermore, health, education, labour market behaviour and other social variables clearly interact, so shedding light on social phenomena does not easily happen in a fragmented statistical system.

Exploiting social surveys

Longitudinal surveys do not lend themselves to the dissemination of findings in the form of relatively simple cross-tabulations. Access to microdata is essential for the complex analytic exploitation needed to identify relationships between outcomes of interest and the factors that appear to be associated with them. But the very richness of the data collected in longitudinal surveys makes it difficult to render the data anonymous, i.e.

suitable for dissemination. But without such dissemination the analysis can only occur inside the statistical office itself that collected the data in the first place.

However, the analysis of longitudinal data sets is at least as complex as their acquisition was in the first place. Statistical offices typically do not have adequate analytic capacity to carry out all the useful and needed analyses, partly because of the large number of issues that can and should be explored in these largely uncharted domains, partly because few scientists inside or outside the office have experience with the complex techniques that are involved. In addition, as in any science, multiple explorations are needed for maximum progress.

It follows that if one is to derive commensurate benefits from the massive investments made in such surveys, a massive mobilisation of the available (and rare) analytic talent is needed. Solving the conundrum of respecting statistical confidentiality while, at the same time, fostering widespread analysis of the data collected is a particularly difficult challenge.

Some Canadian experiences

During the last 10-15 years there has been increased demand for social information, both nationally and internationally: a variety of United Nations and G8 summit meetings centred their attention on different social and socio-economic issues. Budgetary pressures certainly played a powerful motivating role in this development. The Canadian government's determined (and in the end successful) effort to eliminate the endemic budgetary deficits of the 1970s and 1980s had a substantial impact on the evolution of social statistics. Indeed, the urgent need to reduce expenditures led to a new interest in "evidence based decision making". It became centrally important to be able to answer the questions: *which* policies and programs appeared to work, and *why*. The structured effort to rationalise and reduce government expenditures posed these questions much more urgently than they were ever put during the long period of program expansion. Since governments devote by far the largest portion of their expenditures to social and socio-economic programs (health, education, welfare, and labour market programs), the

relatively poorly developed state of social statistics became patently obvious: Statistics Canada was simply unable to help answer the most basic questions about program performance. It became clear to a broad range of decision makers (a process that Statistics Canada actively encouraged) that major investments had to be made not just to expand but to change the very nature of social statistics.

I already mentioned briefly the major expansion, indeed total redefinition, of our health statistics program. Our education statistics program underwent a similar transformation. A number of longitudinal and cross-sectional surveys were started to explore the impact of a large variety of factors on child development, on transitions from high school to the university or the labour market, on factors associated with becoming drop-outs, and so on. Another longitudinal survey was started to explore the factors behind successes and failures in the labour market. And we have just started a new longitudinal survey on immigrants – the factors that account for the fast and successful economic integration of some and the much more lengthy adjustment needed by others. This is an issue of great importance in Canada given that immigration is already the dominant source of our population growth, and that immigrants during the last 15 years appear to have had a much more difficult time to get economically integrated into the fabric of Canada. In all these fields the emphasis is on studying outcomes, as well as the personal, family and external factors associated with them.

The expansion of social statistics brought into sharp focus the issue of analytic exploitation of the new data bases – and how to do so, given that the microdata could not effectively be rendered anonymous. The solution we found was not inexpensive but practical. With financial and substantive collaboration from two agencies devoted to funding scientific work, we opened at nine university campuses extraterritorial enclaves of Statistics Canada where the confidential social data are deposited. These enclaves are subject to all the physical and electronic security of Statistics Canada, and are under the supervision of a full-time Statistics Canada employee. Researchers are admitted as unpaid employees of Statistics Canada under the following conditions: their proposed analysis must pass peer review; they have to submit to Statistics Canada a manuscript for possible

publication; the manuscript must comply with Statistics Canada practice to abstain from both policy criticism and policy advocacy; they must swear the oath of secrecy of Statistics Canada; and all data to be taken out of the enclaves must be verified by our on-site employee as not being confidential. In return, they can access the detailed data, use a modern computing environment, and may publish (after having submitted a manuscript to Statistics Canada) any other article based on their research. The approach might be seen to present some risks should the public perceive that illegitimate access to identifiable (and hence confidential) statistical records was provided to researchers. We thought that the measures we adopted have offset the risks, and at any rate, should the matter become one of public controversy (which it certainly has not), the combination of safeguards and potential public benefits are easy to defend.

These enclaves (we call them Data Research Centres) appear to be remarkably effective. Even though they have only been open for less than a year, more than 200 research proposals have already been accepted on which work is proceeding actively. We fully expect that at least some of the research findings will contribute major insights, perhaps even breakthroughs. In addition to their primary contribution to a better understanding of the workings of social programs, a not unimportant side benefit will be the enhanced reputation of Statistics Canada as an innovative organisation, one that is relevant and which demonstrably disseminates politically unbiased insights. In other words we hope that the Research Data Centres will enhance the trust the public places in our agency.

All of these experiments and experiences are relatively new and it might be early to evaluate them conclusively. Nevertheless, I have little doubt that something along these lines is needed, both nationally and internationally, in order to finally get the Cinderella of social statistics to the ball of Prince Relevance.

The impact on economic statistics of globalisation

There is a degree of tension between *national* statistical systems and *multinational* corporations. In effect, the interaction of modern information technology and national

borders presents both obstacles and opportunities to multinational enterprises. However, the responses to these challenges of enterprises and national governments, more often than not, pose problems for national statistics. The following are a few examples:

- The just-in-time flow of goods is hampered by borders. Governments respond through special measures designed to facilitate these flows which often involve changing traditional customs procedures. These changes, in turn, can introduce potentially serious biases into international trade statistics;
- The flow of certain commercial services via high speed networks can be undetectable, hence potentially missed in estimates of international trade in services;
- Much trade is intra-firm where prices can be determined by non-market considerations, i.e. firms might adjust the prices charged to their subsidiaries in a manner that results in registering profits in those countries whose tax laws are most favourable. The opportunity to minimise taxes might well result in book-keeping changes which, in turn, make it unlikely that the firm would provide to the statistical office a different picture – even if the latter is in line with our statistical standards;
- Even data on shipments can become biased if some production is treated as a contract service to a foreign head office – again, in order to benefit from country-specific tax laws.
- More and more businesses organise themselves along product or service lines, without necessarily any regard to geo-political boundaries. Their record keeping practices can also follow this model, making it difficult to satisfy the requirements of NSOs that approach them with differently expressed and/or timed information demands.

These developments have not yet reached the stage where we could not find adequate compensation for the resulting biases, particularly by exploiting the redundancies inherent within the System of National Accounts. In the longer run we will probably have to invent new methods and adapt our previous approaches in order to keep up with the

evolving practices of large enterprises and this is an area where international experiments can and should be pursued.

We have found that an intensive dialogue between experts involved in establishment surveys and those who compile the national accounts can often pinpoint changing reporting practices of large businesses. Of course, this is much easier done within a centralized statistical system. An idea that we borrowed from the Australian Bureau of Statistics has also been helpful. This involved setting up within Statistics Canada what we call “key provider managers” whose prime function is to keep up to date with the changing structures and practices of the very largest enterprises and to reconcile with them the various reports that they send to us in connection with our different business surveys.

A statistically beneficial impact of globalisation might be the development of harmonised international business accounting practice. However, in order to gain the full benefits of such an evolution, we have to find ways of dealing with the need of reconciling the reports of large multinational enterprises among involved national statistical offices. This can be difficult given the constraints of our respective confidentiality promises. Perhaps we need to change our approach: instead of several NSOs approaching, in a fragmented manner, these enterprises about their national requirements, the enterprises can be asked to reply in an integrated manner and to send the relevant information to each NSO. Each NSO would only receive the information pertaining to its country, but there would likely be a higher level of conceptual coherence with other national reports. In addition, one might request a sharing of this information with the statistical office of the enterprise’s home country. Statistics Canada has recently proposed that an experiment be conducted in this regard¹⁰. It would not necessarily or even primarily aim at an integrated international survey, but could certainly yield interesting insights into, and provide impetus to issues such as: classification convergence, the harmonisation of control and

¹⁰ Richard Barnabé: “Seeing the whole elephant: a proposed experiment on measuring the activities of multinational enterprises”. Paper prepared for the 51st Plenary Session of the Conference of European Statisticians.

ownership rules, and the consistent exploitation of XBRL that is emerging as an international financial information reporting language.

A quite different challenge for economic statistics relates to what is loosely called national competitiveness. As in the case of social statistics, what governments are seeking is statistical information in order to assess *impacts* of policies and programs. For example: what are the economic (indeed social) benefits derived from investments in science and technology; do technology adopting firms decrease their employment; are foreign owned firms more or less productive than domestic ones and do they spend less on research and development; etc. For such studies to be successful, enterprise level data will have to be brought together from different surveys and administrative files. For example, to explore the performance of research intensive firms, we need to link data about R&D investments, their innovations and technology use, their export performance, profitability, employment creation, etc. Such data might come from special surveys about technology use and innovation, linked to other survey data about production, exports etc., and linked to customs data on exports.

A few countries have taken steps in such directions but there is a long way to go and a great many difficulties to overcome. A clear prerequisite for such studies is the existence of a reasonably comprehensive business register, one that actually drives all the business surveys of the statistical office and which has a good facility to link with tax and customs information – something that is still missing in many countries. Another problem arises from the fact that business information, although not subject to privacy concerns in the same way as personal data, is sensitive for confidentiality reasons: it has a potentially high proprietary value and therefore, even if the rich firm-level data bases can be created, access to them by external researchers has to be exceedingly carefully controlled. Indeed, while in the case of social applications the possibility of major public benefit can be an effective counterweight against the privacy concerns, no such counterweight exists to offset the confidentiality concerns of businesses.

Environmental statistics

Environmental statistics (with some notable exceptions) can reasonably be thought of as the second Cinderella of official statistics. In spite of leadership from the Statistics Division of the United Nations, most countries have not invested the resources needed to develop a useful environmental statistics program, i.e. one that effectively informs both public discourse and government policies. There are some reasons for this state of affairs:

- It has not helped that few countries had comprehensive environmental protection policies, and hence the need for statistics in this area did not become a priority for decision makers. For example, as recently as the late 1980's and early 1990's, the Canadian government, in its otherwise very successful efforts to eliminate its budget deficit, practically decimated its capacity for environmental policy analysis.
- It has also not helped that the enthusiasts of environmental protection tried to define sustainable development in such an all-encompassing manner that the very breadth of the definition handicapped serious attempts to develop an operationally useful conceptual framework for environmental statistics. Indeed, if one includes in the concept of sustainable development all social and economic phenomena (as perhaps one should in an ultimate consideration of issues), the breadth and conceptual complexity of any possible framework almost defies imagination.
- Finally, statistical agencies have been disadvantaged in their efforts to build capacity in the environmental domain by their relative weakness in the physical sciences. Because of this weakness, the environmental agencies that sprang forth around the world in the wake of the first UN conference on the environment in 1972 were obliged to build their own data gathering functions. The result is that environmental agencies have developed both considerable experience in data gathering and a considerable following among those who require environmental information, whereas statistical agencies generally have not. Any statistical agency that wishes today to build an environmental statistics program is faced with the reality of being a latecomer to the party. The scientific expertise lies mainly elsewhere and, more importantly, there may be little public recognition of

the role for official statistics in the environmental domain. Overcoming these hurdles is not an insignificant task.

There are some hopeful signs. A genuine need for information that might actually be used in public policy decision making is emerging in the context of the Kyoto accord – and possibly its successors. First, there is a need for a good information system to facilitate the discussion of the detailed plan that has to support all national commitments (if any) regarding Kyoto. The development of such plans is controversial because alternative ways of proceeding have significantly different impacts on different industries and, in federal countries, on sub-national governments. In our experience input-output type matrices were needed in order to estimate the impacts of alternative policies and programs on overall emission reduction, and their impact on different industries and regions. At least in a large country such as Canada whose regions have very different industrial structures, such pre-implementation estimates are crucial for a meaningful public discourse about the costs and impacts of alternative measures. So all relevant estimates had to be broken down by industry and by province.

Once there is a national plan, there is need to monitor its implementation – in at least as much detail as was required to develop the plan. Here again, as in so many other areas, a need has emerged for an “honest information broker”, trusted by all parties. It is hard to see what other organ, besides the NSO, can fulfil this role.

It is noteworthy, however, that in many countries, including Canada, it is the environment agency and not the statistical agency that is responsible for compiling and reporting official estimates of greenhouse gas emissions. As more and more countries ratify the Kyoto accord and put in place national policies to control greenhouse gas emissions – policies that will be promulgated by environment agencies in the main – it is questionable whether these agencies will be able to continue to act as both lawmakers and information providers. Maintaining public trust in the data will likely require that the information role be passed along to or shared with statistical agencies.

Kyoto, however, only deals with greenhouse gas omissions, and so it is only part of the issue of monitoring the sustainability of economic development. It will be no small effort to do this effectively, i.e. in a manner that can be useful in the nurturing of meaningful public policy considerations of alternative scenarios. The associated statistical system will require at least the following major components:

- A set of environmental statistics (or accounts) structured according to a rigorous conceptual framework. Ideally, this framework will facilitate integration of the environmental statistics with those from the social and economic domains. One such framework can be built by expanding the existing System of National Accounts to include “natural capital.” Natural capital comprises those elements of the environment that share the characteristics of economic assets: they provide a benefit to their owners through the flow of a material or a service that can profitably be exploited in some kind of economic activity. However, if a comprehensive assessment of sustainable development is sought, it is necessary to treat environmental assets more broadly than economic assets: assets that are held collectively (such as public forests) must be recognized in addition to those privately held. So too must assets for which there exist no market prices and which, therefore, can be measured in physical terms only.
- Obviously, a conceptual framework for environmental statistics is worthless unless populated with data. The framework described above points to the need for measurement in three areas. First, statistics are required to describe the *stocks* of natural resources, land and ecosystems. These will portray in both physical and monetary terms the natural capital base – or natural wealth – of the nation. Next, statistics describing the ways in which these environmental assets are *used* in human activities are needed. These will detail the extraction of materials and energy from the environment and the disposal of wastes back into it. Finally, statistics are needed to describe what is being done by governments, businesses and individuals to limit the impact they have on the environment; for example, the expenditures they make on pollution abatement technologies.

- Populating the framework with data will require a two-pronged approach. Above all else, a statistical agency will want to exploit all the existing environmental data it can find. Given the potential high cost and significantly increased response burden of a major effort at environmental data collection, making the fullest use possible of existing data is paramount. Most of these data will reside outside of the statistical agency, often at different levels of government. Obtaining access to them will require careful negotiations with data holders. Gaining their confidence may require giving them a say in the establishment of priorities for the programme, perhaps *via* a board of governors.
- Once all available data have been exploited, the remaining gaps must be filled through new collection activities. Some gaps will be amenable to filling through the sample surveys that are the daily fare of statistical agencies. Others will require investments in physical environmental monitoring networks, which are not – and may never be – the realm of statistical agencies. Clearly, in the latter case, excellent relations with the organisations responsible for collecting monitoring data are necessary for the system's development. However, since the agencies that run these networks are often the same ones that set environmental policy, it is important that the statistical agency maintain clear control over the monitoring data collected on its behalf. This means definitely controlling dissemination, including that of the meta-data that articulate any data deficiencies, as well as trying to maintain ultimate control with respect to timeliness, coverage, and comprehensiveness of the data. Anything less could jeopardize the public's trust in the undertaking.

Another source of the demand for comprehensive environmental information will emerge from increasing concerns about the rising cost of the health system and the recognition that environmental factors have a major impact on population health outcomes – and so also on the associated health costs. Exploring the interaction of environmental and health factors will undoubtedly require an extensive program of record linkage of files containing information about persons exposed to specific contaminants and their subsequent health and mortality outcomes. There can be little doubt about the need and

huge potential utility of such information; nor about the sensitivity of the underlying information system. To repeat my theme, the need for a trusted information broker is obvious here as well: trusted not just in terms of non-political professionalism and statistical quality, but also in terms of maintaining the crucial balance between privacy concerns and the public's need to know.

Challenges to the international statistical system

I will single out two challenges to the international statistical system: the particular impact that evidence based decision making might have in the international arena; and the issues surrounding the development of international standards.

Evidence based decision making in the international arena

The political interest in national statistical information has its international counterpart. Implicitly or explicitly, the various United Nations summits, the G8 summits, and meetings of the various working groups of the OECD are demanding comparable statistical information about complex phenomena. They are doing so because they have come to realise that social and economic phenomena don't lend themselves to carefully designed experiments, so the next best thing is to learn from the natural experiments that arise when different countries pursue different policies. But there are even more concrete forces at work. For example, the International Monetary Fund (IMF) has launched a major program in response to the monetary and financial crises of the late 1990s since its political masters came to realise that, if future crises are to be avoided, a significant part of the solution must rest in improved statistics. And the European Union explicitly incorporated into its criteria for acceptance within its most ambitious "club", the European Monetary Union, conditions articulated in terms of some key statistical information.

While many of the leaders involved may not as yet have concluded that such demands involve investments in national, let alone international statistical offices, we might be

optimistic that their demands will lead to commensurate adjustments in resources for statistics. And, indeed, significant investments have already been made in a number of countries, including Canada, the United Kingdom, the United States and others. However, the investments do not follow automatically: NSOs that were successful in this respect invested a sustained effort to highlight the implications for policy development of *not* making some basic statistical investments.

The situation is less favourable with respect to the developing world where resources are clearly not in line with needs, and where even the retention of a small core of experienced staff can be a challenge, given the salary competition of other government departments, not to speak of the private sector. Here again, we can be cautiously optimistic. There is an explicit attempt to establish a kind of “contract” between donor recipient countries: in return for technical assistance, developing countries are undertaking some specific social (and perhaps economic) commitments. This is furthest advanced in Africa under the aegis of the New Economic Program for African Development (NEPAD). The Education for All Program, for example, has very specific goals and both recipient and donor countries are committed to monitoring their achievement. A clear prerequisite for successful monitoring is the capacity of recipient countries to provide the relevant statistical information – and to do so credibly.

It is essential to enlist the United Nations, as well as all donor agencies, to drive home the message to both donor and recipient country governments that in this domain, as in so many others, there is a crucial need for trusted “information brokers” in each national government. There is an equal need for a corresponding United Nations organ to develop the required standards and apply quality assurance measures. Without such effective and trusted information brokers there is little hope for evidence based decision making.

International standards

Developing conceptual frameworks and standards is a traditional function of international statistical organs. A significant innovation in this area of work has been the gradual establishment of the so-called “city groups” during the last 15 years. These groups have

explicitly been formed to supplement capacity shortages at the UN Statistics Division, OECD, and other international organs. They are comprised of volunteer countries who agree to pool their resources to advance conceptual and empirical work in a given field. These groups have made major contributions to environmental statistics, price measurements, problems of measuring certain service industries, etc. But, in spite of these successes, there are challenges. The groups will not be fully useful if they are mainly for a for the exchange of information and if they are not used as “laboratories” where innovative approaches are conceived and even tested. Another key challenge is that the contributors to the development of such standards necessarily come from statistically developed countries. If developing countries do not participate, their needs are unlikely to be reflected in the emerging standards.

It is unrealistic to expect that developed countries will slow down harmonisation of concepts and practices in new areas to which developing countries are unable to contribute, typically because of the lack of experienced resources. Perhaps a realistic strategy would involve two approaches:

- On the one hand, in the case of new and fast evolving domains (e.g. science and technology, Internet commerce, some areas of environmental accounting) we should perhaps scale down our expectations. We might have to content ourselves with gaining international experience among statistically developed countries, in the expectation that as statistical domains mature, truly representative international standards can be developed for them.
- A second strategy would involve an explicit recognition of the fact that most international comparisons occur at the level of only moderate disaggregations. A corresponding simplification of international standards would render our expectations more realistic.

Conclusion

I do not have a particularly good record of forecasting. I may well be incorrect in what I see as the challenges for official statistics that will emerge over the next several years. However, much of what I think are main messages of this paper are based on clear trends whose reversal would be a major social and cultural change. Let me summarise these in conclusion.

1. There is a historic opportunity for official statistics. This is based on a widespread desire, shared by both right- and left-leaning organisations, to make government more effective. Fundamental to effectiveness is evidence-based policy planning and decision making. While not all evidence is statistical, much of it is, or can be.
2. Related to evidence based decision making is the desire for transparency, i.e. the dependence on processes that are based on rules and which are auditable. Transparency also depends on official statistics: whether it is for the monitoring of outcomes to which governments committed themselves, or for the distribution of benefits (or for the sharing of burdens) based on pre-specified quantitative rules for which official statistics provides the parameters.
3. There are two fundamental prerequisites for official statistics to be able to live up to these historic challenges: the trust of the public; and the relevance of its outputs.
4. Of these two prerequisites earning and keeping the trust of the public is by far the more difficult. We clearly cannot earn public trust if we are lacking in the fundamentals: non-political objectivity, high standards of quality, respect for privacy and confidentiality, and transparency of methods. But these attributes are not sufficient. We have to acquire a high enough public profile to be “noticed” – so that our image as distinct from “the government” can be perceived and appreciated. This certainly requires a style of statistical releases which concentrate on what is relevant, i.e. what the new information adds to our understanding of a particular phenomenon, rather than on a recitation of dry numbers. In addition, I believe that the regular release of high profile analyses is

essential for the achievement of the desired profile. These releases clearly have to address phenomena that are perceived to be relevant, but they must also be careful to avoid both policy advocacy and policy criticism.

5. The second fundamental attribute, relevance, also depends on a number of factors. Clearly, there should be a basic product line which is sufficient to meet, on an on-going basis, a significant portion of the statistical information needs of public policy. But we will never have all the information that is needed by society. So must evolve a capacity, both professional and operational, to anticipate or respond to new information needs that arise from new public policy issues. How this is achieved is the subject of other papers¹¹. But it requires an organisational culture of entrepreneurship and flexibility.
6. Analogous opportunities and challenges apply to international statistics. NSOs must be persistent in leveraging their capabilities through bodies such as the City Groups to make significant advances in these domains.

Our task is enormously important and exciting. As statisticians we are privileged to be able to contribute to a profession which plays such a pivotal function in so many walks of life – economic, social, environmental – and which, at the same time challenges not only our professional capacity, but also our managerial ability and, indeed, our moral fibre.

¹¹ Reference to Morris Hansen paper and Jacob's UN manual.