A Proposal for Improving
Business Services Price Indexes

Statistics Canada

March 29, 2004

With the importance of services growing in our economies, the need for better output and price measures for this sector is becoming increasingly pressing. So, if you were looking to allocate limited statistical resources according to priority, my view would be that this particular area merits a higher ranking than in the past. What I'm saying is that, if you are trying to determine whether additional resources should be put in, say, quality adjustments for consumer goods or quality adjustments for services, the choice ought to be services.

Better price and output measures for services would improve our ability to assess overall economic conditions by providing better information on current trends in aggregate output and prices. They would also help us identify other emerging trends or structural changes in the economy. For example, these days, an important issue is to evaluate the productivity gains from the use of information and communication technology (ICT). Knowing the effects of ICT would help us predict future growth in the production capacity of the economy. One way to identify the contribution of ICT to overall productivity is to examine whether productivity gains have been strongest in those sectors that are heavy users of ICT. We know that services is one such sector. But if we do not have the right price deflators for services, we will never get reliable measures of productivity growth and of the ICT effect in that sector. And so, it will be more difficult to judge the contribution of ICT to total productivity and to production capacity.[1]
(Dodge [2003])

For services, however, the databases are less satisfactory. The Census Bureau's Annual Services Surveys only began in the 1980s, and still often contain only a minimal amount of information on individual services industries. In contrast to its good coverage of manufacturing, the PPI price index program had covered only a small fraction of non-goods producing industries by 1990. The information databases for the services and "high-tech" manufacturing industries, which have shown the greatest growth in the past several decades, are insufficient for economic analysis, and are generally inferior to those for the older "smokestack" industries that once accounted for the bulk of U.S. economic activity.

[1] Remarks by David Dodge, to the Conference of European Statisticians, Geneva, Switzerland, 11 June 2003.

These statistical gaps in the services sector inhibit the analysis of the U.S. economy. For example, the large gains in the efficiency with which we produce computers seems evident in the rapid decline in their price. But have there been similar gains in the computer-using industries? Some analysts have argued that the benefits of the computer are underestimated precisely because computer use is concentrated in services industries, such as finance and insurance, where output is not well-defined or measured. (Bosworth and Triplett [2000])

The gaps in data result primarily from the heavy hand that history plays in the shaping and the funding of the government statistical programs. Because we were originally an agricultural nation, it is relatively easy to find out how many plums were grown in South Carolina last year, or to obtain other detailed information about minor crops. Because we have been industrialized for a century, the manufacturing sector is also covered thoroughly. The services sector, however, which accounts for more employment and more gross national product than agriculture and industry combined, receives much less attention. (Victor Fuchs [1985])

Services sector productivity has been neglected, as the quality of the data in many services industries is poor…but services industries account for more than 70 percent of real GDP and employment in Canada and their importance is growing. This means that it is productivity trends in the services sector, not manufacturing, that are the driving force behind aggregate productivity growth and hence real income growth. (Rao, Sharpe and Tang [2004])

Canada, the United States and Mexico are in the process of switching from the old Industrial classification to the North American Classification System (NAICS). Unfortunately, price indexes to deflate the output of these new industries will not be available unless some resources are allocated to the task. Without proper price indexes, it will not be possible to measure the real output of these new NAICS industries with any degree of accuracy. This in turn means that it will not be possible to measure the productivity of many new economy industries with any degree of accuracy. (Diewert [2003])

The main point is that ingenuity cannot fully or effectively compensate for lack of basic information. (Kuznets [1941])

1. Introduction

Services have, throughout the post-war period, become increasingly important to the Canadian economy relative to goods. In 2003, services-producing industries accounted for 75% of employment and 68% of gross domestic product, up from 67% and 60% in 1980 and from 55% and 57% in 1961. Economists from many quarters have been urging Statistics Canada to take steps to upgrade and expand its measurement of price change, real output growth and productivity trends in the services sector. This paper puts forward a concrete proposal aimed in that direction.

A number of factors have been suggested to explain why services have gained so much prominence in the economy over the last 40 years. One theory emphasizes the growing labour force participation of women as a key factor behind the phenomenon, which has led for instance to an increase for the demand for substitute services that were previously supplied by households, such as the services provided by nursery schools (Fuchs [1985]). Another thesis points to the growth of intermediate demand for services by goods-producing industries, as a result of the increased division of labour, in part through outsourcing (Fuchs [1968]). Others such as Gershuny and Miles [1983] are of the opinion there are two elements working together that will lead incontestably to higher growth for the services sector. On the one hand, they point to an "Engel's law" phenomenon whereby richer people tend to consume more services than poorer (the income-elasticity of the demand for services is high); on the other hand, they present the case for the existence of a "productivity gap" between goods-producing industries and services-producing industries whereby firms in the latter group will not, by the very nature of their product and production process, experience substantial productivity gains. Magun [1982] posits, among other factors, a decrease in the relative price of services as the cause for the increasing share of services in the economy.[2] According to Bandt (1985) and Castells (1989), behind the

[2] There is some debate as to this result. For instance, Gagnon, Sabourin and Lavoie [2004] and Kostenbauer and Prud'Homme [1999] find that services prices have been increasing faster than goods prices. However, it should be rather safe to assume that for certain classes of services, what Magun says may indeed be the case – services prices have been declining relative to goods prices.

expansion of the services economy, directly in terms of employment and indirectly in terms of its effects on output, lies the development of the information economy.

1.1 Known issues with deflating services

As services have been expanding in the economy so has the need for more and better statistical information for this sector. Current price estimates of GDP and its components have their purpose, but it is the constant price measures of these indicators that provide the basis for measuring two highly watched economic indicators: period-to-period economic growth and productivity change. In particular, economists in recent years have expressed particular interest on the issue of productivity of labour in the services sector precisely because it is key to economic growth, as the economy becomes more services intensive. Furthermore, labour income in the services sector tends to follow trends in labour productivity, which influences the welfare of a majority of workers (Kendrick [1985]).

Services measurement has always been a difficult statistical challenge, but it it is even more so lately as a result of the prominence of services in today's economy. Moreover, the challenge is growing not only because of the expanding role of services but also as a result of the constant and accelerating flux of new, diverse and often complex services that characterizes a modern economy such as Canada's. The consequences of mismeasurement in this domain are potentially quite serious. As stated by the United Nations Statistical Office [1986], "Can a gross domestic product quantity index (constant price GDP) be considered still reliable if the quantity indices of its major parts or a large constituent part are not reliable?"

Weaknesses in the available statistics on output volumes and prices of services by industry mean that Canadian studies of productivity, innovation and competitiveness must be substantially qualified. Analysts suspect important gains in productivity may be occurring in certain services industries as a result of new and emerging technologies, better management methods (Black and Lynch [2004]), the rising quality of the

labour force (Ho and Jorgenson [1999]) and other factors, but these gains are unfortunately not always reflected with the current methods of measuring services output. Public policies with the goal of stimulating industrial development and encouraging innovation cannot be as solidly based as they should be, and *ex post* assessments of policy effectiveness are difficult to carry out, for lack of supporting statistical information on *real* output of services.

For example, despite rapid progress in information technology and the widespread introduction of computers, official measures in many countries have shown low overall levels of productivity growth from the early 1970s until recently. According to Triplett [1999], the main explanation for this phenomenon is mismeasurement.

The growth and mutation of the services economy is clearly one of the most important economic driving forces that Canada's economic and business statistics must deal with. In recognition of the greater importance of services in the economy, Statistics Canada has taken a number of actions to develop its business surveys and administrative data sources for the specific purpose of improving services sector statistics. As a result of the Project to Improve Provincial Economic Statistics, in particular, a set of very comprehensive statistics on services value added by industry at current prices is now available. However, although much progress has been accomplished in the area of services output at current prices, much remains to be done with regard to measuring the commodity composition of value added and splitting current dollar services statistics into distinct price and volume components.

1.2 International fora

The need to improve the quality and coverage of services sector statistics is not unique to Canada. Recognizing the need for more and better information on the services sector, the Voorburg Group on Services Statistics was formed in the 1980s to facilitate sharing of knowledge by statisticians and economists on this general topic. The group also aimed, and still aims to address conceptual and practical issues pertaining to the production of services statistics, including the measurement of services product outputs and inputs, the

estimation of real product of services activities and other services statistics related topics.[3] The research presented at these meetings has, on the whole, been highly constructive, resulting in very meaningful and concrete recommendations which have been implemented by a number of countries. For example, Canada has adopted a methodology suggested by INSEE (the French national statistical agency) at these meetings for measuring price trends for accounting services.

Another well-known forum on services statistics is the Brookings Institution workshops on services industry productivity and measurement issues. Between 1998 and 2003, Barry Bosworth and Jack Triplett, two prominent economists from the United States, have organized a series of workshops and commissioned papers targeted specifically at measurement problems in the services sector and their effect on productivity.[4] The workshops have brought together academics, researchers, government policy analysts, program managers from major statistical agencies and private sector representatives to assess problems in this area, compare and evaluate current methods, propose new solutions, and report on progress in improving services sector statistics. Many of the latest initiatives in the area of services sector statistics within the US statistical system resulted from exchanges made specifically at the Brookings workshops.

Other examples where major headway is occurring include the development of the Central Product Classification (CPC), the System of National Accounts (SNA 93), the 3rd revision of the International Standard Industrial Classification (ISIC), the North American Industrial Classification System (NAICS), the 5th Balance of Payments Manual of the IMF (BPM5), Eurostat's Handbook on Prices and Volume Measures, and the Manual on Statistics of International Trade in Services. These initiatives have set out basic concepts, definitions, frameworks and international standards for describing services and compiling statistics (see, for example, the OECD Statistics Newsletter [February 2004]).

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[3] More information on the activities of the Voorburg group can be found at: http://unstats.un.org/unsd/methods/citygroup/voorburg.htm

[4] More information on the Brookings workshops on services sector productivity can be found at: http://www.brook.edu/es/research/projects/productivity/productivity.htm

The Voorburg Group, the Brookings workshops and the other international ventures provide very important means towards overcoming the conceptual and methodological difficulties associated with producing services price indexes. International coherence and comparability of price and volume statistics can also benefit from these endeavours.

1.3 Proposal to develop services price indexes

In Canada, very substantial progress has been made, especially over the last 7-8 years, in measuring value added at current prices in the services industries. A 'Services Division' was established at Statistics Canada for this very purpose in 1997. Since then, many new surveys have been launched, existing surveys have been greatly improved and income tax data for corporate and unincorporated businesses have been exploited intensively to maximize statistical quality and coverage. Some progress has been made as well with respect to measuring price and 'real output' (or 'constant price') trends in services industries. However, real output statistics for services industries, which are used widely in discussions about such important economic issues as economic growth cycles, productivity and international competitiveness, remain severely lacking for many industries.

The purpose of this paper is to propose an ambitious program that would aggressively expand the collection of services price data and the production of associated price and output volume indexes by Statistics Canada. This multi-year plan identifies 83 services commodity categories for which new price and volume measures would eventually be developed. Together, they would enable the production of a comprehensive Services Product Price Index (SPPI) covering the business services industries. With this new set of price and volume indexes, productivity and economic growth trends would be better resolved and economic policy makers would have much better indicators to work with.

The proposal confines itself to services commodities produced primarily in the business (private) sector and therefore explicitly excludes health, education and public administration. The reason for this limitation is that government services typically do not

have a market price. Government services volumes therefore cannot, in most instances, be measured by observing a market value and deflating by an index of market prices. So the measurement of output volume for government services is a rather different problem, compared to its private sector counterpart, and is not tackled in this proposal.

The proposal is further limited to business services. Personal services are excluded because they are already quite well measured by the Consumer Price Index (CPI) program. There is room to improve the CPI services indexes, of course, but it was considered wise to limit this proposal to business services to keep the total cost down.

The project will result in a group of price indexes for services that will enable Statistics Canada to produce a 'Services Product Price Index' (SPPI), along the lines of the Industrial Product Price Index (IPPI) program which has existed in one form or another since 1867 and includes price indexes for over 200 commodities.[5] These new services price indexes will provide accurate and timely information on price trends in the business sector of the economy. Table 1 (at the end of this paper) presents a summary of how Canada compares with a group of other countries in the coverage of business services price indexes.[6] Canada does not rank favourably among the countries shown in the table, ending up last in this group with a total coverage of 10 International Standard Industrial Classification (ISIC) business sector services. By contrast, five countries in the group have coverage for 35 or more ISIC categories, with New Zealand having the highest number at 43. The United Kingdom, Japan, Australia and the United States have 37, 38, 39 and 41 respectively. France has coverage for 15 ISIC services categories, 5 more than Canada.

It would seem a very good case can be made for an initiative, like the one proposed here, to expand Canada's services price index program. Many of the conceptual and methodological difficulties that characterized the measurement of services prices in the past have been addressed within the Voorburg Group meetings, the Brookings workshops and in other professional research. These various initiatives have provided many of the tools

[5] This is the number of publicly available component indexes.
[6] Table based on OECD-Eurostat 2003 Inquiry on National Collection of Services Producer Prices.

that are necessary for measuring the prices and outputs of the new service-oriented economy. A comprehensive statistical program of services price indexes would use this existing body of knowledge to good advantage, allowing new indexes to be developed more quickly, with higher quality and at lower cost.

2. Which services?

The services segment of the economy is comprised of three major categories: **Business** services (e.g. courier, advertising and architectural services), **Personal** services (e.g. beauty salons and barber shops, laundry and tailoring services), and **Government** and related services (e.g. defence, public administration and health services).

Government services are mostly financed through taxation and generally (though there are exceptions) do not have well defined market prices. They will not be the focus of this report. Personal services are in most cases well measured by the applicable Consumer Price Indexes (CPI). Data gaps and weaknesses in statistical quality are most apparent for Business services price and volume measures and it is this component that is the focus of this report.

Business services can be divided into five sub-components:

- Wholesale and retail trade;
- Transportation and warehousing;
- Finance, insurance, leasing, real estate, and business management services;
- Scientific, technical and professional services; and
- Information, communication and cultural services.

For a few of these business services, a reliable producer price index has already been developed (e.g. accounting services in the Scientific, technical and professional services category) or is currently being developed, while for others no price indexes are available. Over the past decade services price indexes have been developed in the areas of informatics services, telecommunications, traveller accommodation, accounting services, data processing services and software publishing. Work is currently under way to develop price indexes for non-residential rents, for-hire trucking and couriers. Consumer price indexes are available for urban transit, taxicab transportation, residential rent and cable and subscription programming. In cases where no services price indexes are presently available, for the purposes of the national accounts, real output is typically assumed proportional to the level of employment, the number of hours worked or some other variable believed to be closely related to value added at constant prices. Clearly, when an input variable must be used to estimate the trend in output, the ability to measure productivity change is compromised. As reliable real output and productivity measures are central to strong industrial development policies in firms and in government, it is important that priorities be set to improve Canada's business services price indexes.

The lack of good services price indexes ranks high on the list of data gaps adversely affecting the measurement of real gross output and inputs, real value added and productivity. These measures are widely employed in macro-economic and sectoral analyses impacting monetary and macroeconomic policies, industrial strategies and regional development initiatives. More recently the impact of economic activity on the quality of the environment and depletion of natural resources is being monitored more closely in connection with sustainable development policies and international agreements for industrial production standards. New service industries have been emerging. Here too better measures of real output are needed.

As noted, Canada is not unique in having data gaps for services prices. Other leading nations also recognize the importance of these data and are now at different stages of data development. The United States has a particularly aggressive program for developing services price indexes and new funding recently for quarterly surveys of services-producing

industries in that country will further improve statistical capacity there. The fact that countries are at different stages of development with respect to the measurement of services real output means that international comparisons of growth and productivity may be distorted. This is a matter of considerable concern in Canada, especially vis-à-vis the US.

The statistical methodology for deriving real GDP for services industries also draws upon consumer price indexes in areas such as personal and recreational services, passenger travel, and certain elements of communications services, financial services and insurance. In these areas, data quality is relatively good.

As noted, the services-producing sector accounts for about two-thirds of GDP and an even larger share of employment. About 55% of the services sector represents business services. Personal services account for about 20% and the balance is within the public sector. The nature, structure and complexity of most services-producing industries have changed during the past couple of decades, particularly with the advent of the 'digital revolution'. The new economy has spawned new services industries and dramatically altered the structure of existing industries, changing the ways in which businesses and consumers access and purchase services. Furthermore, developments in computer technology and telecommunications services have changed the ways in which nearly all services providers, from the smallest corner stores to the largest banks, do business. This is a very dynamic part of the modern economy.

3. Statistics Canada's experience

Statistics Canada has produced services price indexes for a long time, although at the beginning they were very limited in scope and in number. For instance, the first Consumer Price Index was first published in 1913. The original CPI basket contained six items of which rent was the only services commodity. This appears to have been the

earliest available services price index in Canada.[7] The Industrial Product Price Index (IPPI) is the second most popular price index series maintained by Statistics Canada. Many of the 200 publicly available price indexes from the IPPI are used for deflating current-price values that are found in the I-O tables. However, the IPPI is strictly a goods price measure. In the late 1980s, recognizing there was indeed a gap in the area of services statistics, Statistics Canada put in place a program to begin developing services price indexes. What follows is a brief chronology of the evolution of services price information since that time.

3.1 The pre-1992 period

During the late 1980s and subsequently until special funding was made available in 1992 under the so-called GAPS-1 initiative[8], services price indexes development was limited to the Consulting Engineering Services Price Index (CESPI). The development work for that index was funded within the Prices Division base budget.

At the start, the CESPI used a 'model' or 'contract' pricing approach, whereby respondents were asked to define a representative bundle of contracts. In order to control for quality, identical contracts were then to be surveyed and re-priced regularly. Soon into the program it was realized there were problems with this approach. Asking the sampled companies to re-price the same contracts proved to be too much of a burden, thus resulting in low response rates. Subsequently a new input-cost-based approach was suggested and implemented, and it is still in use today. According to this method, salaries and wages for those employees directly associated with the output of the firm, such as engineers, are tracked along with the profits or losses of the companies during the reference period. Together, changes in the wage and profit components represent a reasonable proxy for changes in 'price'.

[7] The Wholesale Price Index was one of the first official price index series to be produced in Canada (1867-1975) but did not include any services.

[8] Under the GAPS-1 program, the Government of Canada provided special, ongoing funding to Statistics Canada to pay for several statistical initiatives that were closely related to specific, high-priority areas of policy development.

3.2 The 1992 to 2002 period

A Services Prices Unit was formed within the Industrial Producer Prices Section of the Prices Division. From a staff of only two in 1992, the number of positions allocated to the unit grew to include six individuals by 2001, consisting of three economists and three support staff.

During the ten-year period from 1992 to 2001several price index series were developed, covering the following areas:

1. Informatics professional services;
2. Telecommunications;
3. Traveller accommodation (jointly with the CPI); and
4. Accounting services.

3.3 Year 2003 and beyond

The current annual budget of the Services Prices Unit supports 11 people. The unit is staffed directly by 9 individuals, of which three are economists, five are technical officers and one is a clerk working on a part-time basis. Additional support includes the services of one methodologist and one computer programmer

Further progress was made in 2003. Two new series, Software publishing and Data-processing services, were released in the fall. The unit has made headway in developing services price indexes for (i) Non-residential rents, (ii) For-hire truck transport and (iii) Courier services. These price indexes, which have been produced while taking advantage of lessons learned at meetings of experts—such as those of the Voorburg Group and Statistics Canada's Prices Measurement Advisory Committee—as well as by trial-and-error, will help improve the state-of-affairs with respect to services price index measurement. However, while it is sufficient to update and maintain the indexes developed so far, and to expand and improve the program marginally as time goes by, the available staff numbers are

grossly insufficient if the aim is a full program of services price indicators. It is for that reason that the present proposal is being put forward.

4. American experience

Triplett and Bosworth [2003] provide examples of how improved measurement accounts for some of the growth in the latest productivity measures in the United States. They specifically mention, as a possible reason for the improved performance of some industries in their economy, the US Producer Price Index program that has moved aggressively in the 1990s to begin constructing output prices for services industries. They provide as an example the health care sector, where the average annual pace of multifactor productivity change moved from -1.5 percent prior to 1995 to -0.4 percent after improved measures became available.[9]

The US service price index project aims at producing survey-based price indexes for 145 NAICS-based industries, with all but 10 or fewer of these indexes in place by 2006. Of the 145 indexes, 49 will be in retail and wholesale trade. The scope is broader than what is proposed for Canada in this paper, since it covers personal services and health care, as well as business services. The annual BLS budget for the services price index supports a staff of 29 industry analysts who perform all the research and production activities associated with the initial surveying of new services and their subsequent monthly repricing.

To improve the odds of success, Statistics Canada is trying to learn from the blueprint applied by our American counterparts in their decade-old plan for improving their deflators for the services industries. Much of the output and productivity growth in their services-producing industries can be traced to improvements in their measurement of price indexes. For instance, the now expanded US Producer Price Index (PPI) program covers upwards of 59.2% of services-producing industries, up from just 2.6% in 1990.

When asked, the Bureau of Labor Statistics (BLS) kindly provided the following advice to Statistics Canada, based on lessons they had learned so far while implementing their strategy to improve services price statistics.

1. *Don't treat the services expansion as a research project and don't treat it as normal production.* You need to establish a production schedule allowing for many developmental activities, but still to be accomplished on a fixed work plan that is adhered to. It takes longer to survey a new services industry than to survey a goods industry, but it can be done on a fixed production schedule.
2. *Know your final goal for the expansion before you get going.* What is your finished publication product going to cover? How do your resources conform to your publication goal? Define your final output objectives first—then determine your resource needs to accomplish them.
3. *Find the right people.* The greatest problem is the mindset of the people directly working on the expansion. Services requires a very different mindset than does surveying goods pricing, yet they need to conform to the same theoretical and conceptual model. Finding the right people who really understand this and can do this is a lot harder than you might think.
4. *Early successes are important.* Pick a few fairly straightforward industries to tackle first and design a production process to follow in developing these industries. Perfecting your production process is more important initially than successfully surveying a new industry.
5. *Evaluate your work.* Establish a criterion for evaluating each new industry prior to publication. The criteria should include analyzing any new index in terms of its suitability as a GDP deflator.

BLS reports that it has encountered the greatest challenges in the cases of banking, insurance, computer services and health services. It has experienced several notable successes. A medical services breakthrough for hospital services is a prime example. With

[9] The authors further state their view that the negative growth of -0.4 per cent may be an indication that a certain degree of mismeasurement still exists.

interest (and pressure in some instances) from organisations such as the Council of Economic Advisers and the National Bureau of Economic Research, details of the progress were under close scrutiny. The resulting success in pioneering a price index based on hospital treatments rather than pricing individual services gave the BLS higher credibility among the research and statistical communities. It also taught the project team how to structure surveying activities to fit into the regular PPI production system and how to perform pioneering work in a fairly short period of time.

Another area that has proven challenging to the development of service price indexes for the BLS is the problem of quality adjustment. In their experience to date, the application of explicit or direct quality adjustment methods has been difficult and limited, given the complexity and heterogeneity of particular services. Despite the challenge this poses, the BLS continues to strive towards producing a more robust set of constant-quality price indexes by exploring and implementing a variety of quality adjustment methods. One example where the BLS has been successful is in the case of auto insurance, which has been explicitly quality-adjusted going on several years. Data are purchased from the Insurance Services Office Incorporated (ISO), which provides premium change and risk group change information required for adjustment. Yet another example is the quality treatment for nursing homes. Statistics Canada will continue to follow up on these examples and draw upon the US (and international) experience in this domain.

5. The proposal

Designing services price indexes of high quality, gathering, compiling and analyzing the information necessary to produce them, and publishing indexes on an ongoing basis is in most cases a more expensive and elaborate undertaking than is the comparable exercise for the traditional 'smokestack' industries. In many instances, the prices for services are difficult to measure because the output is often very difficult to define. Services are highly differentiated and the number of specific, identifiable services commodities is so large as to be virtually uncountable. To be practical, our strategy must involve the choice of a

small number of representative services commodity categories, distributed fairly widely over the various industries of the services sector.

We propose a selection of services commodity categories around which a systematic plan to develop price indexes can be developed and implemented. Once work has commenced, the first results from the new program can be available within a year, assuming we put substantial emphasis initially on commodities that are categorized as 'straightforward' (more on this below). To ensure a continuous stream of results over the length of the project, the development phases of the various price indexes will be staggered with indexes for hard-to-measure commodities being developed concurrently with those of the easier-to-measure commodities. Although the maturity dates of both types of indexes will certainly differ, the synergy stemming from working on various industries with conceptually different levels of difficulty will be valuable.

Table 2 at the end of this paper provides summary information about the proposal this paper is putting forward. The table lists the 83 services commodity groups that will comprise the new Services Producer Price Index. Nine of these indexes, representing 13% coverage, are already available. The remainder of this section of the paper explains the origin of the commodity framework, how the individual commodity groups were prioritized, and what the associated costs of development and subsequent update are expected to be.

5.1 Assigning Priorities to Services Industries

The Canadian input-output accounts, at their most extensive level of detail, describe the economy in terms of 300 industries and 725 commodity groups. The majority of the commodity groups are goods, but many are services. If we exclude personal services, health services, education services and other government services we are left with the 83 services commodity groups shown in the table. These commodities can be referred to, somewhat loosely, as the 'business services'. The proposed Services Producer Price Index aims to measure the movement through time of the aggregate of these business services.

The following four criteria were adopted as the basis for ranking the business services categories.

1. Importance of the commodities—the more important the commodity group in terms of its contribution to GDP, the higher the score;
2. The state of the current national accounts volume estimates for that commodity group—the poorer the current estimates, the higher the score;
3. The anticipated degree of difficulty associated with developing an accurate price index based on experience, expert knowledge, review of literature and international experiences—the more difficult the commodity category, the lower the score; and
4. The distribution of commodities over the major industry groups—the aim was to cover the full range of commodities.

In total, there are 83 services commodity groups identified for the purposes of this project. This number is not as overwhelming as it first appears. The list includes a number of commodities for which price indexes already exist or are currently under development. For a certain number of instances, such as the case of financial services, one more-or-less common development and implementation strategy can be applied consistently for several commodities. Similar data sources and methodologies may make it possible to exploit economies of scale to reduce costs and facilitate the delivery of price indexes for some industries. However, it must also be recognized that while there are only 83 commodity categories, within each of these categories there are a great many more specific service commodities. To be representative of a category as a whole, a price index generally must weight up estimates for several different commodities within the category. Viewed from this perspective, the scale of the project is really considerably larger than 83 commodities and it is likely, in fact, to produce more detail than this.

The table also provides information on other aspects regarding the choice of commodity groups that are identified for the purpose of this project. The first column provides information on the weight of each services commodity group among all services commodities that are within the scope of this project. The weight is calculated as the share

of total services value added in 2000, as recorded in the national input-output tables. Two of the commodity groups—wholesaling margins and retailing margins—together account for a quarter of the total weight and these commodities are assigned the top priority (see column 4 of Table 2).

The second column of Table 2 shows the quality score (1 = high quality, 2 = medium quality, 3 = low quality) of the method currently used for estimating the annual change of real production of the commodity in Statistics Canada's estimates of real GDP by industry. The score reflects a subjective evaluation by national accounts analysts who produce these estimates as to their calibre for use as deflators.

The third column contains the complexity score (1 = straightforward, 2 = medium complexity, 3 = high complexity) for developing a price index for that commodity. The scores have been assigned based on experience (STC and international), research and the judgement of price index analysts. The main factor determining the degree of complexity is the perceived difficulty in defining the service. In general, the more complex a service is to define and standardise, the more difficult it will be to collect and reconcile price information. Routine services are relatively easily priced over time. Often the categories and subcategories of such a service are already well defined and standardised by the industry itself as a way of making comparison shopping easier for potential buyers. For example, the courier industry has pricing for standard delivery terms (e.g. package size and weight, same-day or overnight, Vancouver to Montreal) which is repeated fairly consistently over time and across courier companies. This service would be considered straightforward to define and price. In contrast, a specialty or custom-based service such as consulting engineering will vary in its products from contract to contract, making the establishment of a consistent price time series a real challenge for the statistician. In such an industry, the services rendered will vary across projects spanning a multitude of categories—from designing a municipal waste treatment plant to building a large hydro-electric dam in James Bay—resulting in a hybrid mix of outputs. This service would typically be categorised as complex.

The priority score in the fourth column assigns a rank-order priority, based on the factors summarized in the previous columns. For instance, a commodity with a large sector weight, a 'low' quality rating, and a 'low' degree of complexity will generate a high priority score (1=highest priority, 74=lowest priority). By contrast, commodities playing less important role in the services sector, for which reasonably good quality volume indicators already exist, and for which good price indexes are in any case difficult to implement, will score weakly on the priority scale.

As already mentioned, the Distributive trades product group has by far the greatest weight. Truck transportation, telephone and other communications and non-residential rent are the next three highest-ranking commodity groups and again, their large sector weight is the dominant factor—although in the case of trucking the task of developing a price index is considered to be fairly straightforward (complexity score=1). Other services products, although less important in terms of their weight, also score relatively high on the priority scale because their quality or complexity scores are low. Most of the services categories under the Finance, insurance, leasing, real estate and business management heading, and many of those under the Scientific, technical and professional services category get fairly high priority despite their high complexity, because the existing methods for estimating output volume are considered to be weak and, in some cases, because the sector weights are substantial.

5.2 Assessing the Work

In order to assess the effort required to carry out this work, a budget model was developed. In essence, the resources involved in developing a services price index depend on the following factors:

1. The *complexity of the service*: the more complex a services is to define, the more difficult it will be to collect and reconcile the price information. Among the Table 2 commodities, 29 are deemed moderately complex and 21 highly complex, while 24 are judged to be relatively low complexity cases.

2. The *quality dimension*: For some services products, quality varies little over producers and changes slowly if at all over time, while for others quality may vary greatly both across producers and for a given producer over time. When services are heterogeneous and their quality varies through time, they are typically quite difficult and more costly to monitor.

3. The *nature of the industry*: Some industries, particularly but not necessarily some relatively new ones such as in high technology and electronic communications, are very dynamic in terms of entry and exit of firms, and old and new products. Furthermore, the more dispersed or heterogeneous an industry, the larger the sample of firms and products must be. Taking these factors into account implies that selecting and maintaining the price sample for such commodities is a major expense item.

4. *Geographic detail*: If the focus of the indexes is provincial rather than strictly national, a substantially larger sample size is required. A price index that is national in scope, however, does not need as large a sample and will hence be cheaper to produce. The cost estimates in this paper are for a system of national (not provincial and territorial) services price indexes.

In this budget model, the resources for developing and implementing a price index for a given service category can be approximated based on its degree of complexity:

Degree of complexity	One-time development and implementation cost (PYs)	Ongoing annual update and maintenance cost (PYs)
Straightforward	0.9	0.9
Semi-complex	1.4	1.2
Complex	1.9	1.8

The resources are presented in terms of person-years (or PYs), required to develop and implement each of the services indexes on the list. The estimates are calculated from the experience Statistics Canada has had in recent years as it has developed, updated

and maintained the few services price indexes that are currently available. Those products that are qualified as relatively easy to produce—low complexity—are the least costly to develop and implement according to the budgeting model. For instance, a price index for Pipeline transportation of natural gas services (commodity group 11) would be conceptually simple to produce and thus the development and implementation cost is estimated at 0.9 PYs. By contrast, Advertising services (commodity group 61) which, according to many price statisticians and academics, is a product for which the output is challenging to define and measure well, is deemed a Complex service and will therefore require a larger investment of 1.9 PYs . Most of the financial services categories (commodity groups 33 to 56) provide good examples, scoring high with regard to complexity and therefore costing more to produce annually than when compared to services falling under the Transportation and Warehousing category.

5.3 Methodology Options for Producing Service Price Indexes

In addition to rating the complexity for each service, proposed methodologies are presented in column 5 of Table 2. There are two sources for the methodology options listed. The first source is the experience STC has gained in developing and producing a limited but mixed variety of services. The second source is the *OECD-Eurostat 2003 Inquiry on National Collection of Services Producer Prices*, where participating countries provide information on what service price indexes they produce, how they are produced and other background information. The options identified for each service category represent what other countries reported that they currently use (including Canada in several cases) or intend to use.

Several of the more common terms are *transaction price, mark-up price* and *model price*. The t*ransaction price* represents a methodology that captures and uses the price charged by the producer after the deduction of any discounts for an actual transaction. *Mark-up price*, which can also be referred to as input pricing, measures the change in the cost of labour inputs and in profits. When combined, these changes represent the change in price. Finally,

m*odel price* is a methodology measuring the change in price for a specified hypothetical job or transaction.

Based on Canadian and international experience, it would appear that for most of the services identified (85%), a transaction-price approach could be used. The fact that all of the services identified for development have a reference methodology to consider as a starting point lowers the risk that much effort and resources would be expended on having to devise or create one from scratch.

5.3 Comparison to the IPPI program

The resources necessary for updating and maintaining the proposed Services Producer Price Index program are estimated to equal if not greater than those currently supporting the production of the goods prices program, for which the principal outputs are the Industrial Producer Price Index (IPPI) for manufactured goods and the Raw Materials Price Index (RMPI). Together, the IPPI and RMPI programs collect and process about 60,000 price quotes annually, or 5,000 per month on average. In the IPPI, elemental price indexes are calculated for 980 Principal Commodity Group Aggregates (PCGAs) as defined in the 1997 input-output tables, while the RMPI has 80 PCGAs as elemental indexes. The sizeable cost for the SPPI program can be attributed to several factors.

The first is simply scale. The IPPI and RMPI are effectively one large survey, with a single methodology and production system composed of data collection, edit, imputation and estimation systems and publication methods replicated for all of the individual commodities. As a result, there are large economies of scale and these have in fact been exploited over the long life of the program (the IPPI has been in existence in some form for over 40 years). The cost of maintaining the methodology and systems is very low in such a well-established and standardized survey program.

By contrast, the Services Producer Price Index program will be composed of a large number of distinct surveys, each requiring its own unique sample, methodology and

production process. The need for this approach is confirmed by the experience of other countries in Europe and the United States. The resulting support requirements for systems and methodology will be fractured and diverse, and global solutions are not likely to apply, especially in the initial development and early production years. There will certainly be similarities across groups of services and these will be exploited to streamline where possible, but even in maturity the SPPI program will come nowhere close to the level of homogeneity of processes and methodologies as in the case of the IPPI/RMPI.

The difference in scale will be substantial, as evidenced by sample size. The current sample size for the IPPI/RMPI is approximately 3,000 respondents. A preliminary study of the potential SPPI sample size indicates that a total of 37,749 sampling units would be required to sufficiently cover the full range of commodities identified and produce robust price index estimates. This is roughly ten times the size of the IPPI/RMPI sample.[10]

Why is the total SPPI sample size so much larger? The main reason stems from the sheer size of the universe for the SPPI, estimated to contain *1.04 million* sampling units. By comparison, the current sampling universe for the IPPI contains about 37,000 units. Depending on the service industry, the distribution of service producers can be very dispersed, requiring large samples (approximately 300 units per NAICS industry) to accommodate the low degree industry concentration and high firm turnover. In contrast, measuring the price movement of motor vehicles and transportation equipment requires a sample of the several motor vehicle producers only. As a proportion, the SPPI would target sampling 3.6% of its population, while for t the IPPI this figure is 8.1%.

[10] The commodities presented in Table 2 for which a price index would be developed correspond to 125 NAICS industries at the four and five-digit level. The total sample size estimate cited is the sum of the estimated sample size for *each* of the 125 NAICS industries.

Another factor has to do with what is being measured. Generally speaking, the measurement of prices for goods is inherently less challenging than for services. The physicality of goods makes this so—goods are tangible and can be defined by characteristics or specifications and priced accordingly. This is not the case with complex services (e.g. professional services), where uniqueness and customization are prevalent. Collecting price data on complex services is daunting and costly. Even in the case of straightforward services that are standardized or routine in their definition (e.g. many transportation services), challenges in standardizing the wide variety of terms and the conditions associated with transactions add to the cost of collection.

As a result, the staff size for the SPPI program could be as large if not larger than that for the current Producer Price Index program for goods, and it will differ in terms of the staffing mix. Due to the heterogeneity of the services sector, the SPPI will require more analysts and methodology support staff than are presently employed by the IPPI/RMPI program.

However, the final size of the SPPI will be decided through consultation with stakeholders. The costing options vary depending on the coverage desired. As Table 2 shows, concentrating on only the top 30 commodities results in 70.7% coverage at a cost roughly equal to that of the IPPI/RMPI program. Covering the entire portion (100%) of the service groups identified raises the cost considerably to just over three times that of the IPPI/RMPI.

6. Conclusions

The proposal put forward in this paper is a fairly ambitious one. To implement it will require not only substantial funding, but also considerable patience, since the project will take several years to complete. But the time for this project is surely overdue. Other countries have been taking forceful action on this front and so too must Canada. Issues involving the services industries are increasingly dominant on the policy agenda and the country needs an improved information base to deal with them.

Implementation of the full project, involving 74 new services commodity group indexes, would bring a major improvement to the measurement of real GDP and productivity for a portion of the economy—business services—representing 36% of the total GDP. Even the most limited scenario, involving the development of 30 new services commodity group indexes, would directly improve the coverage of 29% of the total economy.

What are the next steps? Discussion, surely, followed by action, hopefully. Is the proposal too ambitious or not ambitious enough? Are the commodity priorities well specified? Is the costing model adequately developed and explained? How should the cost-scope trade-off be resolved? Statistics Canada is circulating this paper to colleagues in other federal departments, to provincial and territorial focal points, and to the members of its Prices, Services and National Accounts Advisory Committees to get feedback on these questions.

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Table 1
Availability of Business Services Price Indexes in Various Countries
By Major ISIC Category

Country	Total number of indexes	Construction	Wholesale and retail trade	Hotels and restaurants	Transport, storage and communications	Financial intermediation	Real estate, renting and business activities
New Zealand	43	0	1	2	13	4	23
United States	41	0	6	1	13	5	16
Australia	39	1	1	1	12	2	22
Japan	38	2	1	0	12	5	18
United Kingdom	37	0	1	2	10	2	22
Mexico	31	0	1	2	10	4	14
Sweden	21	0	0	1	7	2	11
Czech Republic	20	0	0	0	6	3	11
France	15	0	0	0	1	0	14
Canada	10	0	0	1	3	0	6

Table 2
Service Price Indexes Proposed for the New Services Product Price Index

	Service	Service sector weight, 2000	Quality score	Complexity score	Priority rating	Options for Pricing Methodology	Available	In progress	To do
Distributive trades									
1	Wholesaling margins	12.62%	3	2	1	Transaction, model, margin			√
2	Retailing margins	12.48%	2.5	2	2	Transaction, model, margin			√
3	Retailing services	1.23%	2	1	14	Transaction, model, margin			√
4	Rental of office equipment	0.31%	3	2	42	Transaction, model, margin			√
5	Computer lease and rental (hardware)	0.37%	2	2	53	Transaction, model, margin			√
Transportation and warehousing									
6	Truck transportation	3.53%	2	1	3	Transaction		√	
7	Air transport, passenger	1.11%	2	1	8	Transaction			√
8	Courier services	0.62%	3	1	12	Transaction		√	
9	Rail transport, freight	1.20%	2	1	13	Transaction			√
10	Postal services	0.89%	2.5	1	15	Transaction			√
11	Pipeline transportation of natural gas	0.97%	2.5	1	17	Transaction			√
12	Services incidental to water transport	0.28%	3	1	23	Transaction			√
13	School bus and other transportation	0.35%	3	1	27	Transaction			√
14	Crude oil and other pipeline transportation	0.33%	3	1	30	Transaction			√
15	Other services incidental to transport	0.42%	2	1	32	Transaction			√
16	Services incidental to air transport	0.32%	2	1	38	Transaction			√
17	Air transport, freight	0.11%	3	1	39	Transaction			√

	Service	Service sector weight, 2000	Quality score	Complexity score	Priority rating	Options for Pricing Methodology	Available	In progress	To do
18	Water transport, other	0.10%	3	1	47	Transaction			√
19	Other storage and warehousing	0.26%	3	2	50	Transaction			√
20	Water transport, freight	0.16%	3	2	52	Transaction			√
21	Aircraft service and repairs	0.09%	2	1	54	Transaction			√
22	Highway and bridge maintenance	0.11%	3	2	57	Transaction			√
23	Grain storage	0.12%	3	2	58	Transaction			√
24	Air transport, specialty	0.04%	3	1	59	Transaction			√
25	Rail transport, passenger	0.05%	2	1	65	Transaction			√
26	Bus transport, interurban and rural, passenger	0.05%	2	1	67	Transaction			√
27	Services incidental to rail transport	0.04%	2	1	68	Transaction			√
28	Water transport, passenger	0.04%	2	1	70	Transaction			√
29	Bus transport, interurban and rural, parcel express	0.01%	2	1	72	Transaction			√
30	Scenic and sightseeing transportation, bus	0.00%	3	1	73	Transaction			√
31	Urban transit	0.70%	NA	NA	NA	NA	√		
32	Taxicab transportation	0.18%	NA	NA	NA	NA	√		
Finance, insurance, leasing, real estate, and business mgmt.									
33	Non-residential rent	5.16%	2	2	5	Transaction		√	
34	Rental, other machinery and equipment including construction	1.27%	3	2	9	Transaction			√
35	Rental of automobiles and trucks	0.91%	2	1	16	Transaction			√
36	Paid charges, banks and other deposit accepting intermediaries	1.54%	2.5	2	19	Transaction, model			√
37	Real estate commissions and management fees	1.66%	2	2	20	Commissions and fees			√
38	Non-life insurance	2.40%	3	3	21	Premiums and rates of return, transaction			√

	Service	Service sector weight, 2000	Quality score	Complexity score	Priority rating	Options for Pricing Methodology	Available	In progress	To do
39	Other securities, funds, and related services	1.13%	3	3	22	Premiums and rates of return, transaction			√
40	Management fees of companies and enterprises	1.71%	3	3	25	Fees			√
41	Commissions, investment banking and securities dealing, and brokers	1.45%	3	3	26	Transaction, commission, bid-ask spread			√
42	Mutual funds	0.99%	3	3	29	Commissions and fees			√
43	Rental, video and recreation equipment	0.41%	2.2	1	31	Transaction			√
44	Implicit chgs, deposits, banking and other depos. credit intermed. services	2.08%	2.5	3	33	Transaction, model			√
45	Implicit chgs, loans, banking and other depos. credit intermediary services	2.04%	2.5	3	34	Transaction, model			√
46	Life insurance	1.21%	3	3	37	Premiums and rates of return			√
47	Insurance commissions	1.14%	2.5	3	41	Commissions and fees			√
48	Implicit charge, non-depository credit intermediation	0.42%	3	3	43	Transaction, model			√
49	Royalties and license fees (excluding natural resource royalties)	0.50%	3	3	46	Transaction, fees			√
50	Other non-depository credit intermediary services	0.54%	3	3	51	Transaction, model			√
51	Paid charges, credit unions and Caisses populaires	0.18%	3	2	55	Transaction, model			√
52	Implicit charges, deposits, local credit unions	0.24%	2.5	3	64	Transaction, model			√
53	Implicit charges, loans, local credit unions	0.18%	2.5	3	66	Transaction, model			√
54	Trustee pension funds	0.11%	2	3	69	Transaction			√
55	Central bank	0.04%	3	2	71	Transaction			√
56	Gross paid residential rent	5.24%	NA	NA	NA		√		
Scientific, technical and professional services									
57	Other professional, scientific and technical services	2.28%	3	2	6	Transaction, mark-up, model			√
58	Other administrative and support services	4.35%	3	3	7	Transaction, mark-up, model			√

	Service	Service sector weight, 2000	Quality score	Complexity score	Priority rating	Options for Pricing Methodology	Available	In progress	To do
59	Services to buildings and dwellings	0.94%	3	2	18	Transaction, mark-up, model			√
60	Architectural and scientific services	1.53%	2	3	35	Transaction, mark-up, model			√
61	Advertising services	1.17%	3	3	24	Transaction, mark-up, model			√
62	Legal services	1.50%	3	2	11	Transaction, mark-up, model			√
63	Investigation and security services	0.54%	3	2	36	Transaction, mark-up, model			√
64	Photographic services	0.24%	3	2	45	Transaction, mark-up, model			√
65	Travel agents, tour wholesaler and operator services	0.47%	2	2	48	Transaction, mark-up, model			√
66	Veterinary fees	0.18%	2	2	60	Transaction, mark-up, model			√
67	Accounting services	1.50%	NA	NA	NA	Transaction	√		
68	Computer systems design and related services	1.79%	NA	NA	NA	Mark-up	√		
69	Engineering services	1.53%	NA	NA	NA	Mark-up	√		
70	Software products development	1.20%	NA	NA	NA	Mark-up	√		
71	Data processing services	0.39%	NA	NA	NA	Mark-up	√		
Information, communication and cultural services									
72	Telephone and other telecommunications*	4.54%	3	2	4	Transaction, unit price		√	
73	Advertising in print media	0.80%	2	2	28	Transaction, model			√
74	On-line information services	0.18%	3	2	44	Transaction			√
75	Motion picture, audio, and video prod. and distribution	0.46%	3	3	49	Transaction			√
76	Radio and television broadcasting, except cable	0.47%	2.5	3	56	Transaction, average TV/radio advertising spot rate			√
77	Other information services (including news syndicates, microfilm, etcetera)	0.04%	3	3	63	Transaction			√
78	Cable and other subscription programming	0.56%	NA	NA	NA	NA	√		

	Service	Service sector weight, 2000	Quality score	Complexity score	Priority rating	Options for Pricing Methodology	Available	In progress	To do
Other									
79	Services incidental to mining	1.29%	3	2	10	Transaction, model			√
80	Services incidental to forestry	0.16%	3	2	40	Transaction, model			√
81	Services incidental to animal production	0.04%	2	2	61	Transaction, model			√
82	Services incidental to crop production	0.06%	2	2	62	Transaction, model			√
83	Specialized publishing service	0.08%	2	2	74	Transaction, model			√
	Total (top 30 services commodity groups)	70.7%							
	Total (top 70 services commodity groups)	86.7%							
	Total (All services commodity groups "to do" or " in progress")	86.8%							
	Available	13.2%							
	Total (All services commodity groups)	100.0%							

NA: Not applicable as these indexes are already in production.

***** Currently, there is only one price index representing this commodity category, the *Telecommunication Services Price Index* (or TSPI). The TSPI is a quarterly price index measuring the change over time in prices for wired long distance telephone services provided by telecommunications carriers to Canadian-based business clients. However, this important commodity class has several additional communication services not appropriately represented by the TSPI (e.g., wired and wireless local telephone services, and Internet access services). Additional index series need to be developed in order to have a more accurate and representative price index for the commodity category.